known as the "Statute of Monopolies" was passed, declaring all monopolies contary to law, and void, except as to patents, not exceeding the grant of 14 years, to authors of new inventions, and some others not material to be noticed here. This was the earliest recognition of the right of an inventor to a monopoly of the manufacture, sale, and use of his invention. It still remained, however, a royal prerogative, which was granted or refused at the pleasure of the crown. This statute was followed by others, securing to the inventor a monopoly, as a matter of right, and providing the proper machinery for procuring and enforcing it. In this country patents have been recognized as existing only by virtue of positive law. The constitution of the United States conferred upon congress the power "to promote the progress of science and useful art by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries." The adoption of the constitution was followed the next year by the first federal statute upon the subject, which became the foundation of the patent law of this country. That the right of an inventor to a monopoly is purely a feature of the statute was recognized by the supreme court in Brown v. Duchesne, 19 How. 183, 195, in which Mr. Chief Justice Taney observed:

"But the right of property which the patentee has in his invention, and his right to its exclusive use, is derived altogether from these statutory provisions; and this court have always held that an inventor has no right of property in his invention, upon which he can maintain a suit, unless he obtains a patent for it, according to the acts of congress; and that his rights are to be regulated and measured by these laws, and cannot go beyond them."

Still stronger language is used by him in Gayler v. Wilder, 10 How. 477, 493, in which he says:

"The inventor of a new and useful improvement certainly has no exclusive right to it, until he obtains a patent. This right is created by the patent, and no suit can be maintained by the inventor against any one for using it before the patent is issued. But the discoverer of a new and useful improvement is vested by law with an inchoate right to its exclusive use, which he may perfect and make absolute by proceeding in the manner the law requires. * * * The monopoly did not exist at common law, and the rights, therefore, which may be exercised under it, cannot be regulated by the rules of the common law. It is created by the act of congress; and no rights can be acquired in it unless authorized by statute, and in the manner the statute prescribes."

And in the recent unreported case of Marsh v. Nichols, (9 Sup. Ct. Rep. 168, 15 Fed. Rep. 914,) appealed from this court, in which the point decided was that a patent not signed by the secretary of the interior is absolutely void, it is said:

"The invention is the product of the inventor's brain, and, if made known, would be made subject to the use of any one, if that use were not secured to him. Such security is afforded by the act of congress, when his priority of invention is established by the officers of the patent-office, and the patent is issued. The patent is the evidence of his exclusive right to his use of the invention. It therefore may be said to create a property interest in that invention. Until the patent is issued, there is no property right in it; that is, no such right as the inventor can enforce. Until then there is no power over its use, which is one of the elements of a right of property in anything capable of ownership."

A similar observation was made by Judge Shepley in Machine Co. v. Tool Co., 4 Fish. Pat. Cas. 284, 294. "An inventor," says he, "has no right to his invention at common law. He has no right of property in it originally. The right which he derives is the creature of statute and of grant." See, also, Sargent v. Seagrave, 2 Curt. 553, 555.

The power of a court to deal with patents is now regulated by the fifty-fifth section of the patent act of 1870, incorporated into Rev. St. § 4921, which declares that "the several courts vested with jurisdiction of cases arising under the patent laws shall have power to grant injunctions, according to the course and principles of the courts of equity, to prevent violation of any rights *secured by patent,* on such terms as the court may deem reasonable." It is impossible to deduce from this language any recognition of a power to grant such injunction before the right has been "secured by patent." Indeed, if it does not absolutely inhibit that power, it points very strongly in that direction. While no court has decided that it would not grant an injunction after application for but prior to the issue of a patent, it has been frequently held that after a patent has been surrendered no action will lie upon it, and all actions founded upon it abate, notwithstanding an application for a reissue for the same be pending. *Moffitt* v. *Garr,* 1 Black, 273; *Peck* v. *Collins,* 103 U. S. 664. This particular defect has since been remedied by the act of 1870, declaring that the surrender shall take effect upon the issue of the amended patent, but the principle of these decisions is not affected. Now, if a bill will not lie upon a patent surrendered, though an application for a reissue be pending, it is impossible to see upon what ground it can be sustained before any patent whatever has been issued.

There are also certain practical difficulties in the way of assuming jurisdiction of a bill like the one under consideration. Courts of justice have no original cognizance of the subject of inventions. Congress has provided a commissioner of patents, has furnished him with a library of such scientific works and periodicals, both foreign and American, as may aid him in the discharge of his duties, with

copies of models of all patents heretofore granted, together with a large corps of intelligent and experienced assistants, whose duty it is to examine every application; to compare it with patents previously issued, (that two may not be issued for the same invention;) to correct the specifications and claims; to give notice to the patentee of interferences; and to determine questions of priority between rival inventors of the same device. It is a matter of common knowledge that the commissioner is in the habit of limiting, altering, and expunging claims, and that it is impossible to say, after the specifications and claims have been filed, in what shape, and with what limitations, they will emerge from the patent office. It is absolutely impossible for courts of justice to deal with questions of this description. We are asked in this case to assume that a patent will be issued covering five different claims, yet we have no assurance whatever that, if a patent be issued, any one of these claims will be allowed in the language in which it is couched. Besides, the effect of assuming cognizance of a patent before the patent is granted would be to extend the life of the patent beyond the statutory period of 17 years, by the time, which may be months, and even years, during which the application is pending in the patent office.

The jurisdiction of courts to determine the validity of patents is purely appellate. It is conferred upon the theory that, application for patents being made *ex parte,* in the pressure of business, patents may be granted by inadvertence or mistake, or rival claimants may not have an opportunity of being heard; and because there is no other method provided by law of determining whether persons using similar devices are or are not infringers upon the rights of the patentee. It is obvious that when parties are represented by experienced counsel, and witnesses are examined with that care and deliberation which is only attainable in judicial proceedings, a correct result is much more likely to be reached than upon the hurried examination of an examiner in the patent office. These considerations, however, do not by any means justify us in anticipating his decision, or intermeddling in any way with his action before it has been consummated by the issuance or refusal of the patent.

A decree will therefore be entered denying the injunction, and dismissing the bill for want of jurisdiction.

32. McCLURG v. KINGSLAND, 1 How. (U. S.) 202, 11 L. ed. 102 (1843).

BALDWIN, J. * * * Whether these exceptions are well taken or not must depend on the law as it stood at the emanation of the patent, together with such changes as have been since made; for though they may be retrospective in their operation, that is not a sound objection to their validity; the power of congress to legislate upon the subject of patents is plenary by the terms of the constitution, and as there are no restraints on its exercise, there can be no

limitation of their right to modify them at their pleasure, so that they do not take away the rights of property in existing patents. * * * (See No. —.)

[NOTE.—This is sometimes suggested as a judicial dictum that congress is not restrained by the term "exclusive" in the constitution, but it should be observed that the court was here dealing with acts of congress providing rules for the trial of actions for the violation of patented rights, which were held applicable to patents granted before or after the passage of the act.]

33. SEYMOUR v. OSBORNE, 11 Wal. (U. S.) 516, 20 L. ed. 33 (1870).

* * *

* * * Inventions secured by letters patent are property in the holder of the patent, and as such are as much entitled to protection as any other property, consisting of a franchise, during the term for which the franchise or the exclusive right is granted.

Letters patent are not to be regarded as monopolies, created by the executive authority at the expense and to the prejudice of all the community except the persons therein named as patentees, but as public franchises granted to the inventors of new and useful improvements for the purpose of securing to them, as such inventors, for the limited term therein mentioned, the exclusive right and liberty to make and use and vend to others to be used their own inventions as tending to promote the progress of science and the useful arts, and as matter of compensation to the inventors for their labor, toil and expense in making the inventions, and reducing the same to practice for the public benefit, as contemplated by the constitution and sanctioned by the laws of congress. * * *

34. BLOOMER v. McQUEWAN, 14 How. 539, 549, 14 L. ed. 539, 548 (1852).

* * * The franchise which the patent grants consists altogether in the right to exclude every one from making, using or vending the thing patented, without the permission of the patentee. * * *

35. BEMENT v. NATIONAL HARROW COMPANY, 186 U. S. 70; 46 L. ed. 1058 (1901).

* * * It was, therefore, the owner of a monopoly recognized by the constitution and by the statutes of congress. An owner of a patent has the right to sell it or keep it; to manufacture the article himself or to license others to manufacture it; to sell such articles himself or to authorize others to sell it. As stated by Mr. Justice Nelson, in *Wilson v. Rousseau,* (4 How. 646, 674), in speaking of a patent:

"The law has thus impressed upon it all the qualities and characteristics of property for the specified period; and has enabled him to hold and deal with it the same as in the case of any other descrip-

tion of property belonging to him, and on his death it passes, with his personal estate, to his legal representative, and becomes part of the assets." (1846.) * * *

36. GRANT v. RAYMOND, 6 Pet. 218, 241, 8 L. ed. 736 (1832).

* * * And it cannot be doubted that the settled purpose of the United States has ever been, and continues to be, to confer on the authors of useful inventions an exclusive right to their inventions for the time mentioned in their patents. It is the reward stipulated for the advantage derived by the public for the exertions of the individual, and is intended as a stimulus to those exertions. The laws which are passed to give effect to this purpose ought, we think, to be construed in the spirit in which they have been made; and to execute the contract fairly on the part of the United States, where the full benefit has been actually received; if this can be done without transcending the intention of the statute, or countenancing acts which are fraudulent or may prove mischievous. The public yields nothing which it has not agreed to yield; it receives all which it has contracted to receive. The full benefit of the discovery, after its enjoyment by the discoverer for fourteen years, is preserved; and for his exclusive enjoyment of it during that time the public faith is pledged.* * *

37. UNITED STATES v. AMERICAN BELL TELEPHONE CO., 167 U. S. 224, 42 L. ed. 144 (1896).

* * * The only effect of it was to restrain others from manufacturing and using that which he invented. After his invention he could have kept the discovery secret to himself. He need not have disclosed it to any one. But in order to induce him to make that invention public, to give all a share in the benefits resulting from such an invention, congress, by its legislation made in pursuance of the constitution, has guaranteed to him an exclusive right to it for a limited time; and the purpose of the patent is to protect him in this monopoly, not to give him a use which, save for the patent, he did not have before, but only to separate to him an exclusive use. The government parted with nothing by the patent. It lost no property. Its possessions were not diminished. The patentee, so far as a personal use is concerned, received nothing which he did not have without the patent, and the monopoly which he did receive was only for a few years. * * *

38. CONTINENTAL PAPER BAG COMPANY v. EASTERN-PAPER BAG COMPANY, 210 U. S. 405, 52 L. ed. 1122 (1907).

(Mr. Justice McKenna quoting the above case): * * *

"Counsel seem to argue that one who has made an invention and thereupon applies for a patent therefor occupies, as it were,

the position of a quasi-trustee for the public; that he is under a sort of moral obligation to see that the public acquires the right to the free use of that invention as soon as is conveniently possible. We dissent entirely from the thought thus urged. The inventor is one who has discovered something of value. It is his absolute property. He may withhold a knowledge of it from the public, and he may insist upon all the advantages and benefits which the statute promises to him who discloses to the public his invention." * * *

(Mr. Justice McKenna then continued):

"And the same relative rights of the patentee and the public were expressed in prior cases, and we cite them because there is something more than the repetition of the same thought by doing so. It shows that whenever this court has had occasion to speak it has decided that an inventor receives from a patent the right to exclude others from its use for the time prescribed in the statute. And for his exclusive enjoyment of it during that time the public faith is forever pledged." (Chief Justice Marshall in *Grant v. Raymond*, 6 Pet. 243, p. 242.) * * *

[And see *McKay-Copeland, etc., Co. v. Copeland, etc., Co.*, 77 Fed. 306.]

39. RUBBER TIRE WHEEL CO. v. MILWAUKEE, ETC. CO., 154 Fed. 358, 83 C. C. A. 336 (1907).

* * * "Under its constitutional right to legislate for the promotion of the useful arts, congress passed the patent statutes. The public policy thereby declared is this: Inventive minds may fail to produce many useful things that they would produce if stimulated by the promise of a substantial reward; what is produced is the property of the inventor; he and his heirs and assigns may hold it as a secret till the end of time; the public would be largely benefited by obtaining conveyances of these new properties; so the people through their representatives say to the inventor: Deed us your property, possession to be yielded at the end of 17 years, and in the meantime we will protect you absolutely in the right to exclude every one from making, using or vending the thing patented, without your permission." * * *

40. JEWETT v. ATWOOD SUSPENDER CO., 100 Fed. 647.

WHEELER, J. A patent does not confer even the right to use the invention. The inventor had that right before. It is merely an incorporeal right to exclude others from using the invention throughout the United States conferred by the government upon compliance with certain requirements, and is transferable only according to the laws of its creation, which the state statutes cannot affect. Hall, Pat. Est. § 11; Walk. Pat. 274. This is a personal

right. Section 4898, Rev. St. U. S. Patents can be reached under the bankrupt law, because they are wholly subject to the laws of the United States. They cannot be reached otherwise for debts except by proceedings which compel a personal assignment. Ager v. Murray, 105 U. S. 126, 26 L. Ed. 942; Newton v. Buck, 23 C. C. A. 355, 77 Fed. 614. (See Ball v. Coker, 168 Fed. 304.)

41. NATIONAL HOLLOW B. B. CO. v. INTERCHANGEABLE B. B. CO., 106 Fed. 693, 45 C. C. A. 544 (Eighth Circuit, 1901).

A patent is a contract by which the government secures to the patentee the exclusive right to vend and use his invention for a few years, in consideration of the fact that he has perfected and described it and has granted its use to the public forever after.

42. FRIED, KRUPP, ETC. v. MIDVALE STEEL CO,, 191 Fed. 588.

An American patent is a written contract between an inventor and the government. This contract consists of mutual, interrelated considerations moving from each party to the other for such contract. The consideration given on the part of the inventor to the government is the disclosure of his invention in such plain and full terms that any one skilled in the art to which it appertains may practice it. The consideration on the part of the government given to the patentee for such disclosure is a monopoly for 17 years of the invention disclosed to the extent of the claims allowed in the patent.

43. UNITED STATES v. STANDARD SANITARY MFG. CO.,191 Fed. 172.

Before GOFF and PRITCHARD, C. J., and ROSE, D. J.

ROSE, D. J. * * * A patentee is as much subject to the laws of the land as is any other man. From one special application of one class of laws he is exempt. At common law and by statute monopolies are unlawful. At common law and by statute a man who invented a new and useful thing might be given a right which would enable him for a limited time effectually to monopolize it. The courts have said that this right to monopolize what he invented cannot be taken away from a patentee by state laws. They say it has not been taken away by congress. All men know that congress never intended when it passed the Sherman act to change the patent law. It did not do so.

The patentee may, in spite of that law, monopolize for the term of his patent the thing which he or his assignor invented. Neither at common law nor in this country by statute has he ever had a right to monopolize anything else. As to everything not validly claimed in his patent he is as other men. If by the common law or the statutes of the state or by the enactments of congress men are

forbidden to restrain trade or to monopolize it, a patentee may not restrain trade or attempt to monopolize it in anything except that which is covered by his patent.

A patent is a grant of a right to exclude all others from making, using, or selling the invention covered by it. It does not give a right to the patentee to sell indulgences to violate the law of the land, be it the Sherman act or another. The right to exclude others is the property of the patentee. It is his very own. He may do with it as he will. * * *

A patentee who monopolizes his invention breaks no law. He who uses his property right to exclude others from the making, selling, or using his invention, for the purpose and with the effect of making a combination to restrain trade in something from which his patent gives him no right to exclude others, does break the law. He breaks it precisely as the individual defendants in the Standard Oil and American Tobacco Companies broke it. They had the same right to use their brains, their capital, and their credit as they thought best, as he had to use his right to exclude all others from making, using, or selling automatic dredges. He was subject to the same limitations as they were. They could not lawfully use their brains, their money, and their credit to restrain trade in petroleum and tobacco. He cannot use his patent rights to restrain trade in unpatented bath tubs. * * *

[For an elaborate discussion of the right of a patentee to exclude others from making, using or selling the invention for the full term of his patent solely by reason of the bargain made with the government in consideration of the disclosure and without reference to whether or not the invention has been used, see Continental Paper Bag Co. v. Eastern Paper Bag Co., *supra,* and especially the collection of cases therein at page 1131, 52 L. ed. and pages 425, 426, 210 U. S., and also the cases, *contra,* page 1132, 52 L. ed. and pages 427, 428, 210 U. S.]

45.

[For definitions by the state courts of patents as exclusive rights or monopolies, see, for example, Gilbert v. Knobbe, 70 N. Y. 361, 370; King v. Platt, 37 N. Y. 155; Crown Cork, etc., v. State, 87 Md. 687, 689, 40 Atl. 1074; Com. v. Central Dest., etc., Co., 145 Pa. St. 121, 127, 22 Atl. 841; Vose v. Singer, 4 Allen (Mass.) 226, 230.

That the consideration for the grant of a patent is a disclosure of an invention: International, etc., Co. v. Hauks, etc., Co., 111 Fed. 916; Carr v. Rice, 5 Fed. Cas. No. 2,440; 1 Fish Pat. Cas. 198; Goodyear v. N. J. Central R. R., etc., Co., 10 Fed. Cas. No. 5,563, 1 Fish Pat. Cas. 626.

That while the patent is a monopoly it is not a monopoly of

something that previously existed and belonged to others or the public, but is a monopoly of something created by the patentee, and therefore should have a liberal construction. See Davoll v. Brown, 7 Fed. Cas. No. 3,662; Goodyear v. Central, etc., R. R. Co., 10 Fed. Cas. No. 5,563; Singer v. Wamsley, 22 Fed. Cas. No. 12,900; Blanchard v. Sprague, 3 Fed. Cas. No. 1,518; Parker v. Stiles, 18 Fed. Cas. No. 10,749; Wickersham v. Singer, 29 Fed. No. 17,610; De la Vergne Co. v. Featherstone, 147 U. S. 209, 37 L. ed. 138; Lein v. Myers, 97 Fed. 607; McBride v. Kingman, 72 Fed. 908; Fitch v. Bragg, 8 Fed. 588; Holloway v. Whiteley, 4 Wall. 522, 18 L. ed. 335. See also herein divisions ix, xiii, and xiv.]

PART II.

PATENTABILITY—WHAT IS PATENTABLE.

Statutory Classes of Invention and Principles—

Art—Process and Method—Function of Machine—Force of Nature—Scientific Principles and Ideas—Property of Matter—Result or Function—Product—Process and Product—Machine—Article of Manufacture—Composition of Matter.

Statutory Requisites—

Invention—Novelty—Utility—Want of Invention and Tests of Invention—Discovery—Accident—Research—Definitions—Examples—Mechanical Skill—Common Knowledge—Common Experience—Mere Carrying Forward—Portability—Strengthening—Adjustability—Change in Form, Size, Proportion, Degree—Change or Substitution of Material—Adding and Omitting Parts or Elements—Change of Location—Reversal or Transposition of Parts—Duplication or Multiplication of Parts- Adaptation—Inoperativeness—Immoral Object—Simplicity—Demand—Extensive Use—Commercial Success—Turning Failure into Success—Increased Efficiency—Old Elements and Old Result—Old Elements and New Result—New Elements and Old Result—Use or Advantage—Uncontemplated Use or Function—Beneficial Use and Scope.

Unclassified Inventions.

Systems and Arrangements.

Broad and Narrow Inventions.

Improvements.

Statutory Bars—

Want of Patentable Novelty—Anticipation—State of Art—Prior Use—Identity—Single Use—Judicial Notice—(see also Part XVI)—Abandoned Experiments—Secret Use—(see also Part I)—Foreign Use, etc.

Prior Patents and Publications.

Public Use.

Abandonment—Dedication to the Public.

Utility.

Foreign Applications and Patents.

[See Part IX for Double Patenting and Divisional Patenting, Equivalents, and many illustrations of the principles of invention and patentability, and distinctions between patents as to breadth, scope, function, etc.]

STATUTES AND RULES OF PRACTICE.

46. WHAT INVENTIONS ARE PATENTABLE.

Sec. 4886. Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvements thereof, not known or used by others in this country, before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country, before his invention or discovery thereof, or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application, unless the same is proved to have been abandoned, may, upon payment of the fees required by law, and other due proceeding had, obtain a patent therefor.

* * *

"Proviso—Patents Granted to Officers, etc., of the United States; R. S., 4886; Exceptions."

The Secretary of the Interior and the Commissioner of Patents are authorized to grant any officer of the Government, except officers and employes of the Patent Office, a patent for any invention of the classes mentioned in section forty-eight hundred and eighty-six of the Revised Statutes when such invention is used or to be used in the public service, without the payment of any fee: *Provided,* That the applicant in his application shall state that the invention described therein, if patented, may be used by the Government, or any of its officers or employes in prosecution of work for the Government, or by any other person in the United States, without the payment to him of any royalty thereon, which stipulation shall be included in the patent.

47. PATENTS FOR INVENTIONS PREVIOUSLY PATENTED ABROAD.

As amended by act approved March 3, 1897, and act approved March 3, 1903.

Sec. 4887. No person otherwise entitled thereto shall be debarred from receiving a patent for his invention or discovery, nor shall any patent be declared invalid by reason of its having been first patented or caused to be patented by the inventor or his legal representatives or assigns in a foreign country, unless the application for said foreign patent was filed more than twelve months, in cases within the provisions of section forty-eight hundred and eighty-six of the Revised Statutes, and four months in cases of designs, prior to the filing of the application in this country, in which case no patent shall be granted in this country.

An application for patent for an invention or discovery or for a design filed in this country by any person who has previously regularly filed an application for a patent for the same invention, discovery, or design in a foreign country which, by treaty, convention, or law, affords similar privileges to citizens of the United States shall have the same force and effect as the same application would have if filed in this country on the date on which the application for patent for the same invention, discovery, or design was first filed in such foreign country, provided the application in this country is filed within twelve months in cases within the provisions of section forty-eight hundred and eighty-six of the Revised Statutes, and within four months in cases of designs, from the earliest date on which any such foreign application was filed. But no patent shall be granted on an application for patent for an invention or discovery or a design which had been patented or described in a printed publication in this or any foreign country more than two years before the date of the actual filing of the application in this country, or which had been in public use or on sale in this country for more than two years prior to such filing.

48. REQUISITES OF APPLICATION, DESCRIPTION, SPECIFICATION, AND CLAIM.

Sec. 4888. Before any inventor or discoverer shall receive a patent for his invention or discovery, he shall make application therefor, in writing, to the Commissioner of Patents, and shall file in the Patent Office a written description of the same, and of the manner and process of making, constructing, compounding, and using it in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of a machine, he shall explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions; and he shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. The specification and claim shall be signed by the inventor and attested by two witnesses.

Rule 24. [From R. S., secs. 4886, 4887.] A patent may be obtained by any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof, not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, or more than two years prior to his application, and not patented in a country for-

eign to the United States on an application filed more than twelve months before his application, and not in public use or on sale in the United States for more than two years prior to his application, unless the same is proved to have been abandoned, upon payment of the fees required by law and other due proceedings had. (For designs, see Rule 79.)

49. PATENT NOT VOID ON ACCOUNT OF PREVIOUS USE IN FOREIGN COUNTRY.

Sec. 4923. Whenever it appears that a patentee, at the time of making his application for the patent, believed himself to be the original and first inventor or discoverer of the thing patented, the same shall not be held to be void on account of the invention or discovery, or any part thereof, having been known or used in a foreign country, before his invention or discovery thereof, if it had not been patented or described in a printed publication.

50. DISCUSSION OF NEILSON v. HARTFORD, 1 Webs. Pat. Cas. 273-373 (English).

Curtis, § 136. It is quite apparent then, first, that in speaking of the specification of a patent for a principle, in reference to this case of the hot blast, the court had in view a specification stating in the abstract that the patentee had found out that furnaces could be advantageously worked with a blast of hot air instead of cold air, without describing any particular means of applying or working out this principle. Hence, it is to be inferred that there is a distinction between the principle itself and the application or working out of the principle, in arts or manufactures. The former cannot be the subject of a patent; the latter may be. Secondly, the case is an authority to show when and how the application of a principle may be made the subject of a patent; for it ascertains that if the specification discloses, by sufficient and clear directions, some practical means by which persons of competent skill in the art can apply the principle and work it, so as to produce the effect contemplated by the patentee, it discloses a patentable invention, that invention consisting in a machine or other thing embodying the principle; or, stated in the other way, the patentable invention consists in the practical application of the principle. Thirdly, the case is an authority to show that when a patent covers the application of a principle, in the above sense, it may be infringed by the use of machinery or apparatus differing as machinery or apparatus from that described by the patentee, provided it effects a practical application of the same principle embodied by the patentee by means of his machinery or apparatus.

51. DISCUSSION OF STONE v. SPRAGUE, 1 Story 270 (1840), Curtis on Patents, 4th Edition.

* * *

Sec. 146. The patentee was the inventor of an improvement in looms, which consisted in communicating motion from the reed to the yarn-beam, and in the connection of one with the other, which was described as produced by a particular machinery; the invention being claimed as follows: "I claim as my invention the connection of the reed with the yarn-beam, and the communication of the motion from the one to the other, which may be done as above specified." It was contended, in the defense, that this was a claim for an abstract principle, or all modes by which motion could be communicated from the reed to the yarn-beam, and therefore that the patent was void. But the court construed it as a patent for an invention limited to the specific machinery and mode of communicating the motion specially described; at the same time intimating a very decided opinion that, if construed to include all other modes of effecting the object, it would be void, as an attempt to maintain a patent for an abstract principle.

Sec. 147. Upon the whole, the case of Stone v. Sprague, in respect to the limitation of the claim to the specific devices or contrivances described in the patent, is probably to be regarded as a case in which some one had preceded the plaintiff in communicating the described motion by another means. Without this hypothesis, it is not clear that the extreme alternative construction suggested by the court would be necessary; but the limited construction which confined the patentee to his device (as in the case of Seed v. Higgins, ante), would upon this hypothesis be the right one.

52. DISCUSSION OF WYETH v. STONE, 1 Story 273 (1840).

Curtis, § 148. * * * The patent was granted "for a new and useful improvement in the manner of cutting ice, together with the machinery and apparatus therefor." After setting forth two machines, to be used separately or in combination, for the purpose of cutting ice, the patentee summed up his claim as follows: "It is claimed as new, to cut ice of a uniform size, by means of an apparatus worked by any other power than human. The invention of this art, as well as of the particular method of the application of the principle, are claimed by the subscriber." It was held that the first clause of this claim had undertaken to cover an art or principle in the abstract, namely, the cutting of ice of a uniform size by means of an apparatus worked by any other power than human; which would render the patent void, unless a disclaimer had been filed in season to save it as a patent for the machines or machine which constituted the particular method embraced by the second clause of the claim. Certainly if it was necessary to construe this as a claim to the in-

vention and appropriation of an art, being the art of cutting ice by any other than human power, it is an indisputable proposition that it covered no possible subject of a patent privilege. But the first clause of this claim was probably mere surplusage, intended only to state that the patentee was the first person who had invented an apparatus for cutting ice of a uniform size, and that it mattered not by what power the apparatus was moved along the ice. The second clause is the one in which the invention resided; and this appeared, on the face of the claim to be a particular method of applying what the patentee miscalled an art or principle, it being in truth no art or principle whatever to cut ice by any other than human power. In other words, the patent was a patent for an apparatus to be used in cutting ice, and all beyond that, which did not mislead any one, might have been rejected as surplusage. The case is not one which belongs strictly to the class we are here considering. The patentee neither discovered nor applied any force, or truth, or element in nature, or any law or property of matter, never before discovered and applied to the same purpose. He merely invented a machine capable of doing what had before been done by hand.

53. DISCUSSION OF FOOTE v. SILSBY, 1 Blatchf. (U. S.) 445, 4 How. (U. S.) 218, 14 L. ed. 394 (Fed. Cas. No. 4917).

Curtis, § 149. * * * The plaintiff claimed "the application of the expansive and contracting power of a metallic rod by different degrees of heat, to open and close a damper which governs the admission of air into a stove, in which such rod shall be acted upon directly by the heat of the stove or the fire which it contains." At the trial before Conkling, J., he ruled that this was a claim for the application of a natural property of metals for the purpose set forth, and was not the fit subject of a patent, although the specification described devices by which a metallic rod was to be made to work in the application of the expansive and contractile property by means of variation in the heat of the stove. Mr. Justice Nelson reversed this construction, on a motion for a new trial, and held that the claim was not for a natural property of the metallic rod, but for a new application of it by means of mechanical contrivances: and it appeared on this trial that the patentee was the first to make this application to the regulation of the heat of a stove. The mechanical devices used by the defendant were, however, substantially the same as those of the plaintiff. Upon this the learned judge observed: "I am not sure that the plaintiff was bound to go to this length in making out a case of infringement. There is some ground for the position that the new application of the principle, by means of mechanical contrivances, constitutes of itself a part of his invention, and that any different or improved mode of application is but an improvement upon his dis-

covery, and not available without his consent." But the verdict that was affirmed by the refusal of a new trial rested on the validity of a claim which covered the particular combination only. In this dictum we reach, for the first time in any American case, the suggestion of a doctrine which, in reference to cases of this kind, must either be established in or rejected from the patent law. This doctrine treats the application of the principle, by some mechanical means, as being at least a part of the invention and of the subject-matter of the patent; and, as a corollary of this position, it regards a variation of the means, even if an improvement, as still an infringement, if used without the consent of the patentee. The opposite doctrine is that which is maintained by those who contend that the application of a principle in this sense is not capable of appropriation under a patent; that its appropriation can extend only to the application of the principle as effected by the particular means used by the patentee, and by such other means as may turn out to be colorable imitations, mechanical equivalents, or fraudulent evasions, to neither of which categories is a real improvement to be referred. We have seen what the weight of English authority is on this subject; and, having now contrasted the opposite doctrines, we may continue the investigation of the cases in our own courts.

54. DISCUSSION OF ROBERTS v. DICKEY, 4 Fish. 532. (Fed. Cas. No. 11899.)

Curtis, § 153a. In the case of Roberts v. Dickey, the invention claimed was a method of increasing the productiveness of oil wells by causing an explosion of gunpowder in the particular manner described. This invention was based upon the geological knowledge that petroleum, or other oil taken from oil wells, was contained in seams or crevices, usually in the second or third strata of sandstone or other rock abounding in the oil regions; and that these seams, being of different dimensions and irregularly located, were frequently not penetrated by the wells made for this purpose, which circumstance materially affected the supply of oil. Modes of overcoming this difficulty had been used, but with only partial success. The improvement of the patentee was to fracture the oil-bearing rock in proximity to the bore of the well, and for some distance around it, thus making artificial passages into seams or crevices containing oil, which, without such passages, would not communicate with the well, and also enlarging existing apertures into oil deposits, or clearing such apertures when they had become clogged. The method devised for accomplishing these objects was to sink into the well to the desired position a water-tight flask containing gunpowder or other powerful explosive material, then to fill the well with water and cause an explosion of the powder in the flask, which

would open communication between the well and the oil-bearing crevices. "It has been further urged," said Mr. Justice Strong, "that all Roberts discovered was that the seams or rifts in oil-bearing rock would, if opened by a blast, yield oil, and that this was merely a discovery of a law of nature, a geological truth, and not the invention of a new art or manufacture. If this were all, doubtless it would not have been patentable. But it was not all. He devised a mode of turning to practical account this geological truth; and if the means thus devised were novel, if the process was the product of invention and was useful, it was a proper subject for a patent."

This combination, therefore, of instrumentalities before known to produce a new and useful result, was held to be patentable as an art.

55. DISCUSSION OF LEROY v. TATHAM, 14 How. (U. S.) 156, 14 L. ed. 367 (1852, Patent Reissue 82), and 63 U. S. 132, 16 L. ed. 366 (1859).

Curtis, § 62. On the other hand, the great feature of the invention which the plaintiffs claimed consisted in the discovery of the fact, that lead, when recently set, and still under heat, will reunite perfectly around a core, under extreme pressure, notwithstanding the particles have been separated, and will thus form pipe of great solidity and unusual strength. This beautiful discovery was made available by the substitution of a short immovable core in front of the die, supported by a bridge or cross-bars, and extending into and through the die, so that the true centrality of the core in reference to the die was constantly preserved; and although the particles of the metal, when forced through the apertures in the bridge were necessarily separated, they reunited perfectly around the core, and formed a pipe superior in quality and cheaper in production than had ever been made before.

§ 63. The patent which was to protect this remarkable invention, after duly describing the apparatus and its mode of operation, and after disclaiming any design of patenting the machinery independent of the arrangement and combination set forth, summed up the claim as follows: "What we do claim as our invention, and desire to secure, is the combination of the following parts above described, to-wit, the core and bridge, or guide-piece, with the cylinder, the piston, the chamber, and the die, when used to form pipes of metal, under heat and pressure in the manner set forth, or in any other manner substantially the same."

§ 64. It does not appear with sufficient distinctness, from the report of this case, whether the precise combination of the bridge or guide-piece with the cylinder, the piston, the chamber, and the

die, had been used before; although evidence was offered in the defense tending to show that substantially the same combination had been used before in the manufacture of lead pipe, of clay pipe, and of the confection called macaroni. It may be assumed, however, that the evidence did not show any previous manufacture of lead pipe by the substitution of a bridge for the long cylindrical mandril, for the purpose of making available the capacity of lead, when recently set, to reunite after separation. From the charge of the judge who tried the cause, and from the finding of the jury, it is to be inferred, that before the plaintiff's invention this combination of machinery had not been used for the development and application of this property of lead, and that this was a newly discovered property, for the first time made known, and made of practical consequence by the invention of the plaintiff. The jury was instructed, in substance, that the invention of the plaintiff did not consist in the combination of the machinery separate from the manner in which and the purpose for which it was used by him, but that the novelty of the invention consisted in the application of a combination of machinery, which might of itself be old, to a new end, by making a newly discovered property of lead practically useful, and producing thereby an article of manufacture which was both new in respect to the process by which it was made and in respect to its superior qualities, and that such invention was patentable. That this instruction was correct, provided the patentee's summary of his claim had not made the novelty of his machinery essential, there can be, I conceive, no doubt. But in the Supreme Court of the United States it was held by a majority of the judges that the claim did not admit of a construction that would support this direction; but that the patentee had made the novelty of his machinery essential by claiming it as part of his invention, and that therefore the novelty of the machinery was a material fact for the jury.

56. CURTIS, SEC. 153, note.

The case of LeRoy v. Tatham (14 Howard) resulted unfavorably to the patentees, by a construction of the claim which, if correct, shows that the real invention was not duly described in the claim itself. But in a subsequent proceeding (in equity), this patent again came before the Supreme Court, and appears to have been construed and sustained as a patent for a new process, which it undoubtedly was. In coming to this result, the court necessarily discarded the idea that the patented subject consisted in the application of an old contrivance to a new use, which was merely a double use, and they supported the patent upon the ground that, although the machinery might be old, yet its application to the development and employment of a new property of lead made a new and patentable process. See LeRoy v. Tatham, 22 How. (U. S.) 132.

57. O'REILLY v. MORSE, 15 How. (U. S.) 62, 14 L. ed. 601 (1853).

TANEY, C. J., delivered the opinion of the court. * * *

And this brings us to the exceptions taken to the specification and claims of the patentee in the reissued patent of 1848.

We perceive no well-founded objection to the description which is given of the whole invention and its separate parts, nor to his right to a patent for the first seven inventions set forth in the specification of his claims. The difficulty arises on the eighth.

It is in the following words:—

"Eighth. I do not propose to limit myself to the specific machinery or parts of machinery described in the foregoing specifications and claims; the essence of my invention being the use of the motive power of the electric or galvanic current, which I call electromagnetism, however developed for marking or printing intelligible characters, signs, or letters, at any distances, being a new application of that power of which I claim to be the first inventor or discoverer."

It is impossible to misunderstand the extent of this claim. He claims the exclusive right to every improvement where the motive power is the electric or galvanic current, and the result is the marking or printing intelligible characters, signs, or letters at a distance. * * *

Many cases have been referred to in the argument, which have been decided upon this subject, in the English and American courts. We shall speak of those only which seem to be considered as leading ones. And those most relied on, and pressed upon the court, in behalf of the patentee, are the cases which arose in England, upon Neilson's patent for the introduction of heated air between the blowing apparatus and the furnace in the manufacture of iron.

The leading case upon this patent, is that of Neilson and others v. Harford and others, 8 M. & W. 806, in the English Court of Exchequer. It was elaborately argued, and appears to have been carefully considered by the court. [See quotation from this case in LeRoy v. Tatham, and Tilghman v. Proctor.]

* * * Undoubtedly, the principle that hot air will promote the ignition of fuel better than cold, was embodied in this machine. But the patent was not supported because this principle was embodied in it. He would have been equally entitled to a patent, if he had invented an improvement in the mechanical arrangements of the blowing apparatus, or in the furnace, while a cold current of air was still used. But his patent was supported, because he had invented a mechanical apparatus, by which a current of hot air, instead of cold, could be thrown in. And this new method was protected by his patent. The interposition of a heated receptacle, in any form, was the novelty he invented.

We do not perceive how the claim in the case before us can derive any countenance from this decision. If the Court of Exchequer had said that Neilson's patent was for the discovery, that hot air would promote ignition better than cold, and that he had an exclusive right to use it for that purpose, there might, perhaps, have been some reason to rely upon it. But the court emphatically denied his right to such a patent. And his claim, as the patent was construed and supported by the court, is altogether unlike that of the patentee before us.

For Neilson discovered, that by interposing a heated receptacle between the blower and the furnace and conducting the current of air through it, the heat in the furnace was increased. And this effect was always produced, whatever might be the form of the receptacle, or the mechanical contrivances for heating it, or for passing the current of air through it, and into the furnace.

But Professor Morse has not discovered, that the electric or galvanic current will always print at a distance, no matter what may be the form of the machinery or mechanical contrivances through which it passes. You may use electro-magnetism as a motive power, and yet not produce the described effect, that is, print at a distance intelligible marks or signs. To produce that effect, it must be combined with, and passed through, and operate upon, certain complicated and delicate machinery, adjusted and arranged upon philosophical principles, and prepared by the highest mechanical skill. And it is the high praise of Professor Morse that he has been able, by a new combination of known powers, of which electro-magnetism is one, to discover a method by which intelligible marks or signs may be printed at a distance. And for the method or process thus discovered, he is entitled to a patent. But he has not discovered that the electro-magnetic current, used as motive power, in any other method, and with any other combination, will do as well.

We have commented on the case in the Court of Exchequer more fully, because it has attracted much attention in the courts of this country, as well as in the English courts, and has been differently understood. And perhaps a mistaken construction of that decision has led to the broad claim in the patent now under consideration.

We do not deem it necessary to remark upon the other decisions, in relation to Neilson's patent, nor upon the other cases referred to, which stand upon similar principles. The observations we have made on the case in the Court of Exchequer, will equally apply to all of them.

We proceed to the American decisions. And the principles herein stated, were fully recognized by this court in the case of LeRoy et al. v. Tatham et al., decided at the last term, 14 How. (U. S.) 166.

It appeared that, in that case, the patentee had discovered that lead, recently set, would, under heat and pressure in a close vessel, reunite perfectly, after a separation of its parts, so as to make wrought instead of cast pipe. And the court held that he was not entitled to a patent for this newly-discovered principle or quality in lead; and that such a discovery was not patentable. But that he was entitled to a patent for the new process or method in the art of making lead pipe, which this discovery enabled him to invent and employ; and was bound to describe such process or method, fully, in his specification.

Many cases have also been referred to, which were decided in the circuit courts. It will be found, we think, upon careful examination, that all of them, previous to the decision on Neilson's patent, maintain the principles on which this decision is made. Since that case was reported, it is admitted, that decisions have been made, which would seem to extend patentable rights beyond the limits here marked out. As we have already said, we see nothing in that opinion which would sanction the introduction of any new principle in the law of patents. But if it were otherwise, it would not justify this court in departing from what we consider as established principles in the American courts. And to show what was heretofore the doctrine upon this subject, we refer to the annexed cases. We do not stop to comment on them, because such an examination would extend this opinion beyond all reasonable bounds. Wyeth v. Stone, 1 Story, 273, 285, Blanchard v. Sprague, 3 Sumn. 540. The first-mentioned case is directly in point.

Indeed, independently of judicial authority, we do not think that the language used in the act of congress, can justly be expounded otherwise.

The 5th section of the act of 1836 declares that a patent shall convey to the inventor, for a term not exceeding fourteen years, the exclusive right of making, using, and vending to others to be used, his invention or discovery; referring to the specification for the particulars thereof.

The 6th section directs who shall be entitled to a patent, and the terms and conditions on which it may be obtained. It provides that any person shall be entitled to a patent who has discovered or invented a new and useful art, machine, manufacture, or composition of matter; or a new and useful improvement on any previous discovery in either of them. But before he receives a patent, he shall deliver a written description of his invention or discovery, "and of the manner and process of making, constructing, using, and compounding the same," in such exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same.

This court has decided, that the specification required by this law is a part of the patent; and that the patent issues for the invention described in the specification. * * *

The provisions of the acts of congress in relation to patents may be summed up in a few words.

Whoever discovers that a certain useful result will be produced, in any art, machine, manufacture, or composition of matter, by the use of certain means, is entitled to a patent for it; provided he specifies the means he uses in a manner so full and exact, that any one skilled in the science to which it appertains, can, by using the means he specifies, without any addition to, or subtraction from them, produce precisely the result he describes. And if this cannot be done by the means he describes, the patent is void. And if it can be done, then the patent confers on him the exclusive right to use the means he specifies to produce the result or effect he describes, and nothing more. And it makes no difference, in this respect, whether the effect is produced by chemical agency or combination; or by the application of discoveries or principles in natural philosophy known or unknown before his invention; or by machinery acting altogether upon mechanical principles. In either case, he must describe the manner and process as above mentioned, and the end it accomplishes. And any one may lawfully accomplish the same end without infringing the patent if he uses means substantially different from those described.

Indeed, if the eighth claim of the patentee can be maintained, there was no necessity for any specification, further than to say that he had discovered that, by using the motive power of electro-magnetism, he could print intelligible characters at any distance. We presume it will be admitted on all hands, that no patent could have issued on such a specification. Yet this claim can derive no aid from the specification filed. It is outside of it, and the patentee claims beyond it. And if it stands, it must stand simply on the ground that the broad terms above mentioned were a sufficient description, and entitled him to a patent in terms equally broad. In our judgment the act of congress cannot be so construed.

The patent then being illegal and void, so far as respects the eighth claim, the question arises whether the whole patent is void, unless this portion of it is disclaimed in a reasonable time, after the patent issued. * * *

Whether, therefore, the patent is illegal in part because he claims more than he has sufficiently described, or more than he invented, he must in either case disclaim, in order to save the portion to which he is entitled; and he is allowed to do so when the error was committed by mistake. * * *

It appears that no disclaimer has yet been entered at the patent office. But the delay in entering it is not unreasonable. For the objectionable claim was sanctioned by the head of the office; it has been held to be valid by a circuit court, and differences of opinion in relation to it are found to exist among the justices of this court. Under such circumstances the patentee had a right to insist upon it, and not disclaim it until the highest court to which it could be carried had pronounced its judgment. The omission to disclaim, therefore, does not render the patent altogether void; and he is entitled to proceed in this suit, for an infringement of that part of his invention which is legally claimed and described. But as no disclaimer was entered in the patent-office before this suit was instituted, he cannot, under the act of congress, be allowed costs against the wrongdoer, although the infringement should be proved. And we think it is proved by the testimony. * * *

The two reissued patents of 1848, being both valid, with the exception of the eighth claim in the first, the only remaining question is, whether they or either of them have been infringed by the defendants. * * *

The Columbian (O'Reilly's) telegraph does not profess to accomplish a new purpose, or produce a new result. Its object and effect is to communicate intelligence at a distance, at the end of the main line, and at the local circuits on its way. And this is done by means of signs or letters impressed on paper or other material. The object and purpose of the telegraph is the same with that of Professor Morse.

Does he use the same means? Substantially, we think he does, both upon the main line and in the local circuits. He uses upon the main line the combination of two or more galvanic or electric circuits, with independent batteries for the purpose of obviating the diminished force of the galvanic current, and in a manner varying very little in form from the invention of Professor Morse. And, indeed, the same may be said of the entire combination set forth in the patentee's third claim. For O'Reilly's can hardly be said to differ substantially and essentially from it. He uses the combination which composes the register with no material change in the arrangement, or in the elements of which it consists; and with the aid of these means he conveys intelligence by impressing marks or signs upon paper—these marks or signs being capable of being read and understood by means of an alphabet or signs adapted to the purpose. And as regards the second patent of Professor Morse for the local circuits, the mutator of the defendant does not vary from it in any essential particular. All of the efficient elements of the combination are retained, or their places supplied by well known equivalents. Its organization is essentially the same.

Neither is the substitution of marks and signs, differing from those invented by Professor Morse, any defense to this action. His patent is not for the invention of a new alphabet; but for a combination of powers composed of tangible and intangible elements, described in his specification, by means of which marks or signs may be impressed upon paper at a distance, which can there be read and understood. And if any marks or signs or letters are impressed in that manner by means of a process substantially the same with his invention, or with any particular part of it covered by his patent, and those marks or signs can be read, and thus communicate intelligence, it is an infringement of his patent. The variation in the character of the marks would not protect it, if the marks could be read and understood.

We deem it unnecessary to pursue further the comparison between the machinery of the patents. The invasion of the plaintiff's rights, already stated, authorized the injunction granted by the circuit court, and so much of its decree must be affirmed. But, for the reasons hereinbefore assigned, the complainants are not entitled to costs, and that portion of the decree must be reversed, and a decree passed by this court, directing each party to pay his own costs, in this and in the circuit court.

Wayne, J., Nelson, J., and Grier, J., dissent from the judgment of the court on the question of the validity of the eighth claim, and also on the question of costs, and concurred in the opinion of Grier, J., on these points.

[From dissenting opinion by GRIER, J.]

* * * * *

A new and useful art, or a new and useful improvement on any known art, is as much entitled to the protection of the law as a machine or manufacture. The English patent acts are confined to "manufactures," in terms; but the courts have construed them to cover and protect arts as well as machines; yet without using the term art. Here we are not required to make any latitudinous construction of our statute for the sake of equity or policy; and surely we have no right, even if we had the disposition, to curtail or narrow its liberal policy by astute or fanciful construction.

It is not easy to give a precise definition of what is meant by the term "art," as used in the acts of congress; some, if not all, the traits which distinguish an art from the other legitimate subjects of a patent, are stated with clearness and accuracy by Mr. Curtis, in his Treatise on Patents. "The term art, applies," says he, "to all those cases where the application of a principle is the most important part of the invention, and where the machinery, apparatus, or other means, by which the principle is applied, are incidental only, and not of the

essence of his invention. It applies also to all those cases where the result, effect, or manufactured article is old, but the invention consists in a new process or method of producing such result, effect, or manufacture." Curt. on Pat. 80.

A machine, though it may be composed of many parts, instruments, or devices combined together, still conveys the idea of unity. It may be said to be invented, but the term "discovery" could not well be predicated of it. An art may employ many different machines, devices, processes, and manipulations, to produce some useful result. In a previously known art, a man may discover some new process, or new application of a known principle, element, or power of nature, to the advancement of the art, and will be entitled to a patent for the same, as "an improvement in the art," or he may invent a machine to perform a given function, and then he will be entitled to a patent only for his machine.

That improvements in the arts, which consist in the new application of some known element, power, or physical law, and not in any particular machine or combination of machinery, have been frequently the subject of patents both in England and in this country, the cases in our books most amply demonstrate. I have not time to examine them at length; but would refer to James Watt's patent for a method of saving fuel in steam-engines by condensing the steam in separate vessels, and applying non-conducting substances to his steam-pipes; Clegg's patent for measuring gas in water, Webster's Pat. Cas. 103; Jupe v. Pratt, Webster's Pat. Cas. 144; and the celebrated case of Neilson's patent for the application of hot blast, being an important improvement in the art of smelting iron.

In England, where their statute does not protect an art in direct terms, they have made no clear distinction between an art or an improvement in an art, and a process, machine, or manufacture. They were hampered and confined by the narrowness of the phraseology of their patent acts. In this country, the statute is as broad as language can make it. And yet, if we look at the titles of patents, as given at the patent-office, and the language of our courts, we might suppose that our statute was confined entirely to machines. Notwithstanding, in Kneass v. The Bank, 4 Wash. C. C. R. 9, Mr. Justice Washington supported a patent which consisted in nothing else but a new application of copperplates to both sides of a bank-bill as a security against counterfeiting. The new application was held to be an art, and, therefore, patentable. So the patent in McClurg v. Kingsland, 1 How. (U. S.) 204, was in fact for an improvement in the art of casting chilled rollers by conveying the metal to the mould in a direction approaching to the tangent of the cylinder; yet the patentee was protected in the principle of his discovery, (which was but the application of a known law of nature to a new

purpose) against all forms of machinery embodying the same principle.

The great art of printing, which has changed the face of human society and civilization, consisted in nothing but a new application of principles known to the world for thousands of years. No one could say it consisted in the type or the press, or in any other machine or device used in performing some particular function, more than in the hands which picked the types or worked the press. Yet if the inventor of printing had, under this narrow construction of our patent law, claimed his art as something distinct from his machinery, the doctrine now advanced, would have declared it unpatentable to its full extent as an art, and that the inventor could be protected in nothing but his first rough types and ill contrived press.

I do not intend to review the English cases which adopt the principle for which I now contend, notwithstanding their narrow statute; but would refer to the opinion of my brother Nelson, in 14 How. (U. S.) 177; and will add, that Mr. Justice M'Lean, in delivering the opinion of the court in that case, quotes with approbation the language of Lord Justice Clerke, in the Neilson case, which is precisely applicable to the question before us. He says: "The specification does not claim any thing as to form, nature, shape, materials, numbers, or mathematical character of the vessel or vessels in which the air is to be heated, or as to the mode of heating such vessels." Yet this patent was sustained as for a new application of a known element; or, to use correct language, as an improvement in the art of smelting iron, without any regard to the machinery or parts of machinery used in the application. Such I believe to be the established doctrine of the English courts.

He who first discovers that an element or law of nature can be made operative for the production of some valuable result, some new art, or the improvement of some known art; who has devised the machinery or process to make it operative, and introduced it in a practical form to the knowledge of mankind, is a discoverer and inventor of the highest class. The discovery of a new application of a known element or agent may require more labor, expense, persevering idustry, and ingenuity than the invention of any machine. Sometimes, it is true, it may be the result of a happy thought or conception, without the labor of an experiment, as in the case of the improvement in the art of casting chilled rollers, already alluded to. In many cases, it is the result of numerous experiments; not the consequence of any reasoning a priori, but wholly empirical; as the discovery that a certain degree of heat, when applied to the usual processes of curing India rubber, produced a substance with new and valuable qualities.

The mere discovery of a new element, or law, or principle of

nature, without any valuable application of it to the arts, is not the subject of a patent. But he who takes this new element or power, as yet useless, from the laboratory of the philosopher, and makes it the servant of man; who applies it to the perfecting of a new and useful art, or to the improvement of one already known, is the benefactor to whom the patent law tenders its protection. The devices and machines used in the exercise of it may or may not be new; yet, by the doctrine against which I contend, he cannot patent them, because they were known and used before. Or, if he can, it is only in their new application and combination in perfecting the new art. In other words, he may patent the new application of the mechanical devices, but not the new application of the operative element which is the essential agent in the invention. He may patent his combination of the machinery, but not his art.

When a new and hitherto unknown product or result, beneficial to mankind, is effected by a new application of any element of nature, and by means of machines and devices, whether new or old, it cannot be denied that such invention or discovery is entitled to the denomination of a "new and useful art." The statute gives the inventor of an art a monopoly in the exercise of it as fully as it does to the inventor of a mere machine. And any person who exercises such new art without the license of the inventor is an infringer of his patent, and of the franchise granted to him by the law as a reward for his labor and ingenuity in perfecting it. A construction of the law which protects such an inventor in nothing but the new-invented machines or parts of machinery used in the exercise of his art, and refuses it to the exercise of the art itself, annuls the patent law. If the law gives a franchise or monopoly to the inventor of an art as fully as to the inventor of a machine, why shall its protection not be coextensive with the invention in one case as well as in the other? To look at an art as nothing but a combination of machinery, and give it protection only as such, against the use of the same or similar devices or mechanical equivalents, is to refuse it protection as an art. It ignores the distinction between an art and a machine; it overlooks the clear letter and spirit of the statute; and leads to inextricable difficulties. It is viewing a statue or a monument through a microscope.

The reason given for thus confining the franchise of the inventor of an art to his machine and parts of machinery is, that it would retard the progress of improvement, if those who can devise better machines or devices, differing in mechanical principle from those of the first inventor of the art, or, in other words, who can devise an improvement in it, should not be allowed to pirate it.

To say that a patentee, who claims the art of writing at a distance by means of electro-magnetism, necessarily claims all future

improvements in the art, is to misconstrue it, or draws a consequence from it not fairly to be inferred from its language. An improvement in a known art is as much the subject of a patent as the art itself; so, also, is an improvement on a known machine. Yet, if the original machine be patented, the patentee of an improvement will not have a right to use the original. This doctrine has not been found to retard the progress of invention in the case of machines; and I can see no reason why a contrary one should be applied to an art.

The claim of the patentee is, that he may be protected in the exercise of his art as against persons who may improve or change some of the processes or machines necessary in its exercise. The court, by deciding that this claim is too broad, virtually decides that such an inventor of an improvement may pirate the art he improves, because it is contrary to public policy to restrain the progress of invention. Or, in other words, it may be said that it is the policy of the courts to refuse that protection to an art which it affords to a machine, which it is the policy of the constitution and the laws to grant.

2. Let us now consider what is the nature of the invention now under consideration.

It is not a composition of matter, or a manufacture, or a machine. It is the application of a known element or power of nature, to a new and useful purpose by means of various processes, instruments and devices; and, if patentable at all, it must come within the category of "a new and useful art." It is as much entitled to this denomination as the original art of printing itself. The name given to it in the patent is generally the act of the commissioner, and in this, as in many other cases, a wrong one. The true nature of the invention must be sought in the specification.

The word telegraph is derived from the Greek, and signifies "to write afar off or at a distance." It has heretofore been applied to various contrivances or devices, to communicate intelligence by means of signals or semaphores, which speak to the eye for a moment. But in its primary and literal signification of writing, printing or recording at a distance, it never was invented, perfected, or put into practical operation till it was done by Morse. He preceded Steinheil, Cook, Wheatstone and Davy in the successful application of this mysterious power or element of electro-magnetism to this purpose, and his invention has entirely superseded their inefficient contrivances. It is not only "a new and useful art," if that term means anything, but a most wonderful and astonishing invention, requiring tenfold more ingenuity and patient experiment to perfect it, than the art of printing with types and press, as originally invented.

3. Is it not true, as set forth in this eighth claim of the specification, that the patentee was the first inventor or discoverer of the

use or application of electro-magnetism to print and record intelligible characters or letters? It is the very ground on which the court agree in confirming his patent. Now the patent law requires an inventor, as a condition precedent to obtaining a patent, to deliver a written description of his invention or discovery, and to particularly specify what he claims to be his own invention or discovery. If he has truly stated the principle, nature, and extent of his art or invention, how can the court say it is too broad, and impugn the validity of his patent for doing what the law requires as a condition for obtaining it? And if it is only in case of a machine that the law requires the inventor to specify what he claims as his own invention and discovery, and to distinguish what is new from what is old, then this eighth claim is superfluous, and cannot affect the validity of his patent, provided his art is new and useful, and the machines and devices claimed separately are of his own invention. If it be in the use of the words "however developed" that the claim is to be adjudged too broad, then it follows that a person using any other process for the purpose of developing the agent or element of electro-magnetism, than the common one now in use, and described in the patent, may pirate the whole art patented.

But if it be adjudged that the claim is too broad, because the inventor claims the application of this element to his new art, then his patent is to be invalidated for claiming his whole invention, and nothing more. If the result of this application be a new and useful art, and if the essence of his invention consists in compelling this hitherto useless element to record letters and words, at any distance and in many places at the same moment, how can it be said that the claim is for a principle or an abstraction? What is meant by a claim being too broad? The patent law and judicial decisions may be searched in vain for a provision or decision that a patent may be impugned for claiming no more than the patentee invented or discovered. It is only when he claims something before known and used, something as new which is not new, either by mistake or intentionally, that his patent is affected.

The act of congress requires the applicant for a patent to swear that "he is the original and first inventor of the art, machine, etc." It requires the commissioner to make an examination of the alleged invention, "and if it shall appear that the same has not been invented prior to the alleged invention, he shall grant a patent, etc. But if it shall appear that the applicant is not the original and first inventor or discoverer thereof, or that any part of that which is claimed as new had before been invented," then the applicant to have leave to withdraw his application.

The 13th section treats of defective specifications and their remedy, where the applicant, through mistake or inadvertency, had claimed "more than he had a right to claim as new."

The 15th section, in enumerating the defenses which a defendant may be allowed to make to a patent, states that inter alia he may show, "that the patentee was not the original and first inventor or discoverer of the thing patented, or of a substantial and material part thereof claimed as new." And the proviso to the same section allows the court to refuse costs, "when the plaintiff shall fail to sustain his action on the ground that, in his specification or claim is embraced more than that of which he was the first inventor."

The 7th section of the act of March 3, 1837, specially defines the meaning of the phrase "too broad," to be, "when the patent claims more than that of which the patentee was the original and first inventor." And the 9th section of the same act, again providing for cases, where, by accident or mistake, the patentee claims more than he is justly entitled to, describes it to be "where the patentee shall have in his specification claimed to be the original inventor or discoverer of any material or substantial part, of which he is not the first and original inventor, and shall have no legal and just right to the same."

Thus we see that it is only where, through inadvertence or mistake, the patentee has claimed something of which he was not the first inventor, that the courts are directed to refuse costs.

The books of reports may be searched in vain for a case where a patent has been declared void, for being too broad, in any other sense.

Assuming it to be true, then, for the purpose of the argument, that the new application of the power of electro-magnetism to the art of telegraphing or printing characters at a distance, is not the subject of a patent, because it is patenting a principle; yet as it is also true, that Morse was the first who made this application successfully, as set forth in this eighth claim, I am unable to comprehend how in the words of the statute, we can adjudge "that he has failed to sustain his action, on the ground that his specification or claim embraces more than that of which he was the first inventor." It is first inventor, that the courts are directed to refuse costs.

4. Assuming this eighth claim to be too broad, it may well be said, that the patentee has not unreasonably delayed a disclaimer, when we consider that it is not till this moment he had reason to believe it was too broad. But the bill claims, and it is sustained by proof, that the defendant has infringed the complainant's second patent for his improvement.

The court sustains the validity of this patent. Why, then, is the complainant not entitled to his costs? At law, a recovery on one good count is sufficient to entitle the plaintiff to recover costs; and I can see no particular equity which the defendants can claim, who are adjudged to have pirated two inventions at once.

I am of opinion, therefore, that the decree of the circuit court should be affirmed, with costs.

58. CURTIS, § 166.

We have seen that it is possible to destroy a claim to a very important and easily understood invention, by separating the principle from its application by the necessary means; and the more striking and comprehensive the discovery of the principle, the greater will be the tendency, perhaps, to fall into this error. Although there are grounds for contending that Morse's specification furnished the material for saving his eighth claim from this fatal defect, it cannot be denied that it was so drawn as to expose it to the force of this objection. What, then, is the proper mode, or one of the proper modes, of avoiding this peril? The danger of claiming an abstract principle will be avoided by the use of appropriate terms, signifying that the application of the principle is claimed as effected by the means used and described by the patentee, and by all other means which, when applied within the just scope of his conditions, will perform, for the purpose of the application, the like office.

[For a striking example of such a claim in an analogous art sustained by the same court, see the Telephone cases, No. 63, *infra*.]

59. CORNING v. BURDEN, 15 How. (U S.) 252, 14 L. ed. 683 (1853, Patent, No. 1,890 of 1840).

* * * * *

GRIER, J. A process, eo nomine, is not made the subject of a patent in our act of congress. It is included under the general term "useful art." An art may require one or more processes or machines in order to produce a certain result or manufacture. The term machine includes every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result. But where the result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes, methods, or operations, are called processes. A new process is usually the result of discovery; a machine, of invention. The arts of tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores, and numerous others, are usually carried on by processes, as distinguished from machines. One may discover a new and useful improvement in the process of tanning, dyeing, etc., irrespective of any particular form of machinery or mechanical device. And another may invent a labor-saving machine by which this operation or process may be performed, and each may be entitled to his patent. As, for instance, A has discovered that by exposing India rubber to a certain degree

of heat, in mixture or connection with certain metallic salts, he can produce a valuable product, or manufacture; he is entitled to a patent for his discovery, as a process or improvement in the art, irrespective of any machine or mechanical device. B, on the contrary, may invent a new furnace or stove, or steam apparatus, by which this process may be carried on with much saving of labor, and expense of fuel; and he will be entitled to a patent for his machine, as an improvement in the art. Yet A could not have a patent for a machine, or B for a process; but each would have a patent for the means or method of producing a certain result, or effect, and not for the result or effect produced. It is for the discovery or invention of some practicable method or means of producing a beneficial result or effect, that a patent is granted, and not for the result or effect itself. It is when the term process is used to represent the means or method of producing a result that it is patentable, and it will include all methods or means which are not effected by mechanism or mechanical combinations.

But the term process is often used in a more vague sense, in which it cannot be the subject of a patent. Thus we say that a board is undergoing the process of being planed, grain of being ground, iron of being hammered, or rolled. Here the term is used subjectively or passively as applied to the material operated on, and not to the method or mode of producing that operation, which is by mechanical means, or the use of a machine, as distinguished from a process.

In this use of the term it represents the function of a machine or the effect produced by it on the material subjected to the action of the machine. But it is well settled that a man cannot have a patent for the function or abstract effect of a machine, but only for the machine which produces it.

It is by not distinguishing between the primary and secondary sense of the term "process," that the learned judge below appears to have fallen into an error. It is clear that Burden does not pretend to have discovered any new process by which cast iron is converted into malleable iron, but a new machine or combination of mechanical devices by which the slag or impurities of the cast iron may be expelled or pressed out of the metal, when reduced to the shape of puddlers' balls. The machines used before to effect this compression, were tilt hammers and alligator's jaws, acting by percussion and pressure, and by nobbling rolls with eccentric grooves, which compressed the metal by use of the inclined plane in the shape of a cyclovolute or snail cam. In subjecting the metal to this operation, by the action of these machines, more time and manual labor is required than when the same function is performed by the machine of Burden. It saved labor, and thus produced the result in a cheaper, if not a better manner, and was, therefore, the proper subject of a patent.

In either case the iron may be said, in the secondary sense of the term, to undergo a process in order to change its qualities by pressing out its impurities, but the agent which effects the pressure is a machine or combination of mechanical devices.

The patent of Burden alleges no discovery of a new process, but only that he has invented a machine, and therefore, correctly states the nature of his invention.

The patent law requires that "every patent shall contain a short description or title of the invention or discovery, indicating its nature and design," etc. The patent in question recites that:—

"Whereas, Henry Burden, of Troy, New York, has alleged that he has invented a new and useful machine for rolling puddle balls, or other masses of iron, in the manufacture of iron, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said machine, etc."

The specification declares that his improvement consists in "the employment of a new and useful machine for rolling of puddlers' balls;" again, he calls it "my rolling machine," and describes his "machine as consisting of a cast iron cylinder," etc. In fine, his specification sets forth the "particulars" of his invention, in exact accordance with its title in the patent, and in clear, distinct, unequivocal, and proper phraseology.

It is true that the patentee, after describing his machine, has set forth his claim in rather ambiguous and equivocal terms, which might be construed to mean either a process or machine. In such case, the construction should be that which is most favorable to the patentee, *ut res magis valeat quam pereat.* His patent having a title which claims a machine, and his specification describing a machine, to construe his claim as for the function, effect, or result of his machine, would certainly endanger, if not destroy, its validity. His claim cannot change or nullify his previous specification with safety to his patent. He cannot describe a machine which will perform a certain function, and then claim the function itself, and all other machines that may be invented to perform the same function.

We are of opinion, therefore, that the learned judge of the court below erred in the construction of the patent, and in his first proposition or instruction to the jury. And as the second and third instructions are based on the first they must fall with it. Taking the bills of exception to rejection of evidence in the inverse order, it is clear that the last two rulings, being founded on the erroneous construction of the patent, are, of course, erroneous. The testimony offered was directly relevant to the issues trying, and should have been received.

The refusal of the court to hear the opinion of experts, as to the construction of the patent, was proper. Experts may be examined as to the meaning of terms of art on the principle of *cuique in sua arte credendum,* but not as to the construction of written instruments.

60. COCHRANE v. DEENER, 94 U. S. 780, 24 L. ed. 139 (1876, Patent Reissue 5,841).

BRADLEY, J.: * * * "The object of my invention was to increase the production of the best quality of flour; and my improvement consisted in separating from the meal first the superfine flour, and then the pulverulent impurities mingled with the flour-producing portions of the middlings-meal, so as to make 'while' or 'purified' middlings, which, when reground and rebolted, would yield pure white flour which when added to the superfine, would improve the quality of the flour resulting from their union, instead of deteriorating its quality, as had heretofore been the case when the middlings flour was mingled with the superfine." The process employed for producing the result here indicated is then described. It consists in passing the ground meal through a series of bolting-reels clothed with cloth of progressively finer meshes, which pass the superfine flour and retard the escape of the finer and lighter impurities; and, at the same time, subjecting the meal to blasts or currents of air introduced by hollow perforated shafts furnished with pipes so disposed that the force of the blast may act close to the surface of the bolting-cloth; the bolting chest having an opening at the top for the escape of the air, and of the finer and lighter particles therewith, through a chamber where the particles are arrested, whilst the floor and sides of each compartment of the chest are made close, so as to prevent the escape of the air in any other direction than through the said opening. By this means, the superfine flour is separated, and the fine and light specks and impurities which ordinarily adhere to the middlings and degrade the flour produced therefrom, are got rid of; and when the middlings are now separated from the other portions of the meal, they are white and clean, and capable of being reground and rebolted, so as to produce superfine flour equal in quality and even superior to the first installment. * * *

The defendants admit that the process has produced a revolution in the manufacture of flour; but they attribute that revolution to their improvements. It may be as they say, that it is greatly due to these. But it cannot be seriously denied that Cochrane's invention lies at the bottom of these improvements, is involved in them, and was itself capable of beneficial use, and was put to such use. It had all the elements and circumstances necessary for sustaining the

patent, and cannot be appropriated by the defendants, even though supplemented by and enveloped in very important and material improvements of their own. * * *

That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. If one of the steps of a process be that a certain substance is to be reduced to a powder, it may not be at all material what instrument or machinery is used to effect that object, whether a hammer, a pestle and mortar, or a mill. Either may be pointed out; but if the patent is not confined to that particular tool or machine, the use of the others would be an infringement, the general process being the same. A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.

61. TILGHMAN v. PROCTOR, 102 U. S. 708, 26 L. ed. 279 (1880).

BRADLEY, J.: * * * That a patent can be granted for a process, there can be no doubt. The patent law is not confined to new machines and new compositions of matter, but extends to any new and useful art or manufacture. A manufacturing process is clearly an art, within the meaning of the law. Goodyear's patent was for a process, namely, the process of vulcanizing india-rubber by subjecting it to a high degree of heat when mixed with sulphur and a mineral salt. The apparatus for performing the process was not patented, and was not material. The patent pointed out how the process could be effected, and that was deemed sufficient. Neilson's patent was for the process of applying the hot-blast to furnaces by forcing the blast through a vessel or receptacle situated between the blowing apparatus and the furnace, and heated to a red heat; the form of the heated vessel being stated by the patent to be immaterial. These patents were sustained after the strictest scrutiny and against the strongest opposition. * * *

Neilson's patent above referred to had some features very similar to those of Tilghman's. The strong objection urged against the latter is, that the particular apparatus described in the specification is not that which is generally used, and that it cannot be used with much profit or success in large manufacturing operations; whereas the slower method of dissolving fats in a common boiler or digester

at a lower temperature even than that of melting bismuth, which is not described in the specification, is the one which is generally adopted. Precisely this circumstance existed in reference to the patent of Neilson. The specification directed that the blast or current of air produced by the blowing apparatus should be passed into an air-vessel or receptacle heated to a red heat, and from thence into the furnace. Then, after stating that the air-vessel or receptacle should be increased in size according to the size of the forge or furnace to be supplied, the specification adds: "The form or shape of the vessel or receptacle is immaterial to the effect, and may be adapted to the local circumstances or situation." Now, the most simple and natural form of an air-vessel, for heating the blast, as here directed, would be a box or chamber, or a cylindrical vessel; but it turned out in practice that a receptacle of this kind would answer the purpose but very imperfectly; and that the best and most useful method was to heat the blast in a series of tubes placed in a heated oven. This was held to be no ground for invalidating the patent, or for preventing it from covering intermediate tubes, as well as an intermediate box or chamber, the jury being of opinion that a man of ordinary skill and knowledge in the construction of blowing and air-heating apparatus would be able, from the information contained in the specification, to erect a machine which would answer some beneficial purpose in the application of the process, and would not be misled and prevented from so doing by the declaration that the form or shape of the vessel or receptacle was immaterial to the effect. In this view of the subject the patent was sustained after very great consideration.

Some question has, indeed, been made whether Neilson's patent was sustained as a patent for a process. The Court of Exchequer, in reviewing the proceedings at the trial, and answering the objection that it was a patent for a principle, said: "It is very difficult to distinguish it from the specification of a patent for a principle, and this at first created in the minds of some of the court much difficulty; but, after full consideration, we think that the plaintiff does not merely claim a principle, but a machine embodying a principle, and a very valuable one. We think the case must be considered as if, the principle being well known, the plaintiff had first invented *a mode of applying it* by a mechanical apparatus to furnaces; and his invention consists in this,—*by interposing a receptacle for heated air between the blowing apparatus and the furnace.* In this receptacle he directs the air to be heated by the application of heat externally to the receptacle, and thus he accomplishes the object of applying the blast, which was before of cold air, in a heated state to the furnace." Web. P. C. 275, 371.

In this passage, we think that the Court of Exchequer (who spoke through Baron Parke) drew the true distinction between a

mere principle, as the subject of a patent, and a process by which a principle is applied to effect a useful result. That a hot-blast is better than a cold-blast for smelting iron in a furnace was the principle or scientific fact discovered by Neilson; and yet, being nothing but a principle, he could not have a patent for that. But having invented and practically exemplified a process for utilizing this principle, namely, that of heating the blast in a receptacle, between the blowing apparatus and the furnace, he was entitled to a patent for that process, although he did not distinctly point out all the forms of apparatus by which the process might be applied,—having, nevertheless, pointed out a particular apparatus for that purpose, and having thus shown that the process could be practically and usefully applied. Another person might invent a better apparatus for applying the process than that pointed out by Neilson, and might obtain a patent for such improved apparatus; but he could not use the process without a license from Neilson. His improved apparatus would, in this respect, stand in a relation to the process analogous to that which an improvement on a patented machine bears to the machine itself.

That Neilson's patent was regarded as for a process is apparent from what is said by the judges who had it under consideration. Thus Baron Parke at the trial had said: "The specification and patent together make it clear what the discovery was: it was the introduction of hot air by means of heating it before it was introduced into the furnace, between the blowing apparatus and the furnace." Web. P. C. 275, 312. And when the matter came before the House of Lords, after a trial in Scotland, Lord Campbell said: "After the construction first put upon it [the patent] by the learned judges of the Court of Exchequer, sanctioned by the high authority of my noble and learned friend now upon the woolsack, when presiding in the Court of Chancery, I think the patent must be taken to extend to all machines, of whatever construction, whereby the air is heated intermediately between the blowing apparatus and the blast furnace. That being so, the learned judge was perfectly justified in telling the jury that it was unnecessary for them to compare one apparatus with another, because, confessedly, that system of conduit pipes was a mode of heating air by an intermediate vessel between the blowing apparatus and the blast furnace, and, therefore, it was an infraction of the patent." Id. 715.

This case of the hot-blast was commented upon in the great case of O'Reilly v. Morse, and is there recognized and approved in the opinion of this court delivered by Chief Justice Taney. After quoting the remarks of Baron Parke in the Court of Exchequer, cited above, the Chief Justice says: "We see nothing in this opinion differing in any degree from the familiar principles of law applicable to patent cases. Neilson claimed no particular mode of constructing

the receptacle, or of heating it. He pointed out the manner in which it *might* be done; but admitted that it might also be done in a variety of ways, and at a higher or lower temperature; and that all of them would produce the effect in a greater or less degree, provided the air was heated by passing through a heated receptacle. * * * Whoever, therefore, used this method of throwing hot air into the furnace, used the process he had invented, and thereby infringed his patent, although the form of the receptacle or the mechanical arrangements for heating it might be different from those described by the patentee. For whatever form was adopted for the receptacle, or whatever mechanical arrangements were made for heating it, the effect would be produced in a greater or less degree, if the heated receptacle was placed between the blower and the furnace, and the current of air passed through it. * * * The patent was supported because he [Neilson] had invented a mechanical apparatus by which a current of hot air, instead of cold, could be thrown in. And this new method was protected by the patent. The interposition of a heated receptacle in any form was the novelty he invented." 15 How. 62, 115, 116.

We have quoted these remarks of the Chief Justice more fully because they show most clearly that he put the same construction upon Neilson's patent that was put upon it by Lord Campbell, and that he fully acquiesced in the legality and validity of a patent for a process. Yet it has been supposed that the decision in O'Reilly v. Morse was adverse to patents for mere processes. The mistake has undoubtedly arisen from confounding a patent for a process with a patent for a mere principle. We think that a careful examination of the judgment in that case will show that nothing adverse to patents for processes is contained in it. The eighth claim of Morse's patent was held to be invalid, because it was regarded by the court as being not for a process, but for a mere principle. It amounted to this, namely, a claim of the exclusive right to the use of electromagnetism as a motive power for making intelligible marks at a distance; that is, a claim to the exclusive use of one of the powers of nature for a particular purpose. It was not a claim of any particular machinery, nor a claim of any particular process for utilizing the power; but a claim of the power itself,—a claim put forward on the ground that the patentee was the first to discover that it *could* be thus employed. This claim the court held could not be sustained.

That this was the true ground of the decision will be manifest from the following observations of the Chief Justice in the opinion already quoted from. * * *

It seems to us that this clear and exact summary of the law affords the key to almost every case that can arise. "Whoever discovers that a certain useful result will be produced in any art by the use of certain means is entitled to a patent for it, provided he speci-

fies the means." But everything turns on the force and meaning of the word "means." It is very certain that the means need not be a machine, or an apparatus; it may, as the court says, be a *process*. A machine is a thing. A process is an act, or a mode of acting. The one is visible to the eye,—an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed. Either may be the means of producing a useful result. The mixing of certain substances together, or the heating of a substance to a certain temperature, is a process. If the mode of doing it, or the apparatus in or by which it may be done, is sufficiently obvious to suggest itself to a person skilled in the particular art, it is enough, in the patent, to point out the process to be performed, without giving supererogatory directions as to the apparatus or method to be employed. If the mode of applying the process is not obvious, then a description of a particular mode by which it may be applied is sufficient. There is, then, a description of the process and of one practical mode in which it may be applied. Perhaps the process is susceptible of being applied in many modes and by the use of many forms of apparatus. The inventor is not bound to describe them all in order to secure to himself the exclusive right to the process, if he is really its inventor or discoverer. But he must describe some particular mode, or some apparatus, by which the process can be applied with at least some beneficial result, in order to show that it is capable of being exhibited and performed in actual experience.

Let us apply these principles to the present case. In the first place, the claim of the patent is not for a mere principle. The chemical principle or scientific fact upon which it is founded is, that the elements of neutral fat require to be severally united with an atomic equivalent of water in order to separate from each other and become free. This chemical fact was not discovered by Tilghman. He only claims to have invented a particular mode of bringing about the desired chemical union between the fatty elements and water. He does not claim every mode of accomplishing this result. He does not claim the lime-saponification process, nor the sulphuric-acid distillation process, and if, as contended, the result was accomplished by Dubrunfaut, Wilson, and Scharling, by means of steam distillation, he does not claim that process. He only claims the process of subjecting to a high degree of heat a mixture continually kept up, of nearly equal quantities of fat and water in a convenient vessel strong enough to resist the effort of the mixture to convert itself into steam. This is most certainly a process. It is clearly pointed out in the specification, and one particular mode of applying it and carrying it into effect is described in detail. But it is not the particular apparatus described which Tilghman desires to secure by his patent. Having pointed out the process and suggested a particular

mode of applying it, he claims as his invention "*the manufacturing of fat acids and glycerine from fatty bodies by the action of water at a high temperature and pressure.*" The true construction of this claim is to be sought by comparing it, as we have already done, with the context of the specification; with the statement of the patentee that his "invention consists of a *process* for producing free fat acids and solution of glycerine from those fatty and oily bodies of animal and vegetable origin, which contain glycerine as a base;" that "for this purpose he subjects these fatty and oily bodies to the action of water at a high temperature and pressure, so as to cause the elements of those bodies to combine with water and thereby obtain at the same time free fat acids and solution of glycerine;" that he "mixes the fatty body to be operated upon with from a third to a half of its bulk of water, and the mixture may be placed in any convenient vessel in which it can be heated to the melting-point of lead" (which is afterwards explained to be only desirable for a quick result, not essential); that "the vessel must be closed and of great strength, so that the requisite amount of pressure may be applied to prevent the conversion of the water into steam." This is the process which the patentee claims to have invented; and this description of it gives the proper construction and qualification to the claim.

62. NEW PROCESS FERMENTATION CO. v. MAUS, 122 U. S. 413, 30 L. ed. 1193, 7 Sup. Ct. 1304 (1887).

BLATCHFORD, J. This is a suit in equity, brought in the circuit court of the United States for the district of Indiana, by the New Process Fermentation Company, an Illinois corporation, against Magdalena Maus, Albert C. Maus, Casper J. Maus, Frank A. Maus, and Mathias A. Maus, for the infringement of letters patent No. 215,679, granted May 20, 1879, to George Bartholomae, as assignee of Leonard Meller and Edmund Hofmann, as inventors, for an "improvement in processes for making beer," subject to the limitation prescribed by section 4887 of the Revised Statutes, by reason of the inventions having been patented in France, November 30, 1876, and in Belgium, February 28, 1877. * * *

The third claim of the patent is as follows: "(3) The process of preparing and preserving beer for the market, which consists in holding it under controllable pressure of carbonic acid gas from the beginning of the *kraeusen* stage until such time as it is transferred to kegs and bunged, substantially as described." This claim covers the real invention of the process of the patentees, if it be their invention and be patentable as a process.

The circuit court, in its opinion (20 Fed. Rep. 725, 733,) held that the most that could be claimed by the patentees was that they applied the controllable pressure, created by the carbonic acid gas

in a state of fermentation, at an earlier stage than was before known; that the essential parts of the apparatus used were known before; that the same controllable pressure had been applied at various stages of the manufacture; that the application at one stage of the condition of the beer instead of another would seem not to involve anything more than a mere mechanical change, which could be employed by any one skilled in the art; and that the claim of the patent for a particular process, irrespective of the mechanical devices claimed (which the defendants had not used) could not be sustained. But we think that in this view the court erred, and that the third claim of the patent is a valid claim for the process covered by it and described in the specification. The testimony is very full and clear that, as a process, it was not known or used before in the art of making beer; that it worked a valuable and important change in that art, in the particulars set forth in the specification; that it went at once extensively into use, both in Europe and in the United States; and that it was recognized as a new and valuable invention, in published works on the subject, immediately after it was made known.

* * * The invention of the patentees covered by claim 3 is, as stated before, applicable to the beer in the *kraeusen* stage in the shavings casks. The shavings in these casks are thin strips of white beech, hazel-nut, or other suitable wood, placed lengthwise of the cask, on its bottom, opposite the bung-hole, and used as a fining medium. Being porous, they absorb the turbid ingredients in the beer, and also mechanically arrest them, when precipitated. The *kraeusen* beer which is added to the contents of the shavings casks, to produce fermentation, is young beer, in full fermentation, the beer or wort to which the *kraeusen* beer is added in the shavings casks being itself comparatively flat and not clarified.

Vent-bungs of various descriptions existed before, but were used towards the last stage of the fermentation of the beer in the *kraeusen* stage in the shavings casks, to confine mechanically the very last of the slowly generating gas, the valve or vent in the bung operating to prevent overpressure or "overbunging," in case there should be delay in drawing off the beer after it became ready for market. The effect of the accumulation of the carbonic acid gas generated in the later stages of the fermentation was and is to impart more effervescence to the beer. The invention of the patentees is entirely independent of the old and well-known vent-bungs, and of any prior apparatus for preventing overbunging. It is for the process of bunging the cask simultaneously with the commencement of the active fermentation of the beer in the *kraeusen* stage. It utilizes the gas to clarify the beer, the pressure of the gas causing the impurities quickly and permanently to deposit themselves on the bottom and sides of the cask, instead of being removed, as in the old method, by

overflowing and slow deposit. Professor Haines says: "The novelty and characteristic feature of the process, by which its excellent results are produced, chiefly arises from its introducing an automatically-acting process at an earlier stage of the preparation of beer than has been practiced by other devices. This earlier bunging produces a number of valuable results, one of the most valuable of which is the rapid clarification of the beer. By placing the actively fermenting liquid under adequate, automatically controlled pressure, and keeping it thus under pressure until drawn off for use, the beer ferments more equably, less sediment is produced, and clarification is more rapid and more certain. It is, then, as I understand it, not the mechanical application of pressure, but the application of a suitable pressure, beginning with the second active fermentation of the beer and continuing to the close, that constitutes the most valuable and novel feature of this process." * * *

Within the rules laid down by this court in Corning v. Burden, 15 How. 252, 267, in Cochrane v. Deener, 94 U. S. 780, 787, 788, and in Tilghman v. Proctor, 102 U. S. 707, 722, 724, 725, we think that the method or art covered by the third claim of the patent is patentable as a process, irrespective of the apparatus or instrumentality for carrying it out. It is the performing of a series of acts upon the beer in the *kræusen* stage, producing new and useful results in the art of making marketable beer. The process consists not in merely applying an apparatus to the cask at some period of the *kræusen* stage of the beer, but consists in this: that when the beer has been put into the casks, and the *kræusen* beer is added to it, and the apparatus is applied at the beginning of the *kræusen* stage, the beer will be kept under a controllable pressure of carbonic acid gas until such time as it is fit to be transferred to the kegs for market, such pressure resulting in the complete and speedy clarification of the beer, although it is in a state of active fermentation in the closed shavings casks, with the incidental results of no loss of beer, no fouling of the casks or the cellar, no alteration of the flavor of the beer, and no danger to the health of the workmen. This is, as was said in Cochrane v. Deener, "a mode of treatment of certain materials to produce a given result," and "an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing," and "requires that certain things should be done with certain substances, and in a certain order." It is therefore a process or art. The apparatus for carrying out the process is of secondary consequence, and may itself be old, separately considered, without invalidating the patent, if the process be new and produces a new result.

There appears, also, to be a new principle of action involved in the invention of the patentees. The carbonic acid gas generated by the fermentation in the cask, instead of being allowed to continually

ascend, as it does with an open bung-hole, keeping the liquid constantly in a turbid state and overflowing at the bung-hole, is made, as stated in the specification, to first accumulate in the space above the beer in the closed cask, until the pressure is such that the gas overcomes the density of the beer, and enters it again, and charges it up to the pressure at which the water column is set, thus creating an equilibrium between the rising bubbles of gas and the pressure above, so that gravity can act on the yeast and impurities, and carry them down so that they will remain with the shavings at the bottom. This is a new use, in the treatment of fermenting beer, of the carbonic acid gas which it generates, and a new method or process of hastening the clarifying and settling of the beer.

This being the proper construction of the third claim of the patent, we are prepared to consider the question of the novelty of the process covered by the claim, in the light in which it has been explained.

The United States patent to George Wallace, No. 62,581, granted March 5, 1867, does not exhibit any such process. The apparatus shown in it acted on a directly opposite principle, and was designed to stir up the fermenting medium, and accelerate the fermentation and decomposition of mash. Professor Haines says, in regard to it: "I have examined the Wallace patent, and compared it with the process and apparatus of Meller and Hofmann. In my opinion, the two are radically different. The Wallace patent introduces to the bottom of one fermenting tank a pipe which is connected with the upper portion of the other fermenting cask. Now, if any excess of pressure should occur in either cask over what there is in the other, a quantity of carbonic acid gas will be forced to the very bottom of the cask having the smaller pressure, and in this way the yeast and other sediment will be thoroughly stirred up and diffused through the fermenting liquid. This would unquestionably increase the rapidity of fermentation, but it would accomplish exactly the opposite result of what the Meller and Hofmann process contemplates; namely, the forcing down of the sediment, so as to clarify the beer, and not its agitation and dissemination through the fluid. It seems to me, therefore, that the Wallace apparatus and process, as figured and described in patent 62,581, would not and could not be used for the same purposes that the Meller and Hofmann process is employed." Dr. Ruschhaupt testifies to the same effect. * * *

It is testified that the appellant's process of treating beer under the automatically controllable pressure of carbonic acid gas is of great value in the brewing business, and has come into general use, and been put up in about 80 breweries, many of which are among the largest in the United States. * * *

We have confined our consideration of this case to the third claim of the patent, as that is the one which distinctly embodies the inven-

tion of the patentees, and it has been infringed by the defendants. It will be time enough to consider the other process claims, and the eighth claim, in cases involving their infringement, where the third claim is not also infringed. In the present case, it appears that the defendants have used "the process of preparing and preserving beer for the market," by "holding it under controllable pressure of carbonic acid gas from the beginning of the *kraeusen* stage until such time as it is transferred to kegs and bunged, substantially as described" in the specification of the patent.

The decree of the circuit court is reversed, and the case is remanded to that court, with a direction to enter a decree establishing the validity of the third claim of the patent, and awarding a perpetual injunction, and an account of profits and damages, and to take such further proceedings in the suit as may not be inconsistent with this opinion.

63. TELEPHONE CASES, 126 U. S. 1, 31 L. ed. 863, 8 Sup. Ct. 778 (1887, Patents Nos. 174,465, 186,787).

[The figures following illustrate the distinction between the telegraph and the telephone; the microphone which has made the telephone a commercial success, and the features of the earliest form of telephone and the telephones of two of Bell's principal rivals, Gray and Drawbaugh.

Fig. 1 is a diagram representing the simplest form of Morse telegraph without relay. The electricity furnished by the battery 1 goes to the key 2. When the key is "open," i. e., in the position shown, as it normally is, the current of electricity goes no farther. When the finger of the operator depresses the key so that it touches the anvil 3, the electric current passes through the line 4, through the coils of the receiver magnet 5, to the ground at 6, thence through the earth to the ground point 7, and back to the other pole of the battery. When the key 2 is lifted the electric current is interrupted and stops altogether. When the current flows through the receiver 5 it magnetizes the core and thus pulls down the armature 8; when the flow of electricity stops the core ceases to be magnetized and the spring 9 pulls up the armature. The operator at the receiver is aware, by watching the armature, or listening for its click, when the sender depresses his key and when he raises it. By the conventional signals of the Morse alphabet, that is dashes and dots based on the relative length of time the key is held down, these motions represent letters and thus words.

In the actual apparatus as first constructed there was also an elaborate printing mechanism by which these dots and dashes of the Morse alphabet were printed as the armature moved up and down.

In the Morse telegraph the electrical changes are created by interrupting a current, that is by making and breaking the circuit.

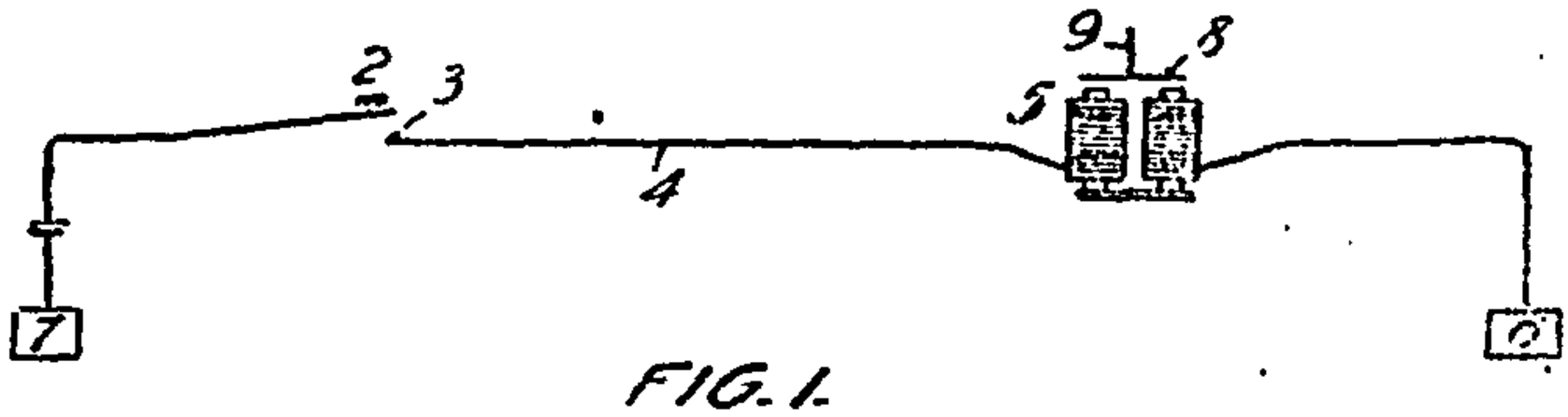


FIG. 1.

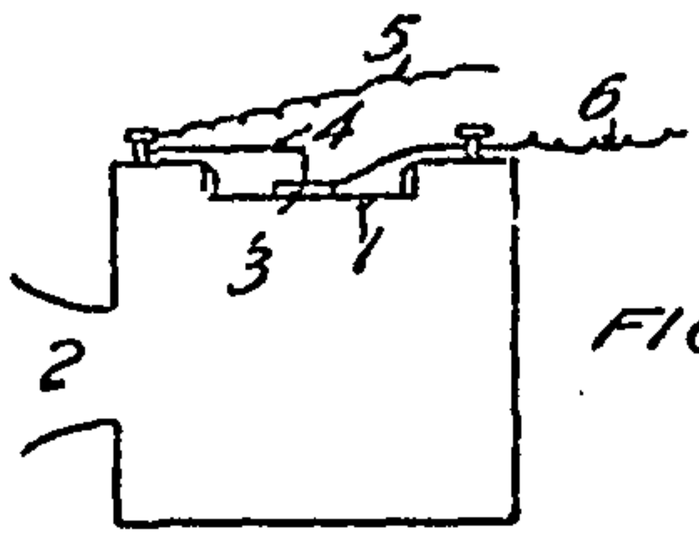


FIG 2

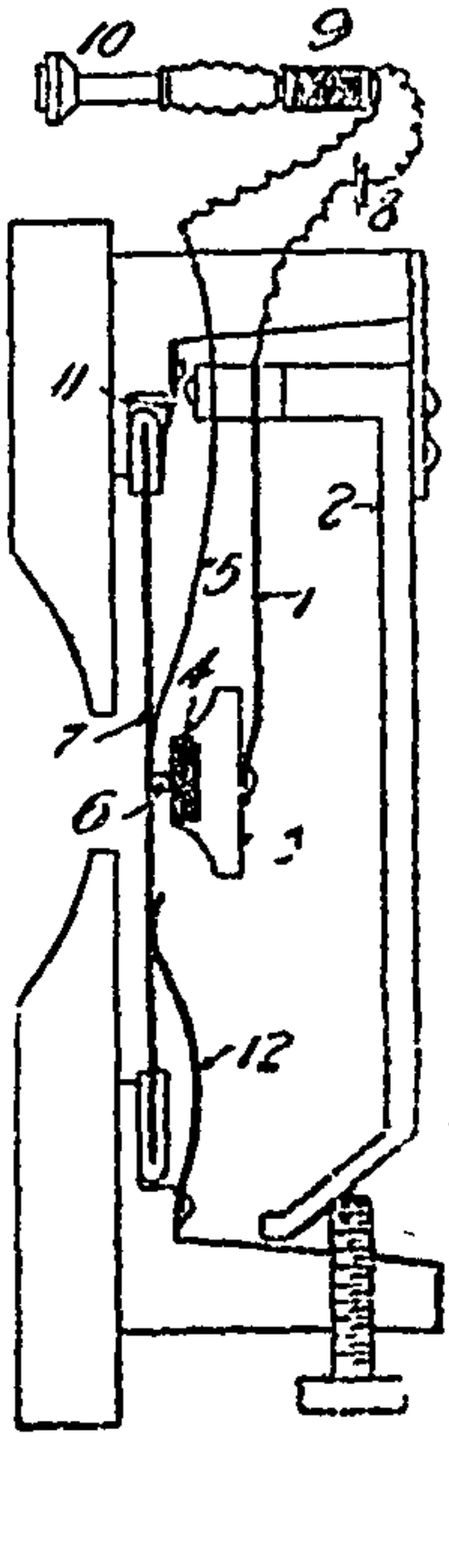


FIG. 4.

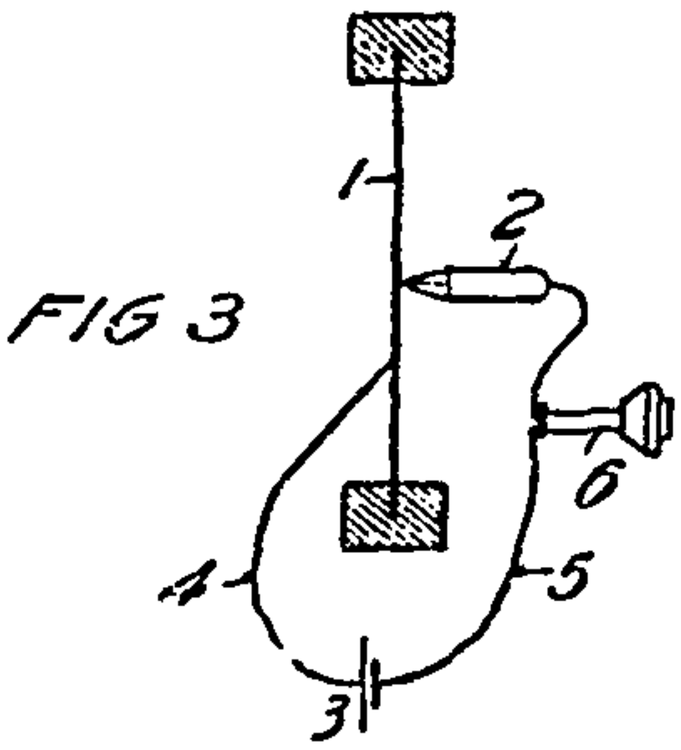


FIG 3

Fig. 2 represents the principle of the Reis telephone which was the principal citation against the validity of the Bell patent and which preceded Bell by at least fifteen years. In this appa-

ratus of Fig. 2, a membrane 1 stretched on the cover of a box was exposed to sound waves entering the tube 2 below the membrane and these sound waves vibrated the membrane, the frequency of the vibrations corresponding to the pitch of the sound. On the center of the membrane 1 was cemented a patch of platinum 3, which was connected with one pole of a battery. On the top of the apparatus was a hopping piece of metal 4, one end of which rested on the frame work and the other, terminating in a little leg, rested on the platinum patch 3. This hopping piece was connected with the other pole of the battery and the circuit was completed by the contact of the leg of the hopping piece and the platinum patch at 3. If this end of the hopping piece 4 be lifted up the circuit is broken and the current ceases. If the membrane be rather thin, such as sausage skin, which Reis employed, and the hopping piece quite light, sound waves of no greater strength than those ordinarily produced by the voice—especially when the sound continues of the same pitch for an appreciable time, as in the case of musical notes—will set the membrane into vibration sufficiently violent to throw the end of the hopping piece up into the air, and thus break the circuit and interrupt the current through the battery which, it is understood, lies between the ends of the coiled wires 5 and 6. It is apparent that this apparatus operated on the make and break principle. That is, it was a modification of the telegraphic principle. It operated to transmit musical notes because musical notes do not have that peculiar quality of the human voice which requires a continuous current to properly join the sounds of the human voice in talking so that the words may be intelligible. That is to say, that sound waves would vibrate the contact pin 3 but when that was done a certain portion of the effect of the sound waves would be lost when the contact was broken, so that the principle of the Reis telephone could not be applied to transmitting the undulations occasioned by the voice in speaking.

Fig. 3 illustrates the principle of the microphone, the feature of the telephone which gives it power and certainty. If a wire be cut at the ends and separated by even a minute distance an electric current will not pass through. If the ends of the wire be brought together the current will pass but not as well as before it was cut, because mere mechanical contact does not give the perfect union of the molecules which is the feature of an uncut wire.

If the two wire ends are lightly brought together the union will be so poor that while a current of electricity will pass it will be a feeble current; if the two wire ends are pressed together vigorously the union is better and the current will be stronger.

The point of this is that the strength of the electric current can be varied by varying the force with which one wire-end or electrode, is pressed against the other.

In Fig. 3, 1 represents the diaphragm of a telephone transmitter. This corresponds to one electrode. The other electrode is shown at 2 with a pointed end pressed against the diaphragm. The battery is indicated at 3 and the wire connections at 4 and 5. 6 represents a receiver. Now, if the diaphragm 1 receives the impact of sound waves, the diaphragm will be moved alternately away and from the electrode 2 and if this be done within so small a range as not to part the contact at the point of the electrode 2, the electric current will be varied in accordance with these motions.

This represents the variable resistance feature which is an essential feature of practical or commercial telephones. Various forms of these microphones have been since invented and so perfected that they have rendered possible long distance telephony. It may be mentioned incidentally that it was acertained that the telephone worked best if one of the electrodes was made of carbon, and that it was later ascertained that the most delicate form was where the diaphragm vibrated against powdered charcoal or similar carbon.

A commercial form of the microphone is illustrated in Fig. 4 which illustrates the Blake transmitter.

1 is a spring of steel, one one-hundredth of an inch thick, and about one-eighth of an inch wide, fastened at its upper end to a heavy lever 2. Its lower end carries a weight—a piece of brass—3, which holds a bit of carbon 4. Another much slimmer spring 5, fastened at its upper end carries at its lower end a little pinhead of platinum 6 which rests against the diaphragm 7, and which, indeed, may be soldered to it. The spring 1 presses towards the diaphragm so that its effect is to keep the carbon 4 in contact with the platinum pin 6 and to press the pin 6 against the diaphragm and make it move with the diaphragm, if it is not already soldered to the latter. The current from a battery 8 goes down the spring 1 to the brass 3, thence to the carbon 4, thence through the contact of 4 and 6 to the pin 6, thence up the spring 5 which is insulated from 1 by the interposition between them of an insulating block, forming a part of the lever 2, thence to the induction coil 9 and back to the battery 8. By means of the induction coil this circuit is connected with the receiver 10. Incidentally, the diaphragm is held in place by two springs 11, 12. When the brass 3 is pulled or thrown backward away from the diaphragm the contact of 4 and 6 is broken and the current ceases to pass. A sharp blow on the front of the diaphragm will throw the weight 2 back and break the current. But the stiffness of the diaphragm and the strength of the spring 1 (the tension of which may be varied by means of the lever 2 and an adjusting screw 13 working against a bent part) and the mass or weight of the brass 1 are so proportioned that ordinary vibrations

given to the diaphragm 7 by the voice will not throw off the weight and break the contact. On the other hand, as the diaphragm

FIG. 5.

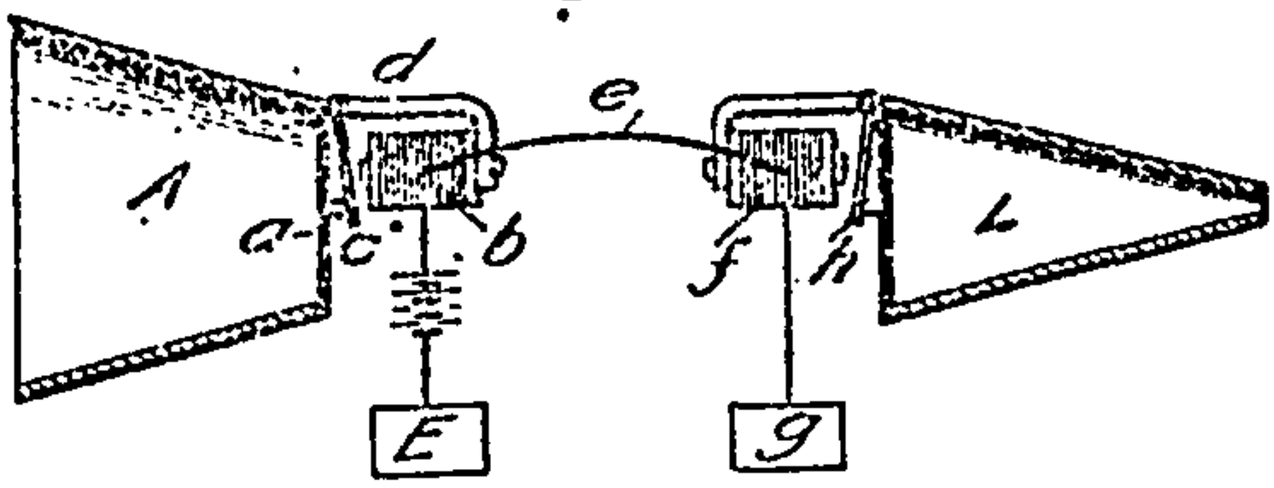
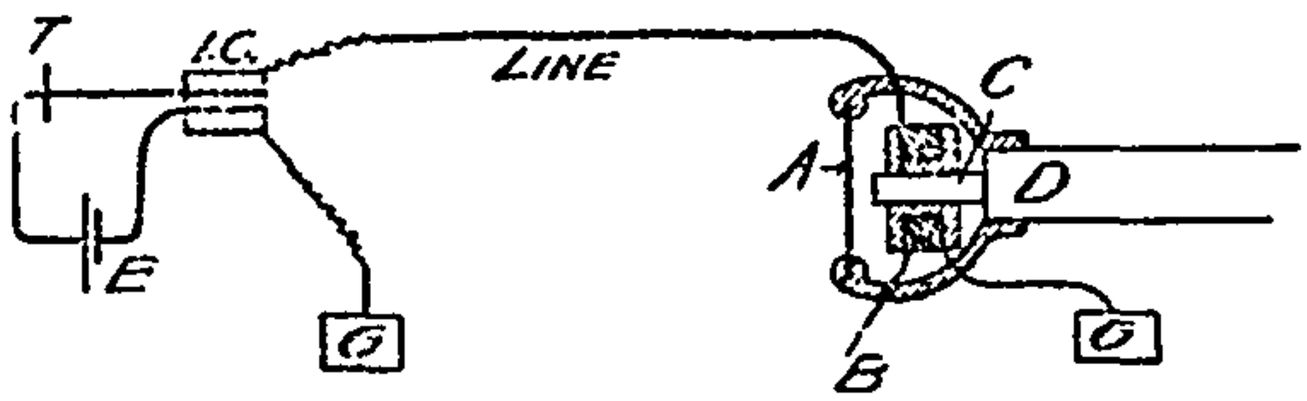


FIG. 6.



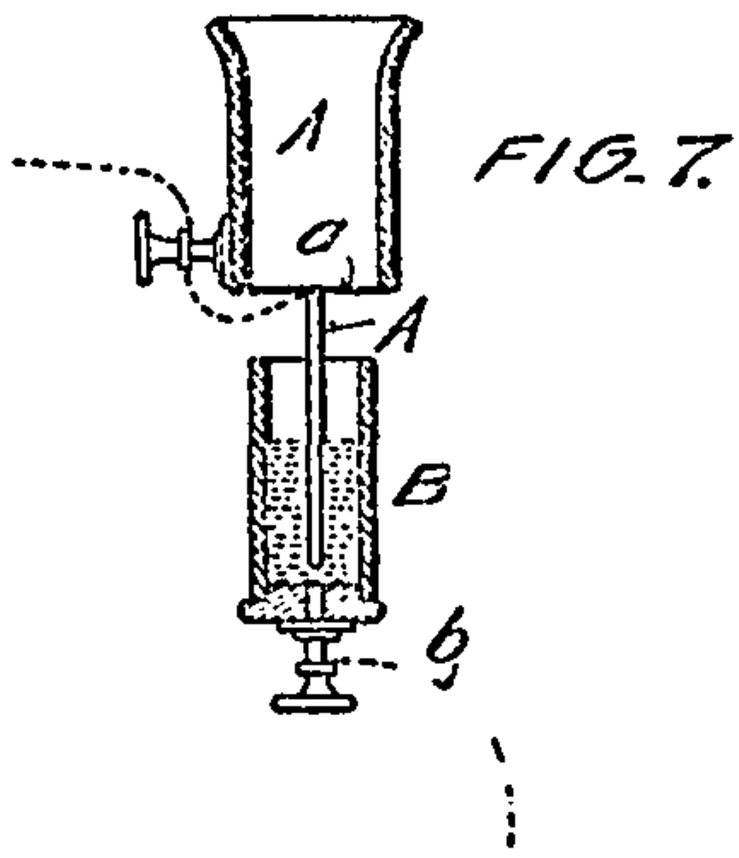
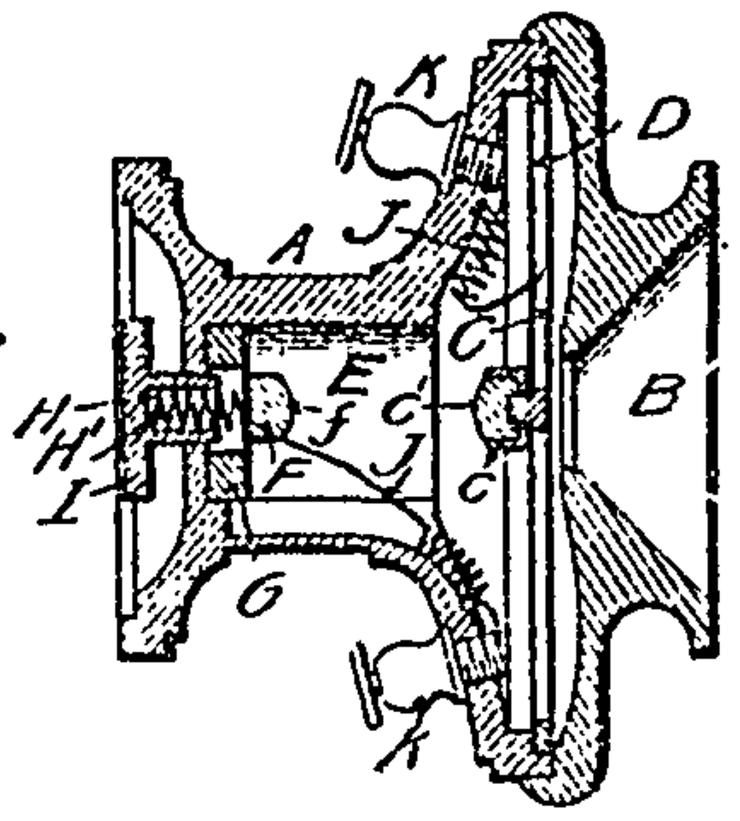


FIG. 7.

FIG. 8



7 moves towards or away from the weight 2 the inertia of the weight develops an increased pressure of the contact of 4 and 6

when the diaphragm is endeavoring to push it back, and a diminished pressure at the same place when the diaphragm recedes. It will be apparent that this commercial transmitter forms a delicate instrument for transmitting the undulations caused by the human voice in speaking. This transmitter is discussed at some length because no such completed commercial transmitter is found in the Bell patent illustrated at Fig. 5.

In the Bell patent there were additional figures but this figure was the main one used to illustrate the principle of the invention. This figure, which is Fig. 7 of the patent, is thus described by Bell in his patent:

"The armature c, Fig. 7, is fastened loosely by one extremity to the uncovered leg d of the electro-magnet b, and its other extremity is attached to the center of a stretched membrane a. A cone, A, is used to converge sound vibrations upon the membrane. When a sound is uttered in the cone the membrane a is set in vibration, the armature c is forced to partake of the motion, and thus electrical undulations are created upon the circuit E b e f g. These undulations are similar in form to the air vibrations caused by the sound: that is they are represented graphically by similar curves. The undulatory current passing through the electro-magnet f influences its armature h to copy the motion of the armature c. A similar sound to that uttered into A is then heard to proceed from L."

The statement of the patent also fully bore out the principle discussed, which was as stated in claim 5:

"5. The method of and apparatus for transmitting vocal or other sounds telegraphically, as herein described by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."

In Fig. 6 is illustrated the form which the Bell telephone took in the fall of 1878 when it was put to commercial use. In this illustration the transmitter is indicated at T, the battery at B, with the connecting wires leading into the induction coil IC. The rest of the circuit is shown by the wire marked "Line" and leading to the ground G. The receiver more fully illustrates these parts, the diaphragm being shown at A, the battery at B, the core of the magnet at C, joined to the handle D which is now in much the same form in the ordinary receiver, it being customary in the present form to attach the wires at the outer end of the handle. It will be observed that this form uses an induction coil by which every varying impulse passing through the primary helix of the coil generates anew in a second helix an exactly corresponding electrical impulse. This induction coil is used because it generates what is called a greater electro-motive force than the battery alone gives—a force better fitted to over-

come the resistance of a long line when a small battery is used. The principle of operation is essentially the same in both the Bell patent and in the commercial form notwithstanding the striking difference in detail and appearance.

Fig. 7 illustrates the transmitter of the Gray caveat. The caveat was filed in the patent office on February 14, 1876. This figure shows a chamber A across the end of which is stretched a diaphragm a of some thin substance such as a parchment or gold beaters' skin. A′ is a light metal conductor of electricity extending into a vessel B of glass or other insulating material, having its lower end closed by a plug which may be of metal, and through which passes a conductor b forming part of the circuit. If the vessel B be partly filled with some liquid possessing high resistance, such, for instance, as water, the vibrations of the plunger or rod A′, which does not quite touch the conductor b, will cause variations in resistance, and consequently, in the potential of the current passing through the rod A′.

It will be apparent that this construction will provide a variable resistance. That is to say, the current will be weaker or stronger as the conducting rod A′ moves up or down and as the current has to pass through more or less of the liquid which resists the passage of the electricity in a greater degree than does the rod. This apparatus, therefore, discloses the principle at the base of the Bell patent and even carries it further in a certain sense, because it fairly discloses and describes not only the plan of holding on to the current and not permitting a make or break, but also the variable resistance idea. It was held, however, that Gray had not completed his invention, either actually by making and testing a telephone or constructively by filing an application.

Fig. 8 illustrates one of the exhibits presented by Drawbaugh and which he testified had been completed in the form shown in this figure prior to the invention of Bell. It will be observed that the Drawbaugh instrument illustrates a form of telephone which at the date of the trial of the cause was of the latest form, that is, according to Drawbaugh's testimony before Bell or any of the others had conceived this invention he had actually made and produced this finished telephone with its carbon microphone transmitter.

The parts indicated are as follows: A, body of instrument. B, cap of same. C, diaphragm. c, carbon cup on diaphragm; brass. c′, carbon ball in cup c. D, cardboard ring. E, recess for carbon holder. F, lower carbon cup; brass. i, carbon ball in same. G, wood ring. H, recess in adjusting screw. H′, spiral spring in same. I, screw; adjusting. J, wires or conductors. K, screw cups.

The final decision of the supreme court was for Bell by a vote of four to three. To make a complete study of this case one should read carefully the able opinion of Judge Wallace in the lower court sustaining the Bell patent and analyzing the testimony. It is the consensus of opinion that the factor which weighed most in Bell's favor was the fact that he was the one who had put the invention to use, had brought it before the public.

Bell had studied and experimented with the Reis telephone. A coin laid upon the hopping piece 4 of the Reis telephone would have made it a speaking telephone. That is, anything which would have kept that piece from hopping, from making and breaking the circuit, would have made it identical in principle and operation with the telephone as illustrated in the Bell patent. Bell when he prevented the make and break at the same time realized its meaning in the application of the transmission of vibrations caused by the human voice, and he also realized then the reason for having the undulations continuous so as to transmit not merely loudness and pitch, but also the quality, the peculiar characteristics of the voice in speaking. In his patent Bell showed an apparatus for creating a varying current. In the telephone as used and as illustrated by Gray in his caveat, the principle was of varying the strength of a current. Thus if Reis had at some time made the part 4 heavier he might have discovered by the results that it would transmit the vibrations made by the voice in speaking. If Gray had filed an application instead of a caveat he might have been adjudged the prior inventor. If Drawbaugh could have produced one positive proof of prior disclosure and demonstration of his invention to the public he would have succeeded as against both Gray and Bell. But after a trial involving fourteen thousand pages of record, the examination of hundreds of witnesses, the testimony of many experts and the elaborate arguments of counsel, the decision was rendered in favor of Bell who had unquestionably made an original invention, whether the first to conceive or not, and who had unquestionably disclosed his invention in the most public manner.

Waite, C. J.: * * * The important question which meets us at the outset in each of these cases is as to the scope of the fifth claim of the patent of March 7, 1876, which is as follows: "The method of and apparatus for transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth." It is contended that this embraces the art of transferring to or impressing upon a current of electricity the vibrations of air produced by the human voice in articulate speech, in

a way that the speech will be carried to and received by a listener at a distance on the line of the current. Articulate speech is not mentioned by name in the patent. The invention, as described, "consists in the employment of a vibratory or undulatory current of electricity, in contradistinction to a merely intermittent or pulsatory current, and of a method of and apparatus for producing electrical undulations upon the line wire." A "pulsatory current" is described as one "caused by sudden or instantaneous changes of intensity;" and an "electrical undulation," as the result of "gradual changes of intensity exactly analogous to the changes in the density of air occasioned by simple pendulous vibrations." Among the uses to which this art may be put is said to be the "telegraphic transmission of noises or sounds of any kind;" and it is also said that the undulatory current, when created in the way pointed out, will produce through the receiver at the receiving end of the line "a similar sound to that uttered into" the transmitter at the transmitting end. One of the means of imparting the necessary vibrations, through the transmitter, to produce the undulations, may be the human voice. Articulate speech is certainly included in this description, for it is an "uttered" "sound," produced by the "human voice." It is contended, however, that "vocal sounds" and "articulate speech" are not convertible terms, either in accoustics or in telegraphy. It is unnecessary to determine whether this is so or not. Articulate speech necessarily implies a sound produced by the human voice; and as the patent on its face is for the art of changing the intensity of a continuous current of electricity by the undulations of the air caused by sonorous vibrations, and speech can only be communicated by such vibrations, the transmission of speech in this way must be included in the art. The question is not whether "vocal sounds" and "articulate speech" are used synonymously as scientific terms, but whether the sound of articulate speech is one of the "vocal or other sounds" referred to in this claim of the patent. We have no hesitation in saying that it is, and that, if the patent can be sustained to the full extent of what is now contended for, it gives to Bell, and those who claim under him, the exclusive use of his art for that purpose until the expiration of the statutory term of his patented rights.

In this art—or, what is the same thing under the patent law, this process, this way, of transmitting speech—electricity, one of the forces of nature, is employed; but electricity, left to itself, will not do what is wanted. The art consists in so controlling the force as to make it accomplish the purpose. It had long been believed that, if the vibrations of air caused by the voice in speaking could be reproduced at a distance by means of electricity, the speech itself would be reproduced and understood. How to do it was the question. Bell discovered that it could be done by gradually changing the intensity of a continuous electric current, so as to make it corre-

spond exactly to the changes in the density of the air caused by the sound of the voice. This was his art. He then devised a way in which these changes of intensity could be made, and speech actually transmitted. Thus his art was put in a condition for practical use. In doing this, both discovery and invention, in the popular sense of those terms, were involved; discovery in finding the art, and invention in devising the means of making it useful. For such discoveries and such inventions the law has given the discoverer and inventor the right to a patent, as discoverer, for the useful art, process, method of doing a thing, he has found; and, as inventor, for the means he has devised to make his discovery one of actual value. Other inventors may compete with him for the ways of giving effect to the discovery, but the new art he has found will belong to him, and those claiming under him, during the life of his patent. If another discovers a different art or method of doing the same thing, reduces it to practical use, and gets a patent for his discovery, the new discovery will be the property of the new discoverer; and thereafter the two will be permitted to operate each in his own way, without interference by the other. The only question between them will be whether the second discovery is in fact different from the first. The patent for the art does not necessarily involve a patent for the particular means employed for using it. Indeed, the mention of any means, in the specification or descriptive portion of the patent, is only necessary to show that the art can be used; for it is only useful arts—arts which may be used to advantage—that can be made the subject of a patent. The language of the statute is that "any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter" may obtain a patent therefor. Rev. St., § 4886. Thus, an art—a process—which is useful, is as much the subject of a patent as a machine, manufacture, or composition of matter. Of this there can be no doubt, and it is abundantly supported by authority. Corning v. Burden, 15 How. 252, 267; Cochrane v. Deener, 94 U. S. 780, 787, 788; Tilghman v. Proctor, 102 U. S. 707, 722, 724, 725; Fermentation Co. v. Maus, 122 U. S. 413, 427, 428, 7 Sup. Ct. Rep. 304. What Bell claims is the art of creating changes of intensity in a continuous current of electricity, exactly corresponding to the changes of density in the air caused by the vibrations which accompany vocal or other sounds, and of using that electrical condition, thus created, for sending and receiving articulate speech telegraphically. For that, among other things, his patent of 1876 was, in our opinion, issued; and the point to be decided is whether, as such a patent, it can be sustained.

In O'Reilly v. Morse, 15 How. 62, it was decided that a claim in broad terms (page 86) for the use of the motive power of the electric or galvanic current called "electro-magnetism, however developed, for making or printing intelligible characters, letters, or

signs, at any distances," although "a new application of that power" first made by Morse, was void, because (page 120) it was a claim "for a patent for an effect produced by the use of electro-magnetism, distinct from the process or machinery necessary to produce it;" but a claim (page 85) for "making use of the motive power of magnetism, when developed by the action of such current or currents, substantially as set forth in the foregoing description, * * * as means of operating or giving motion to machinery, which may be used to imprint signals upon paper or other suitable material, or to produce sounds in any desired manner, for the purpose of telegraphic communication at any distances," was sustained. The effect of that decision was, therefore, that the use of magnetism as a motive power, without regard to the particular process with which it was connected in the patent, could not be claimed, but that its use in that connection could.

In the present case the claim is not for the use of a current of electricity in its natural state as it comes from the battery, but for putting a continuous current, in a closed circuit, into a certain specified condition, suited to the transmission of vocal and other sounds, and using it in that condition for that purpose. So far as at present known, without this peculiar change in its condition it will not serve as a medium for the transmission of speech, but with the change it will. Bell was the first to discover this fact, and how to put such a current in such a condition; and what he claims is its use in that condition for that purpose, just as Morse claimed his current in his condition for his purpose. We see nothing in Morse's case to defeat Bell's claim; on the contrary, it is in all respects sustained by that authority. It may be that electricity cannot be used at all for the transmission of speech, except in the way Bell has discovered, and that therefore, practically, his patent gives him its exclusive use for that purpose; but that does not make his claim one for the use of electricity distinct from the particular process with which it is connected in his patent. It will, if true, show more clearly the great importance of his discovery, but it will not invalidate his patent.

But it is insisted that the claim cannot be sustained because, when the patent was issued, Bell had not in fact completed his discovery. While it is conceded that he was acting on the right principle, and had adopted the true theory, it is claimed that the discovery lacked that practical development which was necessary to make it patentable. In the language of counsel, "there was still work to be done, and work calling for the exercise of the utmost ingenuity, and calling for the very highest degree of practical invention." It is quite true that when Bell applied for his patent he had never actually transmitted telegraphically spoken words so that they could be distinctly heard and understood at the receiving end of his line; but in his specification he did describe accurately,

and with admirable clearness, his process,—that is to say, the exact electrical condition that must be created to accomplish his purpose,—and he also described, with sufficient precision to enable one of ordinary skill in such matters to make it, a form of apparatus which, if used in the way pointed out, would produce the required effect, receive the words, and carry them to and deliver them at the appointed place. The particular instrument which he had, and which he used in his experiments, did not, under the circumstances in which it was tried, reproduce the words spoken so that they could be clearly understood; but the proof is abundant, and of the most convincing character, that other instruments, carefully constructed, and made exactly in accordance with the specification, without any additions whatever, have operated, and will operate, successfully. A good mechanic, of proper skill in matters of the kind, can take the patent, and, by following the specification strictly, can, without more, construct an apparatus which, when used in the way pointed out, will do all that it is claimed the method or process will do. Some witnesses have testified that they were unable to do it. This shows that they, with the particular apparatus they had, and the skill they employed in its use, were not successful; not that others, with another apparatus, perhaps more carefully constructed, or more skillfully applied, would necesarily fail. As was said in Loom Co. v. Higgins, 105 U. S. 580, 586, "when the question is whether a thing can be done or not, it is always easy to find persons ready to show how not to do it." If one succeeds, that is enough, no matter how many others fail. The opposite results will show that in the one case the apparatus used was properly made, carefully adjusted, with a knowledge of what was required, and skillfully used, and that in the others it was not. The law does not require that a discoverer or inventor, in order to get a patent for a process, must have succeeded in bringing his art to the highest degree of perfection; it is enough if he describes his method with sufficient clearness and precision to enable those skilled in the matter to understand what the process is, and if he points out some practicable way of putting it into operation. This Bell did. He described clearly and distinctly his process of transmitting speech telegraphically, by creating changes in the intensity of a continuous current or flow of electricity, in a closed circuit, exactly analogous to the changes of density in air occasioned by the undulatory motion given to it by the human voice in speaking. He then pointed out two ways in which this might be done: One, by the "vibration or motion of bodies capable of inductive action, or by the vibration of the conducting wire itself in the neighborhood of such bodies;" and the other, "by alternately increasing and diminishing the resistance of the circuit, or by alternately increasing and diminishing the power of the battery." He then said he preferred to employ for his purpose "an electro-magnet.

* * * having a coil upon only one of its legs," and he described the construction of the particular apparatus shown in the patent as Fig. 7, in which the electro-magnet, or magneto method, was employed. This was the apparatus which he himself used without entirely satisfactory results, but which Prof. Cross, Mr. Watson, Dr. Blake, Prof. Pope, and others testify has done, and will do, what was claimed for it, and transmit speech successfully, but not so well, indeed, as another constructed upon the principle of the microphone or the variable resistance method.

An effort was made, in argument, to confine the patent to the magneto instrument, and such modes of creating electrical undulations as could be produced by that form of apparatus; the position being that such an apparatus necessarily implied "a closed circuit, incapable of being opened, and a continuous current, incapable of being intermittent." But this argument ignores the fact that the claim is—First, for the process; and, second, for the apparatus. It is to be read (1) as a claim for "the method of transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth;" and (2) as for "the apparatus for transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations, * * * substantially as set forth." The method, "as herein described," is to cause gradual changes in the intensity of the electric current used as the medium of transmission, which shall be exactly analogous to the changes in the density of the air occasioned by the peculiarities in the shapes of the undulations produced in speech, in the manner "substantially as set forth:" that is to say, "by the vibration or motion of bodies capable of inductive action, or by the vibration of the conducting wire itself in the neighborhood of such bodies," which is the magneto method; or "by alternately increasing and diminishing the resistance of the circuit, or by alternately increasing and diminishing the power of the battery:" which is the variable resistance method. This is the process which has been patented, and it may be operated in either of the ways set forth. The current must be kept closed, to be used successfully; but this does not necessarily imply that it must be so produced, or so operated upon, as to be incapable of being opened. If opened, it will fail to act for the time being, and the process will be interrupted; but there is nothing in the patent which requires it to be operated by instruments which are incapable of making the break. The apparatus, "as herein described," which is included in the claim, is undoubtedly one in which an electro-magnet is employed, and constructed "substantially as set forth" in the specification. One acting on the variable resistance mode is not described, further than to say that the vibration of the conducting wire in mer-

cury, or other liquid, included in the circuit, occasions undulations in the current, and no other special directions are given as to the manner in which it must be constructed. The patent is both for the magneto and variable resistance methods, and for the particular magneto apparatus which is described, or its equivalent. There is no patent for any variable resistance apparatus. It is undoubtedly true that when Bell got his patent he thought the magneto method was the best. Indeed, he said, in express terms, he preferred it; but that does not exclude the use of the other, if it turns out to be the most desirable way of using the process under any circumstances. Both forms of apparatus operate on a closed circuit by gradual changes of intensity, and not by alternately making and breaking the circuit, or by sudden and instantaneous changes, and they each require to be so adjusted as to prevent interruptions. If they break, it is a fault, and the process stops until the connection is restored.

It is again said that the claim, if given this broad construction, is virtually "a claim for speech transmission by transmitting it; or, in other words, for all such doing of a thing as is provable by doing it." It is true that Bell transmits speech by transmitting it, and that long before he did so it was believed by scientists that it could be done by means of electricity, if the requisite electrical effect could be produced. Precisely how that subtle force operates under Bell's treatment, or what form it takes, no one can tell. All we know is that he found out that, by changing the intensity of a continuous current so as to make it correspond exactly with the changes in the density of air caused by sonorous vibrations, vocal and other sounds could be transmitted and heard at a distance. This was the thing to be done, and Bell discovered the way of doing it. He uses electricity as a medium for that purpose, just as air is used within speaking distance. In effect, he prolongs the air vibrations by the use of electricity. No one before him had found out how to use electricity with the same effect. To use it with success, it must be put in a certain condition. What that condition was he was the first to discover, and with his discovery he astonished the scientific world. Prof. Henry, one of the most eminent scientists of the present century, spoke of it as "the greatest marvel hitherto achieved by the telegraph." The thing done by Bell was "transmitting audible speech through long telegraphic lines;" and Sir William Thomson, on returning to his home in England, in August or September, 1876, after seeing at the Centennial Exposition in Philadelphia what Bell had done and could do by his process, spoke in this way of it to his countrymen: "Who can but admire the hardihood of invention which devised such very slight means to realize the mathematical conception that, if electricity is to convey all the delicacies of quality which distinguish articulate speech, the strength of its current must vary continuously, as nearly as may be, in simple

proportion to the velocity of a particle of air engaged in constituting the sounds." Surely, a patent for such a discovery is not to be confined to the mere means he improvised to prove the reality of his conception.

We come now to consider the alleged anticipation of Philipp Reis. And here it is to be always kept in mind that the question is not whether the apparatus devised by Reis to give effect to his theory can be made, with our present knowledge, to transmit speech, but whether Reis had in his time found out the way of using it successfully for that purpose; not as to the character of the apparatus, but as to the mode of treating the current of electricity on which the apparatus is to act, so as to make that current a medium for receiving the vibrations of air created by the human voice in articulate speech at one place, and, in effect, delivering them at the ear of a listener in another place. Bell's patent is not alone for the particular apparatus he describes, but for the process that apparatus was designed to bring into use. His patent would be quite as good if he had actually used Reis' apparatus in developing the process for which it was granted. That Reis knew what had to be done in order to transmit speech by electricity is very apparent, for in his first paper he said: "As soon as it is possible to produce, anywhere and in any manner, vibrations whose curves shall be the same as those of any given tone, or combination of tones, we shall receive the same impression as that tone, or combination of tones, would have produced on us." Bourseul also knew it before Reis, for, in a communication published in a Paris journal in 1854, he said: "Reproduce precisely these vibrations," to-wit, the vibrations made by the human voice in uttering syllables, "and you will reproduce precisely these syllables." Reis discovered how to reproduce musical tones, but he did no more. He could sing through his apparatus, but he could not talk. From the beginning to the end he has conceded this. * * * It is not contended that Reis had ever succeeded in actually transmitting speech, but only that his instrument was capable of it if he had known how. He did not know how, and all his experiments in that direction were failures. With the help of Bell's later discoveries in 1875 we now know why he failed.

As early as 1854, Bourseul, in his communication which has already been referred to, had said, substantially, that, if the vibrations of air produced by the human voice in articulate speech could be reproduced by means of electricity at a distance, the speech itself would be reproduced and heard there. * * * That Reis was working all the time, from the beginning to the end of his experiments, upon the principle of the telegraph as thus suggested by Bourseul, is abundantly proven. * * *

Such was the beginning, and it was maintained persistently to the end, as well by Reis as by those who availed themselves of what

he was doing. * * * All recognized the fact that the "minor differences in the original vibrations" had not been satisfactorily reproduced, but they attributed it to the imperfect mechanism of the apparatus used, rather than to any fault in the principle on which the operation was made to depend. It was left for Bell to discover that the failure was due, not to workmanship, but to the principle which was adopted as the basis of what had to be done. He found that what he called the "intermittent current"—one caused by alternately opening and closing the circuit—could not be made, under any circumstances to reproduce the delicate forms of the air vibrations caused by the human voice in articulate speech, but that the true way was to operate on an unbroken current by increasing and diminishing its intensity. This he called a "vibratory or undulatory current," not because the current was supposed to actually take that form, but because it expressed with sufficient accuracy his idea of a current which was subjected to gradual changes of intensity, exactly analogous to the changes of density in the air occasioned by its vibrations. Such was his discovery, and it was new. Reis never thought of it, and he failed to transmit speech telegraphically; Bell did, and he succeeded. Under such circumstances, it is impossible to hold that what Reis did was an anticipation of the discovery of Bell. To follow Reis is to fail, but to follow Bell is to succeed. The difference between the two is just the difference between failure and success. If Reis had kept on, he might have found out the way to succeed; but he stopped, and failed. Bell took up his work, and carried it on to a successful result.

As to what is shown to have been written and done by Dr. Van der Weyde, it is only necessary to say that he copied Reis; and it was not until after Bell's success that he found out how to use a Reis instrument so as to make it transmit speech. Bell taught him what to do to accomplish that purpose.

So, as to James W. McDonough. We presume that it will not be claimed that he is entitled to more than he asked for in his application for a patent, filed April 10, 1876; and there a "circuit breaker," so adjusted as to "break the connection by the vibrations of the membrane," is made one of the elements of his invention. The patent office was clearly right in holding that he had been anticipated by Reis.

The patents of Cromwell Fleetwood Varley, of London, England, —granted, one, June 2, 1868, and the other, October 8, 1870,—were for "improvements in electric telegraphs." * * *

Another alleged anticipation is that of Daniel Drawbaugh. Bell got his patent March 7, 1876, and the fortunate accident which led to his discovery occurred June 2, 1875. Active litigation to enforce his patented rights was begun by his company on the 12th of September, 1878, with a suit, in the circuit court of the United States

for the district of Massachusetts, against Richard A. Dowd. This suit was defended by the Western Union Telegraph Company, and vigorously contested. The answer was filed November 4, 1878, setting up alleged anticipations by Gray, Edison, Dolbear, and others. The record fills 1,200 printed pages; but before a decision was reached the case was compromised, and a decree entered by consent. The litigation ended at some time in the latter part of the year 1879. The last deposition was taken on the 19th of September in that year. The next contested suit was brought in the same court on the 28th of July, 1880, against Albert Spencer and others. An answer was filed in this case September 6, 1880, and depositions afterwards taken; some of those in the Dowd suit being used in this by stipulation. On the 27th of June, 1881, a decision was announced by Judge Lowell sustaining the patent, upon which a decree was entered. On the 14th of November, 1879, Abner G. Tisdel filed in the patent-office an application for a patent for "a new and useful improvement in speaking telephones," and on the 18th of November, 1879, Frank A. Klemm also filed an application for a patent for "a new and useful improvement in telephone transmitters." These inventions were transferred by assignment to Ernest Marx and Frank A. Klemm, of New York city, Moritz Loth, of Cincinnati, and Simon Wolf, of Washington. On the 6th of March, 1880, these parties entered into a mutual agreement to the effect that "each and all of their interests in said improvements and inventions, and the letters patent to be issued therefor, shall be merged and consolidated as common stock in a corporate body, under the laws of either of the states of Ohio, New York, or the general laws of the United States, relating to the formation of incorporations in the District of Columbia, or of such other states or territories as may be found necessary hereafter." This agreement was recorded in the patent-office March 10, 1880. On the 6th of May, 1880, Edgar W. Chellis, a merchant of Harrisburg, Pa., M. W. Jacobs, a lawyer at the same place, and Lysander Hill, a lawyer then residing in Washington, in the District of Columbia, made an arrangement with Daniel Drawbaugh by which they were to become jointly interested with him in his alleged telephone inventions, each to have a quarter interest. Nothing was paid for this, but each of the parties was to have one-fourth of anything that should be realized from the enterprise. On the 24th of May, 1880, Simon Wolf, one of the parties interested in the Klemm and Tisdel inventions, visited Harrisburg on business with Chellis in reference to telephone matters. On the 18th of May, four days before this visit, a patent was issued to Wolf and his associates upon the invention of Tisdel. While Wolf was in Harrisburg negotiations were begun with Chellis for a transfer of the Drawbaugh inventions to the owners of those of Klemm and Tisdel. These negotiations resulted in a conditional contract of the

22d of June, by reason of which Chellis, Jacobs, Hill and Drawbaugh went to Washington; and there, on the 21st of July, 1880, Drawbaugh, claiming to "have invented certain new and useful improvements in the transmission of vocal speech, and the apparatus to be used for such purpose, for which I am about to make application for letters patent of the United States," assigned to Klemm, Marx, Wolf, and Loth "the full and exclusive right to the said invention, as fully set forth and described in the specification prepared and executed by me, dated the 21st day of July, 1880, preparatory to obtaining letters patent of the United States therefor;" and he at the same time, and by the same instrument, authorized and requested the commissioner of patents to issue the patent to his assignees, "each as assignee of one-fourth part." The specification referred to in the assignment has not been put in evidence in any of the cases. In the course of taking the testimony, it was called for by the Bell Company; but the counsel for the opposite party refused to produce either the original, or a copy from the patent-office. The assignment was recorded in the patent-office July 22, 1880, and in the official digest of assignments the following notation appears: "About to make appl'n. Spe'n dated July 21, 1880." * * *

At this time, and in this way, the attention of the general public was called for the first time to the fact that Drawbaugh claimed to have anticipated Bell in the discovery of the telephone. Bell's success had been proclaimed more than four years before at the Centennial Exposition in Philadelphia. In the mean time, inventions in aid of his discovery had been multiplied. According to the testimony of Park Benjamin, more than 100 patents had been issued and indexed under the word "Telephone." Numerous interferences had been declared and considered at the patent-office. Gray, Edison, Dolbear, and others had either claimed for themselves, or others had claimed for them, priority of invention and discovery, and Bell had thus far been sustained as against them all. Blake had perfected his microphone apparatus, and Bell's patent had become a great commercial success. * * *

The People's Company began taking depositions on the 19th of April, 1881, but Drawbaugh himself did not appear as a witness until December 7, 1881. After that time others were examined, and when the proofs were closed between three and four hundred witnesses had been produced whose testimony was taken, and put into the record, to establish the priority of Drawbaugh's invention. This testimony, as is now claimed, shows the story of that invention to have been as follows: "Early conception and experiments with the continuous current, 1862, 1866, and 1867. Teacup transmitter and receiver, 1866 and 1867. Tumbler and tin-cup and mustard can, ('F' and 'B,') 1867 and 1869. Improvement on 'B' ('C,') 1869, 1870. Further improvement upon 'C,' and the more perfect

magneto instrument, 'I,' 1870, 1871. Mouth-piece changed to center and adjusting screw inserted, (Exhibit A,) 1874. 'D' and 'E,' perfectly adjusted and finished magneto instruments, January and February, 1875. 'L,' 'M,' 'G,' and 'O,' from February, 1875, to August, 1876. 'H,' August, 1876. 'J,' 'N,' and 'P,' 1878." This statement of the Drawbaugh claim we have quoted from the brief of counsel appearing in his behalf, and his success in the litigation has been placed, as we understand it, both in the answer and in the argument, on the truth or falsehood of what is thus set forth. The letters "F," "B," etc., in the statement, refer to exhibits in the cause, being certain instruments claimed to have been made and used by Drawbaugh in the progress of his work, and preserved until now. The original tea-cup instrument was not produced, but Drawbaugh in his deposition gave what he said was a drawing, showing how it had been constructed. "F," "B," "C," "I," and "A" were neither of them in a condition for use when they were put in evidence, and no one of all the witnesses except Drawbaugh could tell how they were originally constructed, or what the process was by which sound was transmitted when they were used. All any of the witnesses could say on that subject was that they had used one or more of the different instruments at Drawbaugh's shop; had heard sounds, and sometimes spoken words, through them; and that Drawbaugh told them the sound was carried on the wire by electricity. There was nothing whatever produced in print or in writing on the subject; not even a memorandum or a drawing of any kind. And there is nothing in the testimony to show that Drawbaugh ever told any one how his earlier instruments were made, or what his process was, until he was called as a witness in December, 1881, and explained it in his testimony. This was nearly twenty years, according to the present claim, after he had begun his experiments; nearly seven after he had made and used "D" and "E," perfectly adjusted and finished magneto instruments; and more than five after "L," "M," "G," "O," and "H" had been constructed, and kept in his shop. It was also nearly six years after the date of Bell's patent, more than five after the success of his discovery had been proclaimed at the Centennial Exposition in Philadelphia, four after his process had got into public use, three after it had become an established success, and two after he had brought his first suit for the establishment of his rights against Dowd, who represented the Western Union Telegraph Company, to a successful termination.

Under these circumstances, it becomes important to consider the conduct of Drawbaugh in reference to his alleged invention during this 20 years of eventful history, as connected with the discovery and use of telephones. If his present claim is true, his experiments began almost as far back as those of Reis, and he had in

his shop at Eberlys Mills, within three miles of Harrisburg, telephones that were substantially perfect months before Bell, on the 2d of June, 1875, got the clue to his subsequent discoveries. It is conceded that "D" and "E," made, as is claimed, in February, 1875, are substantially as good magneto instruments as any Bell had used before December, 1881; and "L," "M," "G," "O," and "H," all of which it is claimed were constructed by August, 1876, and some in February, 1875, are as good, or nearly as good, microphones as those of Blake, which were not invented until 1878. This is the theory of Drawbaugh's defense as it is set forth in the answer and in the argument, and by it his case must stand or fall. The claim is that the discovery of the process was complete, and that perfect telephones had been made, and were in a condition for use, a year and more before Bell got his patent. Drawbaugh was, when he gave his deposition, 54 years of age, and had lived all his life at or near Eberly Mills, a small village near Harrisburg. He was a skillful and ingenious mechanic; and if he made "D" and "E," and the instruments which came after them, at the time it is said he did, he had good tools and good materials in 1875 and 1876, and was capable of doing the best of work. He was also somewhat of an inventor, and had some knowledge of electricity. According to the testimony, he was an enthusiast on the subject of his "talking machine," and showed it freely to his neighbors and people from the country when they visited his shop. The Centennial Exposition was opened at Philadelphia in May, 1876, and Drawbaugh visited it on the 17th of October, 1876, remaining four or five days. Before he went he had heard, as he says, that some one besides himself had invented a speaking telephone, which he had the impression was on exhibition there. If what he now claims is true, he had then on hand in his shop Exhibits D, E, L, M, G, O, and H; all of them good instruments of their kind, and capable of transmitting speech, and some of them but just finished. Bell's apparatus had been exhibited to the board of judges in June before, and had attracted marked attention. The matter was much discussed in the public press, and yet it never seems to have occurred to Drawbaugh to take any of his telephones with him when he went, although they were small in size, and some, or all of them, could have been carried without serious inconvenience.

When giving his testimony, he was examined in chief as to that visit; and this is what he said on the subject of telephones: "Question 386. Did you attend the Centennial Exposition at Philadelphia in the year 1876? Answer. Yes, sir; I did. Q. 387. Can you give the date on which you went there? A. I can by reference to a book. It was October 17, 1876. The 17th was a day on which I dated a letter from Philadelphia, while I was there on that visit. Q. 388. How long did your visit there last? A. About four or five

days, to the best of my recollection. Q. 389. Who went with you on that visit? A. Mr. George Leonard. Q. 390. Was that the only visit to the Centennial Exhibition that you made? A. Yes, sir; it was. Q. 391. At the time that you went there, or before that time, had you heard that somebody else besides yourself had invented a speaking telephone, or a telephone? A. Yes, sir; some time before that. I don't remember how long, but not a great while. Q. 392. When you went there, did you suppose it would be on exhibition there? A. I don't remember whether I had heard that it was on exhibition or not; but I got the impression some way that it was on exhibition. Q. 393. While you were there at the Centennial, did you see any telephones, or make an effort to see any there? A. Yes, sir; I made an effort, and seen an instrument called a 'telephone,' and supposed it to be the instrument spoken of,—the one of which I had heard. I was looking and had made some inquiry, and was directed or came to a portion of the building where I saw on a counter some man's telephone; the name I don't remember. At that time, or several times that I called, there was no one there to attend to it. I spoke to another party that had something else on exhibition—I don't recollect what it was—just near by, and I asked him whether there was any one there to attend, or to show the instruments. I was informed, then, there was no one there to show them. Q. 394. If you remember, please state what kind of an instrument it was that you saw there, and state what information you were able to obtain there regarding it, and its mode of operation. A. There was a number of instruments placed onto a raised portion,—something like a shelf; that is, it resembled something like pigeon-holes, a box open in front, and each instrument at the back of it had an electro-magnet. The number of instruments I don't remember. I don't remember of counting them. If I am not mistaken, there may have been a dozen or more, perhaps. Some were larger than others. I could not give you a much better description than that. I couldn't get any information about them. This attendant made some remarks about the instruments; but he didn't understand them, and couldn't explain them. I was several feet from where the instruments were. They were placed—it occurs to me—on a raised place like a shelf, just about high enough for a man to speak into; that is the way it looked to me. I did not go in behind the counter to examine them, although there was an opening to go in by, because I did not like to make too free, as there was no one there. Q. 395. Did you see any circulars lying around there referring to these instruments, or other advertisements of them? A. I don't remember about that; it may have been. Q. 396. What was your impression as to the character of the instruments when you finally left them? A. I was impressed with the idea that they were instruments to telegraph by sounds. A certain sound to represent a certain letter of the alpha-

bet. I am not certain how I got the idea, or whether any person told me that at the time, but that is the idea that I had. When I said certain sounds, I meant that sounds of a different pitch would represent different letters. Q. 397. Do you know whether that was 'Gray's Harmonic Telegraph' that you saw there or not? A. It didn't say 'Telegraph;' I am confident is was called 'Telephone.' I didn't see the working parts of the interior, except the electro-magnets. I took the name of the man and his address on a piece of paper, and put it in my pocket, but I don't know what became of it. I don't know whether it was 'Gray's Harmonic Telegraph' or not. Q. 398. Did you see any tuning forks about it? A. I did not."

That was all he did during his entire visit to ascertain whether any one besides himself had actually entered upon this then new and interesting field of invention and discovery. He spoke to no one about what he had done himself, and he made no special effort to find out whether that which was on exhibition was in any respect like what he had at home. Neither did he when he got home, so far as the records show, say anything to his neighbors or visiting friends about what he had seen or heard. He had apparently lost all interest in "talking machines." Not so, however, with his other inventions. The testimony shows that during the early part of 1876 he was much occupied in building an electric clock, which he thought of exhibiting at the Centennial. This he did not do, however, but either just before he went to Philadelphia, or soon after, Rufus E. Shapley, a jeweler of Mechanicsburg, went by his invitation, or on his suggestion, to Eberly's Mills to look at the clock which he had made. Soon afterwards the clock was taken to Shapley's store in Mechanicsburg, and on the 8th of November, 1876, Drawbaugh by an instrument in writing, transferred to Shapley a half-interest in the "clock I am getting up, the said R. E. Shapley to pay for patenting the same." Shapley had then $2,000 in money which Drawbaugh was anxious to have him invest in that business, and the clock was taken by him to his shop so that it might be examined with that end in view, if it should prove to be useful. Some time afterwards it was taken back to Eberly's Mills, where it remained until April 1, 1878, or thereabouts, when a clock company was formed, and that clock, or another one substantially like it, was taken about the country for exhibition. For this Drawbaugh was paid $500, with an interest in the profits, and on the 20th of September, 1878, he applied for a patent for "improvement in earth batteries for electric clocks," which was issued January 14, 1879, to the members of the clock company. The enterprise does not seem to have been productive of any great success. In November or December, 1878, while this clock was on exhibition at Harrisburg, Drawbaugh was introduced to Edgar W. Chellis. He had with him at the time a "wooden model of a faucet" that he wanted Chellis and another man to take

each a third interest in. An arrangement was afterwards made by which Chellis got a two-thirds interest, he paying for it $250 January 7, 1879. On the 14th of the same month Drawbaugh filed in the patent-office an application for a patent for "improvement in rotary measuring faucets;" Chellis to have a two-thirds interest. After this application an interference was declared, March 29, 1879, between Drawbaugh and David A. Hauck, who had filed a conflicting application January 17th. In his preliminary statement upon this interference, Drawbaugh said that he had conceived the idea of his faucets, and sketched them, late in the fall of 1876; that he made a working model in the spring of 1877, and actually tested it then, but the patent-office model was not completed until about the 1st of November, 1878. The case was closely contested, but finally decided in favor of Drawbaugh, January 15, 1880. The patent was granted to him and Chellis, July 6th of the same year. In this contest Jacobs and Hill, who afterwards became interested in his telephone claims, appeared as the counsel of Drawbaugh. On the 2d of July, 1879, Drawbaugh filed another application in the patent-office for "improvement in water motors;" Chellis to have in this, also, a two-thirds interest. Upon this application a patent was issued March 16, 1880. It is impossible to believe, if Drawbaugh had in his shop, when he reached home from the Centennial, Exhibits D, E, L, M, G, O, and H, or even D and E alone, that he would have set himself to work, in the first instance, at developing his clock enterprise, or perfecting his former conception of a measuring faucet, instead of making some effort to call the attention of his friends to his great discovery of the telephone, which he was in danger of losing by the patent which had been issued to another, and which he could not but have known was even then attracting the greatest attention. And in this connection it must be kept in mind that the theory of the defense is, as stated in the answer, that Drawbaugh had at that time fully perfected his invention; and that while, at first, he "conceived that its range and capacity for usefulness to the public might be very greatly enlarged," he had, before the date of Bell's patent, "notwithstanding his embarrassed and impoverished pecuniary condition, and his utter want of proper mechanical tools," finally perfected his work. His conduct afterwards, therefore, is to be judged, not as that of one who was still in the midst of his experiments, and doubtful of the results, but of one who had arrived at the end and had completed his success.

No man of his intelligence, with or without the enthusiasm upon the subject which it is said he possessed, could have remained silent under such circumstances. As we have read the testimony, it is not even pretended that he took any of his instruments outside of his own village until May, 1878, when, as is claimed, he showed one to his friend Stees, in Harrisburg, whom he had known for years, and

who was the first to use, and, in fact, was then using, a Bell telephone, in that place, upon a private line of his own between his office and his shops. This produced no results; and when afterwards, in January, 1879, Chellis was told that Drawbaugh had "a phonograph and a telephone that he had invented," he gave it no attention, because, to use his own language, "I was interested in the faucet and motor business, and wished to push them, and I did not think we could do much with the telephone, as Bell had a patent, and I did not know that he could antedate them." And again, when speaking of a conversation he had with Drawbaugh, he said: "I advised him to drop it,—the telephone,—as he could not antedate Bell. He said he did not know about that; that he had been working on it a good while. It was his way of expressing himself. When I would say 'You can't antedate Bell,' he would say, 'I don't know about that; I have been working at it a good while.'" This, it must be remembered, was in 1879, after the telephone had become a success, and after it had been a year or more in use in Harrisburg, where Chellis lived. It is impossible to believe that either Chellis or Drawbaugh was ignorant of the approximate time of Bell's invention, which had been the subject of frequent newspaper comment from the time of its exhibition at the Centennial. The subject was often referred to in the Harrisburg and Mechanicsburg papers, and it is not for a moment to be supposed that all of these various articles escaped their attention. Under such circumstances, if it were true that Drawbaugh had made his "D" and "E," as is now claimed, in February, 1875, he certainly would have said so, and would not have contented himself with so doubting an answer to Chellis' suggestion of his inability to antedate Bell as that which Chellis now says he gave.

Another important fact in this connection is one which is proved by the testimony of Andrew R. Kiefer, who from 1863 had been division telegraph operator, having charge of the middle division of the Pennsylvania railroad, and residing in Harrisburg. From 1867 to the winter of 1881-82 he was a member of a partnership firm in that place which was engaged in "the manufacture of burglar alarms, electric hotel annunciators, and fine electric work for the government,—instruments for the signal bureau, patent models, etc." He had also, since 1876, kept a place for the sale of electrical supplies. He had known Drawbaugh certainly since 1876, and probably before. Drawbaugh met him on different occasions and talked upon electrical matters. In the course of their acquaintance, Drawbaugh showed him an electrical fire-alarm apparatus, and the works of his electric clock; but the subject of telephones was never alluded to between them until in the summer of 1881, when this occurred. We quote from Kiefer's deposition: "In the summer of 1881 I took my wife out for a drive, and went over to see his (Drawbaugh's) works, never having seen them, and having promised to come and see him

some time. My wife, not caring about going through the shop, remained in the carriage, and I went through alone with Mr. Drawbaugh. He showed me through the shops, and introduced me to Mr. Chellis, and showed me parts of the water motor and some other things of his getting up. On account of my wife's being in the carriage alone, I did not stay long. As I stepped into, or was just in, the carriage, Mr. Drawbaugh said, 'I forgot to show you my telephone.' I did not get out again to go and see it, and I drove away without seeing it, expecting to see it again; but I have never got over to the shop since." This was after the suit of the Bell Company against the People's Company was begun, and of course after the matter got into the hands of Chellis and his associates. It is no answer to the criticism of Drawbaugh's conduct in this particular to say, as was said in argument, that "one reason why he did not speak or apply to every man with whom he had personal acquaintance was that he was ridiculed by his neighbors; that his invention was considered a humbug by them, and of no commercial value." Bell's success was proclaimed in the Harrisburg Patriot as early as February 26, 1877, and the days of ridicule were then past. If Drawbaugh had at that time in his shop the machines which it is now claimed were all complete as they now are by August, 1876, and most of them before, there cannot be a doubt that he would have taken them to some place where they could be tried, and show that they would do what he had all along claimed for them. All he had to do, at any time after he came back from the Centennial, was to take any pair of his little instruments to his friend Zeigler or his friend Stees at Harrisburg, attach them to a line wire, and show what he had. They were men who could appreciate his achievement, and help him if it was, as he now says it was, a success. It would certainly have been easier then, within two years of the time the first of them were made, and within a year of the date of Bell's patent, to show that he "antedated" Bell, than it was three years afterwards, when he was brought into the controversy through the instrumentality of his associates; not, as must be evident to all, to get a patent for himself, but to defeat that of Bell. And in this connection it is specially significant that the application which it is claimed was made for a patent on the 21st of July, 1880, and the specification of his invention which was then written out, have been purposely and designedly kept out of the case, although their production was demanded. They were written before this suit was begun, and it is impossible to believe that they would have been withheld, at least upon the call of the opposite party, if they were in all respects consistent with the subsequent developments of the case. The excuse given by counsel at the time, that they were "in the secret archives of the patent-office," and, "if produced and published in this cause, would possibly invite the filing of contesting

applications, and result in interference and additional litigation, besides unnecessarily prolonging the taking of testimony here, and increasing the expenses," we cannot accept as satisfactory, especially as in the answer it was said that one object of filing the application was to procure "interference proceedings to be instituted against the patents of Bell, in order that Drawbaugh may be adjudged by the commissioner to be, as he rightfully is, the original and first inventor."

We have not overlooked the depositions that have been taken in such large numbers to show that Drawbaugh was successful with "F," "B," "C," "I," and "A," before "D" and "E" were made. They have been studied with care, and, if they contained all the testimony in the case, it would be more difficult to reach the conclusion that Drawbaugh's claim was not sustained. But in our opinion their effect has been completely overcome by the conduct of Drawbaugh, about which there is no dispute, from the time of his visit to the Centennial until he was put forward by the promoters of the People's Company, nearly four years afterwards, to contest the claims of Bell. He was silent, so far as the general public were concerned, when, if he had really done what these witnesses now think he did, he would most certainly have spoken. There is hardly a single act of his connected with his present claim, from the time he heard, before going to Philadelphia, that some one else had invented a telephone which was on exhibition at the Centennial, that is not entirely inconsistent with the idea, even then, of a complete discovery or invention by himself which could be put to any practical use. It is not pretended that what he did was done in private. He had influential friends, with ample pecuniary resources, ready to help him in bringing out his inventions when they promised success. He easily got aid for his clock and for his faucet. The news of Bell's invention spread rapidly and at once, and it took but a few months to demonstrate to the world that he had achieved a brilliant success. If it were known at Eberly's Mills alone that Drawbaugh had been doing the same thing for years in his shop there,—and it certainly would have been known all through the little village if it had actually been done,—no one can believe that the public would be kept in ignorance of it until four years afterwards, when a "special" from Washington "to the Cincinnati Commercial" announced a "telephone combination" "to have entire charge of the telephones, not only in this country, but in the world," that could transmit messages "for almost a song."

But there is another fact in this case equally striking. As has already been seen, "F," "B," "C," and "I" were in no condition for use when they were produced and put in evidence. They were mere "remains," and no one but Drawbaugh himself could tell how they were made, or how they were to be used. He undertook to repro-

duce some of them, especially "F" and "B." This was in the latter part of 1881, while the testimony was being taken. The Bell Company proposed that they should be tried to see if they would do what the witnesses said had been done with the originals, which the "remains" show must have been exceedingly primitive in their character. The testimony also shows that, when they were originally used by or in the presence of the witnesses, no particular care was taken in their adjustment. They were lying around in the shop, or standing upon shelves. Some say that when experiments were made they were held in the hand, or allowed to stand on the table. Many testify to satisfactory results, and Drawbaugh himself said in his deposition: "I would have persons in the cellar reading printed matter,—some advertisement or something,—and I could hear the words that were read; and at other times I would go down into the cellar and read something, and coming up they would repeat the words to me that I had read."

The proposition of the Bell Company was accepted, and the reproductions were tried in March, 1882, under the most favorable circumstances. Three days were occupied in the test, and it is substantially conceded that it was a failure. Occasionally a sound was heard, and sometimes a word, but "it would not transmit sentences." At the time of these experiments, "F," which was the transmitter, was placed on a table, and used as Drawbaugh said it was originally. Two years afterwards other reproductions were presented, differently constructed, and used in a different way, and these would "talk;" but they were neither made nor used in the same way as the originals. To our minds, the result of the second experiments conclusively showed that the original instruments could not have done what the witnesses supposed they did, and that what they saw and heard was produced by some other means than an electric speaking telephone. We do not doubt that Drawbaugh may have conceived the idea that speech could be transmitted to a distance by means of electricity, and that he was experimenting upon that subject; but to hold that he had discovered the art of doing it before Bell did, would be to construe testimony without regard to "the ordinary laws that govern human conduct." Atlantic Works v. Brady, 107 U. S. 192, 203, 2 Sup. Ct. 225. Without pursuing the subject further, we decide that the Drawbaugh defense has not been made out.

Another objection to Bell's patent, put forth in the oral argument of Mr. Hill, and in the printed brief signed by him, and in that signed by Mr. Dixon, is that his application as originally filed in the patent-office did not contain his present fourth claim, or any description of the variable resistance method, and that all which now appears in the specification on that subject, including the fourth claim, was surreptitiously interpolated afterwards. Bell's application was filed February 14, 1876, and afterwards, during the same day,

Elisha Gray filed a *caveat,* in which he claimed as his invention "the art of transmitting vocal sounds or conversations telegraphically through an electric circuit," and in his specification described the variable resistance method. The precise charge now made in the printed brief of Mr. Hill is that "Mr. Bell's attorneys had an underground railroad in operation between their office and Examiner Wilbur's room in the patent-office, by which they were enabled to have unlawful and guilty knowledge of Gray's papers as soon as they were filed in the patent-office," and "that an important invention, and a claim therefor, were bodily interpolated into Bell's specification, between February 14, 1876, and February 19, 1876, by Pollock, in consequence of the guilty knowledge which the latter already had of the contents of Gray's *caveat* before the declaration of interference with Gray on February 19th." So grave a charge, made in so formal a manner, is entitled to careful consideration. It involves the professional integrity and moral character of eminent attorneys, and requires us to find from the evidence that after Bell swore to his application on the 20th of January, 1876, and after the application thus sworn to had been formally filed in the patent-office, an examiner, who got knowledge of the Gray *caveat* put in afterwards, disclosed its contents to Bell's attorneys; that they were then allowed to withdraw the application, change it so as to include Gray's variable resistance method over Bell's signature, and over the jurat, and then restore it to the files, thus materially altered as if it were the original; and all this between February 14th and February 19th. Although much stress was laid in argument on the fact that what purported to be a certified copy of the specification of Bell, as found in the file-wrapper and contents printed in the Dowd case, differed materially from the patent, the cause of these differences has been explained in the most satisfactory manner; and we entertain no doubt whatever that the specification as now found in the patent is precisely the same as that on which the order to issue was made. If any alterations were made, it was all done before February 19th; and the fair copy which is now found on the files of the office is precisely as it was when the order for the patent was granted. Not a shadow of suspicion can rest on any one growing out of the misprint of the specification in the Dowd case. All that remains, therefore, on which to rest this serious charge is that in a paper handed by Bell to George Brown, of Toronto, describing his invention, and which was intended to be used in England to secure a British patent, what is now claimed to be an interpolation in the American application is not to be found. It is but right to say that, during the whole course of the protracted litigation upon the Bell patent, no argument was ever presented based on this discrepancy until the brief of Mr. Hill was filed in this court on the 18th of January, 1887, six days before the argument in these ap-

peals was begun. So far as we are advised, nothing had ever before occurred in the cases that seemed to make it necessary to prove when the variable resistance method or the fourth claim was put into the American application, or why it was left out of the paper handed to Brown. It seems always to have been assumed, until the cases got here, that, because it was in the American patent, it was rightfully there. Certainly, there is nothing in the pleadings in any of the cases to direct attention to the materiality of this fact. A comparison of the paper handed Brown with the American application shows that they differ in more than 30 different places, besides those which relate to the variable resistance method and the fourth claim. The differences are generally in forms of expression; thus indicating that one was written after the other, and evidently for the purpose of securing greater accuracy. The paper handed Brown was clearly a rough draft, and not a fair copy, for the record shows that it bore on its face the evidence of many erasures and interlineations. Bell says in his testimony that he began writing his specification in September or October, 1875, and wrote and rewrote it a number of times, finally adopting that mode of expression which seemed to him the best to explain his invention, and the relation which one portion bore to another. He visited Brown in Canada in September, and again in December, 1875. The arrangement was made between them on the 29th of December, at this last interview, by which Brown was to interest himself in getting out British patents. Other inventions besides the telephone were included in the contract entered into for that purpose. Bell returned to Boston on the 1st of January, and immediately set himself to work to complete his specification. He had it done so that it was taken to Washington by Mr. Hubbard about the 10th of that month, and delivered to Pollok & Bailey, the attorneys. It was then examined by the attorneys, found correct, and a fair copy made, and returned on the 18th to Bell in Boston for his signature and oath. It was signed and sworn to in Suffolk county, Mass., January 20th, and immediately returned to the attorneys. Afterwards Pollok met Bell in New York, and it was again gone over with care by the two together. No change whatever was made in it at that time, and Pollok took it back with him to Washington. On the 25th of January, 1876, Bell met Brown, who was then on the way to England, in New York. It is now assumed that the paper which Brown took to England was handed to him then; and, because the variable resistance method and the fourth claim were not in that, it is argued that they could not have been in the American specification at that time. But no one has said when the paper was actually handed to Brown. Bell says he cannot tell, but that it must have been after he made his contract with Brown on the 29th of December. As the American specification was signed and sworn to five days before the interview with Brown on the 25th

of January, and the paper of Brown differs from it in so many particulars besides that now in question, it would seem to be clear that the paper was a copy of some former draft which Bell had made,—possibly, one taken to Canada in December,—and not of that which was perfected afterwards. As the specification which had been prepared and sworn to was a fair copy, without erasures or interlineations, the fact that the paper handed Brown was not a fair copy would imply that it was not intended to be an exact transcript of the other. At any rate, the bare fact that the differences exists, under such circumstances, is not sufficient to brand Bell and his attorneys, and the officers of the patent-office, with that infamy which the charges made against them imply. We therefore have no hesitation in rejecting the argument. The variable resistance method is introduced only as showing another mode of creating electrical undulations. That Bell had had his mind upon the effect of such a method is conclusively established by a letter which he addressed to Mr. Hubbard on the 4th of May, 1875, and which is found in the Dowd record, introduced into the Overland case by stipulation. Its insertion in his final draft of his specification is another proof of the care with which his work had been done.

In the case of the Clay Commercial Company objection was made to the sufficiency of the proof of the incorporation of the American Bell Telephone Company, and of its title to the Bell patents. Upon the first point the proof was (1) a special act of the general court of Massachusetts, entitled "An act to incorporate the American Bell Telephone Company," which authorized certain persons therein named, and their associates, to organize themselves under the provisions of chapter 224 of the Acts of 1870, and the acts in amendment thereof, for telephone purposes; and (2) a certificate of the secretary of the commonwealth, in the form required by section 11, of chapter 224, that certain persons, among whom were the most of those mentioned in the special act, were legally organized and established as an existing corporation, under the name of the American Bell Telephone Company. This section made such a certificate "conclusive evidence of the existence of a corporation" organized under that chapter. The authority granted by the special act to the persons named to organize as a corporation in this way gave them the authority to select a corporate name, and also made the statutory certificate conclusive evidence of their corporate existence. The objections to the proof of title are not, in our opinion, well taken. We do not deem it necessary to add to the length of this opinion by referring particularly to the testimony on that point.

This disposes of all the cases so far as the patent of March 7, 1876, is concerned. It remains only to consider the patent of January 30, 1877, about which but little has been said either in the oral

or printed arguments. Apparently, it received but little attention by counsel or the court in either of the cases below. In the Dolbear case, it was, by consent, excluded from the decree, and of course is not presented by that record in this court. In all the other cases the patent was sustained, and the Clay Commercial Company was adjudged to have infringed the third, fifth, sixth, seventh, and eighth claims; the Molecular Company, the sixth, seventh, and eighth, but not the fifth; the People's Company, the fifth, sixth, and eighth; and the Overland Company, the third, fifth, sixth, seventh, and eighth. From the decree in favor of the Molecular Company as to the fifth claim the Bell Company has appealed. In the case of the Clay Commercial Company, it was alleged in the answer that the substantial and material parts of the things described and claimed were described and claimed in a prior British patent taken out by or for Bell, dated December 9, 1876, and that, inasmuch as the American patent does not bear the same date with the foreign patent, and is not limited to expire therewith, it is void. This patent has not been pressed in the argument here, and in our opinion it has been settled by the decision of this court in O'Reilly v. Morse, 15 How. 62, 112, and impliedly by that in Siemens v. Sellers, 123 U. S. 276, 8 Sup. Ct. 117, (at the present term,) that the effect of section 4887, Rev. St., is not to render invalid an American patent which does not bear the same date as a foreign patent for the same invention, but only to limit its term. The patent itself is for the mechanical structure of an electric telephone, to be used to produce the electrical action on which the first patent rests. The third claim is for the use in such instruments of a diaphragm, made of a plate of iron or steel, or other material capable of inductive action; the fifth, of a permanent magnet constructed as described, with a coil upon the end or ends nearest the plate; the sixth, of a sounding box, as described; the seventh, of a speaking or hearing tube, as described, for conveying the sounds; and the eighth, of a permanent magnet and plate combined. The claim is not for these several things in and of themselves, but for an electric telephone, in the construction of which these things, or any of them, are used; hence the fifth claim is not anticipated by the Schellen magnet, as was decided in the Molecular case below. The patent is not for the magnet, but for the telephone of which it forms but part. To that extent the decree in that case was erroneous.

It follows that the decree in each of the cases, so far as it is in favor of the Bell Company, and those claiming under it, must be affirmed, and that the decree in the Molecular case, so far as it is against that company on the fifth claim of the patent of January .0, 1877, must be reversed, and a decree directed to that extent in its favor. It is consequently so ordered.

Gray, J., was not present at the argument, and took no part in the decision of these cases. Lamar, J., not being a member of the court when these cases were argued, took no part in their decision.

Bradley, J., (*dissenting*). Mr. Justice Field, Mr. Justice Harlan, and myself are not able to concur with the other members of the court, sitting in these cases, in the result which has been reached by them. Without expressing an opinion on other issues, the point on which we dissent relates to the defense made on the alleged invention of Daniel Drawbaugh, and applies to all the cases in which that invention is set up. We think that Drawbaugh anticipated the invention of Mr. Bell, who, at most, is not claimed to have invented the speaking telephone prior to June 10, 1875. We think that the evidence on this point is so overwhelming, with regard both to the number and character of the witnesses, that it cannot be overcome. As this is a question of fact, depending upon the weight of the evidence, and involves no question of law, it does not require an extended discussion on the part of those who dissent from the opinion of the majority; which is very ably drawn, and presents the case with great clearness and force. On the point mentioned, however, we cannot concur in the views expressed.

The essence of the invention claimed by Mr. Bell is the transmission of articulate speech to a distance, by means of an electrical current subjected to undulations produced by the air vibrations of the voice. There are two modes (as yet discovered) by which these undulations may be thus produced. In one, they are produced by interposing in the circuit a substance whose electrical conductivity may be varied by the concussions or vibrations of the air produced by the voice. This is called the "variable resistance process," because the electrical current is subjected to the variable resistance (or conductivity) of the substance thus interposed. By the other mode, the undulations are produced by the inductive effect of an armature, (or small, flat piece of iron,) attached to the membrane spoken against, and placed near to the poles of an electro-magnet situated in the circuit. In both cases the undulations impart the vibrations which caused them to another diaphragm at a distance (called the receiver) by means of an electro-magnet in the circuit, placed near to an armature affixed to such diaphragm. These vibrations, thus reproduced, are detected by the ear, and the spoken words are heard. We are satisfied from a very great preponderance of evidence, that Drawbaugh produced, and exhibited in his shop, as early as 1869, an electrical instrument by which he transmitted speech, so as to be distinctly heard and understood, by means of a wire, and the employment of variable resistance to the electrical current. This variable resistance was produced by causing the electrical current to pass through pulverized charcoal, carbon, and other substances,

acted upon by the vibrations of the voice in speaking. This was the whole invention, so far as the principle of variable resistance is concerned. We are also satisfied that as early as 1871 he reproduced articulate speech, at a distance, by means of a current of electricity, subjected by electrical induction to undulations corresponding to the vibrations of the voice in speaking,—a process substantially the same as that which is claimed in Mr. Bell's patent.

In regard to the instrument in which the principle of variable resistance was used, more than 70 witnesses were examined, who either testified to having seen it and heard it, or established such facts and circumstances in relation to it as to put its existence and date beyond a question. With regard to the instrument in which electrical induction was employed to produce the requisite undulations, some 40 or 50 witnesses were produced, many of whom saw it, and heard speech through it; and others either saw it, or heard it talked about in such a manner as to fix the time when it was in existence. On the questions of time and result, there is such a cloud of witnesses in both cases, that it seems almost impossible not to give credence to them. The evidence of some of them may have been shaken with regard to the time they had in mind; but that of the great majority was not shaken at all, but corroborated by circumstances which rendered the proof irrefragable. Many of them, it is true, were plain country people; but they heard the words through the instrument, and that is a matter about which they could not be mistaken. It did not require science nor learning to understand that. But the witnesses were not confined to this class. A number of them were people of position in society, official, professional, and literary; all, however, like the inventor, regarding the matter more as one of curiosity than of public importance. As it would serve no useful purpose to repeat the testimony of these witnesses, we shall refrain from doing so. We will only add that nearly all the original instruments used by Drawbaugh were produced on the trial, and identified by the witnesses. Some of them were broken, and in a dilapidated condition, but sufficiently perfect to be accurately reproduced. Their very form and principle of construction showed that they were intended for speaking telephones, and nothing else. Drawbaugh certainly had the principle, and accomplished the result. Perhaps without the aid of Mr. Bell, the speaking telephone might not have been brought into public use to this day; but that Drawbaugh produced it there can hardly be a reasonable doubt. We do not question Mr. Bell's merits. He appreciated the importance of the invention, and brought it before the public in such a manner as to attract to it the attention of the scientific world. His professional experience and attainments enabled him to see, at a glance, that it was one of the great discoveries of the century. Drawbaugh was a different sort of man. He did not

see it in this halo of light. Had he done so, he would have taken measures to interest other persons with him in it, and to have brought it out to public admiration and use. He was only a plain mechanic; somewhat better instructed than most ordinary mechanics,—a man of more reading; of better intelligence. But he looked upon what he had made more as a curiosity than as a matter of financial, scientific, or public importance. This explains why he did not take more pains to bring it forward to public notice. Another cause of his delay in bringing his invention to public notice was that he was ever indulging the hope of producing speech, at the receiving end of the line, loud and distinct enough to be heard across a room, like the voice of a person speaking in an ordinary tone.

It is perfectly natural for the world to take the part of the man who has already achieved eminence. No patriotic Briton could believe that anybody but Watts could produce an improvement in the steam-engine. This principle of human nature may well explain the relative feeling towards Bell and Drawbaugh in reference to the invention of the telephone. It is regarded as incredible that so great a discovery should have been made by the plain mechanic, and not by the eminent scientist and inventor. Yet the proof amounts to demonstration, from the testimony of Mr. Bell himself, and his assistant, Watson, that he never transmitted an intelligible word through an electrical instrument, nor produced any such instrument that would transmit an intelligible word, until after his patent had been issued; while, for years before, Drawbaugh had talked through his so that words and sentences had again and again been distinctly heard. We do not wish to say a word depreciatory of Mr. Bell. He was original, if not first. He preconceived the principle on which the result must be obtained, by that forecast which is acquired from scientific knowledge, as Leverrier did the place of the unknown planet; but in this, as in the actual production of the thing, he was, according to the great preponderance of the evidence, anticipated by a man of far humbler pretensions. A common astronomer, by carefully sweeping the sky, might have been first in discovering the planet Neptune; while no one but a Leverrier, or an Adams, could have ascertained its existence and position by calculation. So it was with Bell and Drawbaugh. The latter invented the telephone without appreciating the importance and completeness of his invention. Bell subsequently projected it on the basis of scientific inference, and took out a patent for it. But, as our laws do not award a patent to one who was not the first to make an invention, we think that Bell's patent is void by the anticipation of Drawbaugh.

64. LAWTHER v. HAMILTON, 124 U. S. 1, 31 L. ed. 325, 8 Sup. Ct. 342 (1887, Patent No. 168,164).

Bradley, J. The appellant, Alfred B. Lawther, filed his bill in the court below against the appellees, alleging that they were infringing a patent granted to him on the twenty-eighth of September, 1875, for certain improvements in processes of treating oleaginous seeds, and praying for an account of profits and damages, and an injunction. * * *

The purpose and effect of the invention claimed by the patentee as a new process, and the argument against the validity of the patent as a patent for a process, cannot be better or more clearly stated than is done in the opinion of the court below, pronounced by Judge Dyer (21 Fed. Rep. 811). We quote therefrom as follows: "The proofs show, and in fact it is undisputed, that formerly, in the process of extracting oil from flaxseed, the seed was subjected to the crushing and disintegrating action of the muller-stones, which consisted of two large and very heavy stone wheels, mounted on a short horizontal axis, attached to a vertical shaft. By the rotation of this shaft the stones were caused to move on their edges shortly around in a circular path upon a stone bed-plate, with a peculiar rolling and grinding action, upon a layer of flaxseed placed on the bed-plate. This was the usual mechanical appliance in connection with the operating movement of the muller-stones. By this means such portions of the seed as came in contact with the muller-stones were reduced to a complete state of pulverization. To facilitate the disintegrating action of the muller-stones, the seed was generally first more or less crushed by passing it through one or more pairs of rollers, thus better preparing it for the rubbing and grinding action of the muller-stones. The further treatment of the seed required the application of heat and moisture, and this was accomplished in various ways. Sometimes the heat and moisture were applied by a steaming device before the seed was crushed by the muller-stones. Sometimes the seed was moistened when it was under the action of the muller-stones, by sprinkling water upon the layer of seed beneath the stones, the heat being applied afterwards by a separate operation. At other times both heat and moisture were applied after the seed had been run through the mullers, and was in the form of meal in the heater. As the last step in the process, the seed thus crushed and disintegrated, and in moist and warm condition, was usually placed in haircloth mats or bags, and subjected to hydraulic pressure, by which means the oil was extracted. This was the state of the art, and this the usual process, when the complainant obtained his patent." * * *

The view thus taken by the court below seems to us open to some criticism. If, as that court says, and we think rightly says, the omission of the muller-stones is a real improvement in the process of ob-

taining the oil from the flaxseed; if it produces more oil and better oil-cakes, and it is new, and was not used before,—why is it not patentable discovery? and why is not such new method of obtaining the oil and making the oil-cakes a process? There is no new machinery. The rollers are an old instrument, the mixing machinery is old, the hydraulic press is old; the only thing that is new is the mode of using and applying these old instrumentalities. And what is that but a new process? This process consists of a series of acts done to the flaxseed. It is a mode of treatment. The first part of the process is to crush the seeds between rollers. Perhaps, as this is the only breaking and crushing of the seed which is done, the rollers are required to be stronger than before; but, if so, it is no less a process.

The evidence shows that although the crushing of the seed by two horizontal rollers, and then passing it, thus crushed, under the muller-stones, was the old method commonly used, yet that, for several years before Lawther took out his patent, a more thorough crushing had been effected by the employment of four or five strong and heavy rollers arranged on top of one another in a stack, still using the muller-stones to grind and moisten the crushed seed after it was passed through the rollers. The invention of Lawther consisted in discarding the muller-stones, and passing the crushed seed directly into a mixing machine, to be stirred, moistened, and heated by jets of steam or water and then transferring the mass to the presses for the expression of the oil by hydraulic or other power. The machinery and apparatus used by Lawther had all been used before. His only discovery was an improvement in the process. He found that, by altogether omitting one of the steps of the former process,—the grinding and mixing under the muller stones,—and mixing in the mixing-machine by means of steam, a great improvement was effected in the result. Why should it be doubted that such a discovery is patentable? It is highly useful, and it is shown by the evidence to have been the result of careful and long-continued experiments, and the application of much ingenuity. By the omission of the mullers, greater care may be necessary on the part of the workman in carrying on the operations, especially in watching the moistening and mixing process, so as to produce the proper moisture and consistency of the mass before subjecting it to hydraulic pressure. But though it be true that the new process does require greater care, and even greater skill, on the part of the workman than was formerly required, this does not change its character as being that of a process, nor does it materially affect its utility.

The only question which, in our view, raises a doubt on the validity of the patent, is whether it sufficiently describes the process to be followed in order to secure the beneficial results which it promises. * * *

From this statement it is apparent that the beneficial result is due, not only to a proper degree of crushing of the seed in the rolls, but to a proper and uniform moistening of the crushed material in the heating-machine before it is subjected to pressure. The question is whether the patent sufficiently describes the operation to be performed in order to accomplish these results. After a careful consideration of the specification of the patent, and in view of the principle of law that it is to be construed in the light of that knowledge which existed in the art at the time of its date, we are satisfied that it does sufficiently describe the process to be followed. * * *

Every oil manufacturer in the country would understand him. They would also understand that it might require additional care and skill to make the new process work successfully. It is evident that they did understand him, and that the manufacture of linseed oil and oil-cakes has ever since been greatly improved and facilitated by the invention.

But while we are satisfied that the invention is that of a process, it is nevertheless limited by the clear terms of the specification, at least so far as the crushing of the seed is concerned, to the use of the kind of instrumentality described, namely, in the first part of the process, to the use of powerful revolving rollers for crushing the seed between them under pressure. The claim cannot have the broad generality which its terms, taken literally, might, at first sight, seem to imply; but, limited as suggested, it seems to us sustainable in law. * * *

The appellees also contend that they do not (in the words of the claim) "moisten the seeds by direct subjection to steam." It is proven, however, that they do moisten the seeds by a shower of spray in the mixing-machine, produced by directing a jet of steam against a small stream of water. This is within the claim of the patent. The specification describes the process of moistening the seeds as follows: "They are then passed [after being crushed] directly, without the aid of muller-stones, to the mixing-machine, to be stirred, moistened, and heated by the admission of small jets of water or steam to the mass." Again: "The crushed seeds are next placed in a steam-jacketed reservoir of the mixing-machine, where they are stirred, moistened, and heated by perforated revolving stirrer arms, which throw jets of water or steam into the mass," etc. Then the claim is for three successive steps, viz., the crushing of the seeds under pressure, the moistening of the seeds by direct subjection to steam, and the expression of the oil by suitable pressure. These words are to be read in the light of the explanations in the descriptive part; and, thus read, it is apparent that the meaning of the claim is that the crushed seeds are to be moistened and heated by the use of steam, or steam and water, immediately after coming from the

rollers, without any aid from muller-stones. This is precisely what the appellees do.

One of the defenses set up is an implied license. It seems that Lawther has another patent for some improvement in the stack of rollers now commonly used for crushing the seed, and supplies them to order through a foundryman by the name of McDonald. The appellees purchased a set of these rollers from McDonald, with the knowledge and consent of Lawther. These rollers were returned on account of some imperfection in the material; but the frame was retained, and the appellees procured similar rollers made elsewhere. They contend that by this transaction Lawther gave his consent to their use of his process. We do not think that there is sufficient evidence of any such consent. The use of the rollers did not necessarily involve the use of the process, and there is no proof that anything was said about the process.

Other points were raised which we do not deem it necessary to discuss. We cannot but think that Lawther discovered a new process of manufacturing oil from seeds, and that he was entitled to a patent therefor; and we are of opinion that the patent in suit, construed as we have suggested, is a good and valid patent. We are also of opinion that the appellees infringe the patent, and that they have not shown any legal defense to the suit. It follows that the appellant is entitled to a decree for an injunction, and an account of profits and damages, as prayed in the bill. The decree of the circuit court is therefore reversed, and the cause remanded, with instructions to enter a decree for the appellant, and take such further proceedings as may be in conformity with this opinion.

65.

[Note: The patent office had granted many "mechanical method" patents and the Supreme Court of the United States and the other federal courts had sustained many patents for processes which were either purely "mechanical" or on the border line between mechanical methods and processes of a chemical or elemental nature. In addition to the cases hitherto presented may be noted the following:—

Downton v. Yaeger Milling Co., 108 U. S. 466, 27 L. ed. 789; Eames v. Andrews, 122 U. S. 40, 30 L. ed. 1064; Ansonia Brass and Copper Co. v. Electrical Supply Co., 144 U. S. 11, 36 L. ed. 327; Hoyt v. Horne, 145 U. S. 302, 36 L. ed. 713; Wood v. Cleveland, etc., Co., Fed. Cas. No. 17,941, 4 Fish. 550; Wallace v. Noyes, 13 Fed. 172; Globe Nail Co. v. United States Horse Nail Co., 19 Fed. 819; Celluloid Mfg. Co. v. Tower, 26 Fed. 451; Union Paper-Bag Machine Co. v. Standard Paper-Bag Co., 29 Fed. 96; Henius v. Lublin, 30 Fed. 838; Cottle v. Krementz, 31 Fed. 42; Hammerschlag Mfg.

Co. v. Bancroft, 32 Fed. 585; Eastern Paper-Bag Co. v. Standard Paper-Bag Co., 30 Fed. 63; Edison v. Klaber, 38 Fed. 744; Uhlmann v. Bartholomae & Leicht Brewing Co., 41 Fed. 132; Hoff v. The Iron Clad Mfg. Co., 139 U. S. 326, 35 L. ed. 179; Oval Wood Dish Co. v. Sandy Creek, N. Y., Wood Mfg. Co., 60 Fed. 285; Goldie v. Diamond State Iron Co., 64 Fed. 237; Travers v. American Cordage Co., 64 Fed. 771; Clinton Wire-Cloth Co. v. Wright, etc., Co., 65 Fed. 425; Ex parte Young, 46 O. G. 1635; Ex parte Bulz, 67 O. G. 677; Celluloid Mfg. Co. v. Arlington Mfg. Co., 52 Fed. 740, 3 C. C. A. 269; Appleton v. Ecaubert, 67 Fed. 917, 15 C. C. A. 730; Lalance, etc., Mfg. Co. v. Haberman Mfg. Co., 8 C. C. A. 53, 59 Fed. 143; Vermont Farm Machine Co. v. Gibson, 5 C. C. A. 451, 56 Fed. 143; Guarantee Trust, etc., Deposit Co. v. New Haven Gas-Light Co., 39 Fed. 268; Ex parte Rudd, 68 O. G. 535; Ex parte Holt, 68 O. G. 536.

An early example of a similar claim found patentable is the English case of Russell v. Cowley, 1 Web. P. C. 459, Exchequer N. P. Feb. 14, 1834, in which the following claim was interpreted as a process and sustained in that and subsequent suits, and the process of the defendant, though carried out by a different apparatus, was held an infringement:

"The principle of my invention is to heat the previously proposed tubes of iron to a welding heat, that is, nearly to the point of fusion, and then, after withdrawing them from the fire, to pass them between dies or through holes, by which the edges of the heated iron may be pressed together, and the joint firmly welded."

In Globe Nail Co. v. United States Horse Nail Co.,supra, the following claim was sustained, and the case accepted as an authority:

"The process of curving the bodies of nails and beveling their points by spreading the metal laterally and afterwards forcing them through an open die to shear off superfluous metal, substantially as and for the purpose specified."

These are claims somewhat of the order of Corning v. Burden, New Process v. Maus (infra), and Lawther v. Hamilton. Some idea, therefore, may be had of the surprise with which the men of the patent world read the following case of Risdon v. Medart and of the interest with which they followed the subsequent reduction of this case by the Supreme Court in Westinghouse v. Boyden, and the manner in which Risdon v. Medart was disregarded by the other courts and the patent office, and its final overthrow in the Expanded Metal case.]

66. RISDON IRON, ETC., WORKS v. MEDART, 158 U. S. 68, 39 L. ed. 899, 15 Sup. Ct. 745, (1894, Patent No. 248,599).

Mr. Justice Brown delivered the opinion of the Court.

The three patents involved in this suit are for an improved belt-

pulley, and for the manufacture of the same. Each of them requires a separate consideration.

First. Patent No. 248,599 is for an improved process of manufacturing that class of belt-pulleys formed of a wrought-metal rim and a separate center, usually a spider, and usually made of cast metal. The drawings represent the machinery for carrying out the invention, and the pulley at the various stages of its manufacture. The process of manufacture is set forth in detail in the specification, and consists of the following steps: first, centering the pulley center or spider; second, grinding the ends of the arms concentrically with the axis of the pulley; third, boring the center; fourth, securing the rim to the spider; fifth, grinding the face of the rim concentric with the axis of the pulley; sixth, grinding or squaring the edges of the rim. This process, it may be observed, is purely a mechanical one.

Does it disclose a patentable invention? That the patent is for a process in manufacture, and not for the mechanism employed, nor for the finished product of such manufacture, is undeniable, and is so expressed upon the face of the specification.

The four claims of the patent make no reference to the mechanism exhibited in the drawings, and described in the specification. All claim an improvement in the art of manufacturing, and set forth in more or less detail the various steps in that process. That certain processes of manufacture are patentable is as clear as that certain others are not, but nowhere is the distinction between them accurately defined. There is somewhat of the same obscurity in the line of demarkation as in that between mechanical skill and invention, or in that between a new article of manufacture, which is universally held to be patentable, and the function of a machine, which it is equally clear is not.

It may be said in general that processes of manufacture which involve chemical or other similar elemental action are patentable, though mechanism may be necessary in the application or carrying out of such process, while those which consist solely in the operation of a machine are not. Most processes which have been held to be patentable require the aid of mechanism in their practical application, but where such mechanism is subsidiary to the chemical action, the fact that the patentee may be entitled to a patent upon his mechanism does not impair his right to a patent for the process; since he would lose the benefit of his real discovery, which might be applied in a dozen different ways, if he were not entitled to such patent. But, if the operation of his device be purely mechanical, no such considerations apply, since the function of the machine is entirely independent of any chemical or other similar action.

A review of some of the principal cases upon the subject of patents for processes may not be out of place in this connection, and will

serve to illustrate the distinction between such as are and such as are not patentable. * * *

The first case in this Court in which a claim for a process received attentive consideration was the great case of O'Reilly v. Morse, (15 How. 62), involving the validity of the patent to Morse for an electric telegraph. This patent contained eight claims, all of which, except the last, were for the machinery by which the electricity was transmitted and the message recorded. The eighth claim was for the use of the electric current as a motive power, however developed, for marking or printing intelligible characters at any distance. This claim was held to be too broad and not warranted by law, the Court being of opinion that the allowance of such a claim would shut the door against the inventions of other persons, and enable the patentee to avail himself of any new discoveries in the properties and powers of electricity which scientific men might bring to light. In delivering the opinion of the Court Mr. Chief-Justice Taney observed:

"Whoever discovers that a certain useful result will be produced in any art, machine, manufacture, or composition of matter, by the use of certain means, is entitled to a patent for it; provided he specifies the means he uses in a manner so full and exact that any one skilled in the science to which it appertains can, by using the means he specifies, without any addition to, or subtraction from them, produce precisely the result he describes. And if this cannot be done by the means he describes the patent is void. And if it can be done, then the patent confers on him the exclusive right to use the means he specifies to produce the result or effect he describes and nothing more. And it makes no difference, in this respect, whether the effect is produced by chemical agency or combination; or by the application of discoveries or principles in natural philosophy known or unknown before his invention; or by machinery acting altogether upon mechanical principles. In either case he must describe the manner and process as above mentioned, and the end it accomplishes. And any one may lawfully accomplish the same end without infringing the patent, if he uses means substantially different from those described."

In view of some of our later decisions it may be questioned whether the language used by the Chief Justice in some portions of this paragraph may not be broader than these cases would justify, since patents for processes involving chemical effects or combinations have been repeatedly held to be valid. Thus in Mowry v. Whitney (14 Wall. 620), a patent was sustained for an improved process for manufacturing cast-iron railroad-wheels, by retarding their cooling by a second application of heat, until all parts of the wheel were raised to the same temperature, and then permitting the heat to subside gradually. So in Cochrane v. Deener (94 U. S. 780), a patent to Cochrane for a process in manufacturing flour, which consisted in passing the ground meal through a series of bolting-reels

composed of cloth of progressively finer meshes, and at the same time subjecting the meal to blasts or currents of air, by which the superfine flour was separated and the impurities were so eliminated as to be capable of being reground and rebolted, so as to produce superfine flour, was held to be valid, and the patentee not limited to any special arrangement of machinery. In delivering the opinion of the Court, Mr. Justice Bradley observed:

"That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. * * * A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed, and reduced to a different state or thing. If new and useful, it is just as patentable as a piece of machinery. In the language of patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence."

It will be observed in this case that the process for which the patent was sustained was not chemical in its nature, but, as stated in the opinion of the Court, was a series of acts performed upon the subject-matter to be transformed and reduced to a different state or thing.

In Tilghman v. Proctor (102 U. S. 707), a patent for a process for separating the component parts of fats and oils, so as to render them better adapted to the uses of the arts, or, as stated in the claim, "the manufacturing of fat acids and glycerine from fatty bodies by the action of water at a high temperature and pressure," was sustained. The case of O'Reilly v. Morse was distinguished as not a patent for a process, but for a mere principle.

"If the mode of doing it (said Mr. Justice Bradley), or the apparatus in or by which it may be done, is sufficiently obvious to suggest itself to a person skilled in the particular art it is enough, in the patent, to point out the process to be performed, without giving supererogatory directions as to the apparatus or the method to be employed."

In New Process Fermentation Company v. Maus (122 U. S. 413), a patent was sustained for preparing and preserving beer for the market, which consisted in holding it under controllable pressure of carbonic-acid gas from the beginning of the kraeusen stage until such time as it is transferred to kegs and bunged. The process was strictly a chemical one, and was patentable within all the authorities upon the subject, although the mechanism by which the process was applied was also set forth in the patent.

Undoubtedly, the most important case in which a patent for process was considered was that of the Bell Telephone, 126 U. S. 1, in which a claim was sustained for—

"the method of, and apparatus for, transmitting vocal and other sounds telegraphically * * * by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."

The case of O'Reilly v. Morse was again commented on and distinguished, Mr. Chief-Justice Waite remarking:

"In the present case the claim is not for the use of a current of electricity in its natural state as it comes from the battery, but for putting a continuous current in a closed circuit into a certain specified condition suited to the transmission of vocal and other sounds, and using it in that condition for that purpose. * * * We see nothing in Morse's case to defeat Bell's claim; on the contrary, it is in all respects sustained by that authority. It may be that electricity cannot be used at all for the transmission of speech except in the way Bell has discovered, and that therefore, practically, his patent gives him its exclusive use for that purpose, but that does not make his claim one for the use of electricity distinct from the particular process with which it is connected in his patent."

See also American Bell Telephone Co. v. Dolbear, 15 Fed. 448.

It will be observed that, in all these cases, the process was either a chemical one, or consisted in the use of one of the agencies of nature for a practical purpose.

It is equally clear, however, that a valid patent cannot be obtained for a process which involves nothing more than the operation of a piece of mechanism, or, in other words, for the function of a machine. The distinction between the two classes of cases nowhere better appears than in the earliest reported case upon that subject, viz., Wyeth v. Stone, 1 Story 273, in which the patentee claimed as his invention the cutting of ice of a uniform size by means of an apparatus worked by any other power than human. This was said to be a claim for an art or principle in the abstract, and not for any particular method or machinery by which ice was to be cut, and to be unmaintainable in point of law, although the patent was held to be good for the machinery described in the specification.

The leading case in this Court is that of Corning v. Burden, 15 How. 252, decided at the same term with that of O'Reilly v. Morse. The patent was for a new and useful machine for rolling puddler's balls and other masses of iron, in the manufacture of iron. Upon the trial the court below charged the jury that the patent was for a new process, mode, or method for converting puddler's balls into blooms by continuous pressure and rotation of the balls between converging surfaces. Upon appeal to this Court, however, the patent was held to be one for a machine, and, in delivering the opinion of the Court,

Mr. Justice Grier stated with great clearness the difference between such processes as were patentable and such as involved merely mechanical operation. * * * [See infra.]

Although the cases are not numerous, this distinction between a process and a function has never been departed from by this Court, and has been accepted and applied in a large number of cases in the circuit courts. The following processes have been held not to be patentable: an improvement in sewing-machines, by which the soles and uppers of boots and shoes could be sewed together without any welt by a certain kind of stitches, McKay v. Jackman, 12 Fed. Rep. 615; a process for washing shavings in breweries, Brainard v. Cramme, 12 Fed. Rep. 621; for an improved method of treating seed by steam, Gage v. Kellogg, 23 Fed. Rep. 891; a process for crimping heel-stiffenings of boots and shoes, Hatch v. Moffitt, 15 Fed. Rep. 253. See also Sickles v. Falls Company, 4 Blatchf. 508; Excelsior Needle Co. v. Union Needle Co., 32 Fed. Rep. 221.

The patent in question clearly falls within this category. As already shown, it is upon its face "for an improved process of manufacture," and mechanism is shown and described simply for the purpose of exhibiting its operation, which is described in detail. The result is a pulley more perfectly balanced, more faultless in shape, stronger and more durable, perhaps, than any before produced; but this was not because the patentee had discovered anything new in the result produced, but because the mechanism was better adapted to produce that result than anything that had before been known. As pulleys of that description had been produced before, doubtless, with greater care in the manufacture of them, a pulley as perfect as his might have been made. So that all that he invented in fact was a machine for the more perfect manufacture of such pulleys. The operation or function of such machine, however, is not patentable as a process.

Second Patent No. 248,598, granted upon the same day, is obviously, though not in so many words, for the product of the mechanical process described in the patent just disposed of—in other words, for a belt-pulley made substantially in the manner detailed in that patent. In his specification the patentee states that his invention—"consists in a pulley which is perfectly true and accurately balanced—that is, a pulley in which the center of gravity and geometrical center or axis coincide."

He further states that all the prior belt-pulleys had been open to the objection of not having been accurately balanced, a defect inherent in their structure.

"Thus, while cast pulleys are of accurate shape, they cannot be practically produced of perfect balance, owing to the irregularity of the weight of the metal at different portions of the rim, and to contraction in cooling; and where pulleys of similar character to

that herein shown have been made, the spiders have not been properly prepared—that is, the spiders have not been operated upon so as to make the ends of their arms exactly concentric with the true center or axis of the pulley * * * The spider, however made, will be slightly imperfect in shape, and unless the irregularities are cured before applying the rim, the completed pulley will not be accurately balanced."

After detailing the advantages of having the pulleys perfectly balanced and shaped with absolute accuracy, and setting forth in general terms the manner of securing this by grinding the rim concentrically with the axis, he claims, first—

"the improved belt-pulley herein described, having the ends of the spider-arms ground off concentrically with the axis of the pulley;" and second, the same pulley with the rim and the ends of the spider-arm ground off concentrically.

Obviously the patent in question is not for a new device, nor for a new combination of old devices. It contains precisely the elements of every other belt-pulley, and operates in substantially the same way. It is in reality a patent for a belt-pulley which differs from other belt-pulleys only in the fact that the rim and ends of the spider-arms are ground off concentrically with the axis. Obviously this is not a patentable feature. The claims state in substance that the belt-pulley must be made in a peculiar way, which is equivalent to saying that it must be made by a peculiar process; in other words, that it is a product of a mechanical process, which we have already held not to be patentable. The only object in having the ends of the spider-arms ground off concentrically with the axis of the pulley is that the rim may be concentric with such axis. This, however, is necessary in every pulley, and if the patented pulley be superior to others in this particular, it is because its workmanship is superior, and because it is made so by a superior process of manufacture. The specification states in substance that this belt-pulley is superior to every other because it is better made, more perfectly balanced, and is one in which the center of gravity and geometrical center, or axis, coincide. It is said that such perfection of balance can only be obtained by the process described in the prior patent, viz., by grinding off the ends of the spider-arms; but it does not follow that some other person may not, by another process, or by greater care or superior skill or deftness in the handling of tools, manufacture a pulley which shall be equal to this. But if this patent be valid, he would be an infringer in so doing, though he employed no mechanism whatever in the manufacture of such pulley, and did the work entirely with his own hands, if only he ground off the ends of the spider arms.

In short, this is a patent only for superior workmanship, and within all the authorities is invalid. This Court has repeatedly stated

that all improvement is not invention. If a certain device differs from what precedes it only in superiority of finish, or in greater accuracy of detail, it is but the carrying forward of an old idea, and does not amount to invention. Thus, if it had been customary to make an article of unpolished metal, it does not involve invention to polish it. If a telescope had been made with a certain degree of power, it involves no invention to make one which differs from the other only in its having greater power. If boards had heretofore been planed by hand, a board better planed by machinery would not be patentable, although in all these cases the machinery itself may be patentable. * * *

[Citing Smith v. Nichols, Pickering v. McCullough, Burt v. Evory and Wooster v. Calhoun.] * * *

As the first claim does not describe a pulley which differs at all in its completed state from prior pulleys, it is clearly invalid.

The second claim is for a belt-pulley provided with wooden arms and a cast-iron hub with sockets and bracket-lugs, for the attachment of the rim. But as this claim was not found by the court below to have been infringed, it is not necessary to consider it.

For the reasons above given we think all these patents are invalid, and that the demurrer to the bill should have been sustained, except perhaps so far as the second claim of the last patent is concerned.

Medart may or may not have been entitled to a patent for the machinery employed in the manufacture of the belt-pulleys in question; but he certainly was not entitled to a patent for the function of such machine, nor to the completed pulley, which differed from the prior ones only in its superior workmanship.

The decree of the court below must, therefore, be reversed, and the case remanded to the circuit court, with directions to dismiss the bill.

67. WESTINGHOUSE v. BOYDEN, 170 U. S. 537, 42 L. ed. 1136, 18 Sup. Ct. 707 (1897, Patent No. 360,070).

Mr. Justice Brown delivered the opinion of the Court.

The history of arresting the speed of railway trains by the application of compressed air is one, to which the records of the Patent Office bear frequent witness, of a gradual progress from rude and imperfect beginnings, step by step, to a final consummation, which, in respect to this invention, had not been reached when the patent in suit was taken out, and which, it is quite possible, has not been reached to this day. It is not disputed that the most important steps in this direction have been taken by Westinghouse himself.

The original substitution of the air-brake for the old hand-brake was itself almost a revolution, but the main difficulty seems to have arisen in the subsequent extension of that system to long trains of

freight-cars, in securing a simultaneous application of brakes to each of perhaps forty or fifty cars in such a train, and finally in bringing about the instantaneous as well as simultaneous application of such brakes in cases of emergency, when the speediest possible stoppage of the train is desired to avoid a catastrophe. * * *

[Then discusses patents Nos. 88,929, 124,404, 141,685, 163,242, 144,006, 168,359, 217,838, 220,556.] * * *

From this description it will be seen that the action of the automatic brake was, in fact, the converse of that of the straight air-brake, and that the result was to obviate the most serious defects which had attended the employment of the former.

This automatic brake appears, in its perfected form, in Patent No. 220,556, although this patent was but the culmination of a series of experiments, each successive step in which appears in the prior patents. * * *

He embodied in Patent No. 220,556, (1879), the most complete form of the automatic brake, as stated by the court below—

"the ordinary work of braking was performed by a partial traverse of its chamber by the triple-valve piston, graduated according to the purpose desired, at the will of the engineer, and emergency work was done by an extreme traverse of the piston to the end of its chamber."

While the automatic brake had thus obviated the most important defects of the old or straight air-brake, and came into general use upon passenger-trains, throughout the country, it was found, in practice upon long freight-trains, that the air from the auxiliary reservoirs did not act with sufficient promptness upon the brakes of the rear cars, where a particularly speedy action was required, and that it would be necessary to devise some other means for cases of special emergency. In the business of transporting freight over long distances, the tendency has been in the direction of increasing the load by using stronger and heavier cars and larger locomotives. Upon a long train of this kind, composed of thirty to fifty cars, a demand was made for quicker action in cases of emergency than had yet been contemplated, although for ordinary work, such as checking the speed of a train while running, holding it at a slow speed on a downgrade, and also for making the ordinary station stops, the automatic brake was still sufficient, and produced satisfactory results even in the equipment of long and heavy trains. But however effective for ordinary purposes, the automatic brake did not sufficiently provide for certain emergencies, requiring prompt action, and, therefore, failed in a single important particular.

Upon examination of these defects it was found that they could only be remedied by securing (1) in cases of emergency, a more abundant discharge of compressed air into the brake-cylinder; and (2) an escape of air near to each triple valve without requiring the

escaping air to travel all the way back to the engine. The latter device having been already embodied in Patent No. 217,838, these features Mr. Westinghouse introduced into the patent in suit, by which a passage was opened directly from the train-pipe, filled from the main reservoir on the engine, to the brake-cylinder through which, in cases of emergency, the train-pipe air, instead of being discharged into the atmosphere, could pour directly from the train pipe into the brake-cylinder. This operation resulted in charging the brake-cylinder and applying the brakes more quickly than before, and also, by reason of the fact that the filling of the brake-cylinder from the train-pipe on one car made what was, in effect, a local vent for the release of pressure sufficient to operate the valve on the next car behind, each successive valve operated more quickly than when a diminution of pressure was caused by an escape of air only at the locomotive. * * *

We are now in position to take up the several claims of the patent in suit, and their defenses thereto. It may be stated generally that the position of complainants in this connection is, that the novel feature of this patent, in respect to which they are entitled to be protected, is the opening of a passage directly from the train-pipe to the brake-cylinder, without passing through the auxiliary reservoir and without reference to the means by which such passage-way is controlled. Defendant's theory is that they are limited to such passage-way when governed by the auxiliary valve 41, a device which, although of no utility as arranged in the patent in suit, became afterward exceedingly useful when further combined with the supplementary piston shown in Patent No. 376,837. The further inference is that, as they do not use the auxiliary valve of this patent, they cannot be held liable as infringers.

Complainant's case must rest either upon the theory that the admission of compressed air directly from the train-pipe to the brake-cylinder is patentable as a function, or that the means employed by the defendants for that purpose are a mechanical equivalent for the auxiliary valve 41, described in the patent.

1. The first theory is based upon the second claim, which is—

"in a brake mechanism, the combination of a main air-pipe, an auxiliary reservoir, a brake-cylinder, and a triple valve having a piston, whose preliminary traverse admits air from the auxiliary reservoir to the brake-cylinder, and which by a further traverse admits air directly from the main air-pipe to the brake-cylinder, substantially as set forth."

In the construction of this claim, the district judge was of opinion that it was broad enough to cover other devices in which air was admitted directly from the train-pipe to the brake-cylinder by the further traverse of the piston actuating a valve admitting such air, and that the defendants could not exculpate themselves from the charge

of infringement, from the fact that in their device the train-pipe air was admitted through the triple-valve chamber, and not through a by-passage, nor by the fact that in their device the further traverse of the piston opens the main valve in a special manner, which produces the same result, but does not make use of a separate auxiliary valve.

Upon the other hand, the Circuit Court of Appeals held that—

"the transmission of train-pipe air and auxiliary-reservoir air simultaneously to the brake-cylinder is a result of [or] function, and is not patentable; [that] the means by which this or any other result or function is accomplished may be many and various, and if these several means are not mechanical equivalents, each of them is patentable."

It was of opinion that when the second claim—

"in its language describing the action of that device, failed to describe any means by which the extreme traverse of the piston produced it, declaring merely that the piston, 'by a further traverse, admits air directly from the main air-pipe to the brake-cylinder,' it was fatally defective, claiming only a result which is public property, and not identifying the specific means (his own property) by which the result is achieved."

It is true, as observed by the Court of Appeals, that the further traverse of the piston for use in cases of emergency had been shown in prior patents, but it had never been employed for the purpose of admitting air directly from the main air-pipe to the brake-cylinder until the patent in suit was taken out.

The claim in question is, to a certain extent, for a function, viz., the admission of air directly from the train-pipe to the brake-cylinder, and is only limited to such function when performed by the further traverse of the piston of the triple valve. This limitation, however, does not obviate the objection that the means are not fully and specifically set forth for the performance of the function in question.

The difficulty we have found with this claim is this: That, if it be interpreted simply as a claim for the function of admitting air to the brake-cylinder directly from the train-pipe, it is open to the objection, held in several cases to be fatal, that the mere function of a machine cannot be patented.

This rule was clearly laid down in the leading case of Corning v. Burden, 15 How. 252, in which Mr. Justice Grier, delivering the opinion of the Court, drew the distinction between such processes as were the result or effect of—

"chemical action, by the operation or application of some element or power of nature, or of one substance to another,"

and the mere result of the operation of a machine. * * *

In the subsequent case of Burr v. Duryee, 1 Wall. 531, 570, Mr. Justice Grier laid down the same principle as follows: * * * [See infra.]

So also in Fuller v. Yentzer, 94 U. S. 288, this Court, speaking through Mr. Justice Clifford, also said:

"Patents for a machine will not be sustained if the claim is for a result, the established rule being that the invention, if any, within the meaning of the patent act, consists in the means or apparatus by which the result is obtained, and not merely in the mode of operation independent of the mechanical devices employed; nor will a patent be held valid for a principle or for an idea, or any other mere abstraction."

Most of the prior authorities upon this subject are reviewed in the recent case of Risdon Locomotive Works v. Medart, 158 U. S. 68, in which it was also held that a valid patent could not be obtained for a process which involved nothing more than the operation of a piece of mechanism, or the function of a machine. See also to the same effect Wicke v. Ostrum, 19 O. G. 867; 103 U. S. 461, 469. These cases assume, although they do not expressly decide, that a process to be patentable must involve a chemical or other similar elemental action, and it may be still regarded as an open question whether the patentability of processes extends beyond this class of inventions. Where the process is simply the function or operative effect of a machine, the above cases are conclusive against its patentability; but where it is one which, though ordinarily and most successfully performed by machinery, may also be performed by simple manipulation, such, for instance, as the folding of a paper in a peculiar way for the manufacture of paper bags, or a new method of weaving a hammock, there are cases to the effect that such a process is patentable, though none of the powers of nature be invoked to aid in producing the result. (Eastern Paper-Bag Co. v. Standard Paper-Bag Co., 30 Fed. Rep. 63; Union Paper-Bag Machine Co. v. Waterbury, 39 Ib. 389; Travers v. Am. Cordage Co., 64 Ib. 771.) This case, however, does not call for an expression of our opinion upon this point, nor even upon the question whether the function of admitting air directly from the train-pipe to the brake-cylinder be patentable or not, since there is no claim made for an independent process in this patent, and the whole theory of the specification and claims is based upon the novelty of the mechanism.

But if the second claim be not susceptible of the interpretation that it is simply for a function, then the performance of that function must be limited to the particular means described in the specification for the admission of air from the train pipe to the brake-cylinder. This we understand to be the theory of the defendants, and this raises the same question which is raised under the first and fourth claims, whether defendants' device contains the auxiliary valve of the Westinghouse patent, or its mechanical equivalent.

In this view, it becomes unnecessary to express an opinion whether the second claim be valid or not, since in the aspect of the

case most favorable to the complainants, it is necessary to read into it something which is not found there, or, in the language of complainant's brief—

"to refer back to the specification; not, it is true, for a slavish adoption of the identical instrumentalities therein described, but for the understanding of the essential and substantial features of the means therein illustrated."

In thus reading the specification into the claim, we can adopt no other construction than to consider it as if the auxiliary valve were inserted in the claim in so many words, and then to inquire whether the defendants make use of such valve, or its mechanical equivalent.

There are two other facts which have a strong bearing in the same connection, and preclude the idea that this can be interpreted as a claim for a function, without reading into it the particular device described in the specification.

One of these is that the claim is for a triple-valve device, etc., for admitting air from the main air-pipe to the brake-cylinder, "substantially as set forth." These words have been uniformly held by us to import into the claim the particulars of the specification, or, as we said in Seymour v. Osborne (11 Wall. 516, 547)—

"where the claim immediately follows the description of the invention, it may be construed in connection with the explanations contained in the specifications; and where it contains words referring back to the specifications, it cannot be properly construed in any other way."

In that case it was held that a claim which might otherwise be bad, as covering a function or result, when containing the words "substantially as described," should be construed in connection with the specification, and when so construed was held to be valid. To the same effect is The Corn Planter Patent, 23 Wall. 181-218.

Again, it appears from the file-wrapper and contents, that in his original application Mr. Westinghouse made a broad claim for the admission of air directly from the main air-pipe to the brake-cylinder, which was rejected upon reference to a prior patent to Boyden, No. 280.285, and that on January 19, 1887, his attorney wrote the patent-office in the following terms:

* * *

[Here follow extracts from file.]

We agree with the defendant that this correspondence, and the specification as so amended, should be construed as reading the auxiliary valve into the claim, and as repelling the idea that this claim should be construed as one for a method or process. Language more explicit upon this subject could hardly have been employed.

While it is true that no claim is formally made for the admission of train-pipe air directly to the brake-cylinder as a method or pro-

cess, a construction is given by the complainants and the circuit court to the second claim which eliminates the mechanical features described, and one which could only be supported upon the theory that the claim was for a method or process. If the mechanism described by Westinghouse, and particularly the auxiliary valve, be not essential to the validity of the second claim, then it could only be supported upon the theory that it was for the process of admitting train-pipe air directly to the brake-cylinder.

2. The first and fourth claims of this patent are as follows:

"1. In a brake mechanism, the combination of a main air-pipe, an auxiliary reservoir, a brake-cylinder, a triple valve, and an auxiliary-valve device, actuated by the piston of the triple valve and independent of the main valve thereof, for admitting air in the application of the brake directly from the main air-pipe to the brake-cylinder, substantially as set forth.

4. The combination, in a triple-valve device, of a case or chest, a piston fixed upon a stem and working in a chamber therein, a valve moving with the piston-stem and governing ports and passages in the case leading to connections with an auxiliary reservoir and a brake-cylinder and to the atmosphere, respectively, and an auxiliary valve actuated by the piston-stem and controlling communication between passages leading to connections with a main air-pipe and with the brake-cylinder, respectively, substantially as set forth."

These two claims are practically little more than different expressions of one and the same invention. In both of them there is a main air-pipe, an auxiliary reservoir, a brake-cylinder, a triple valve and piston, described in the fourth claim as "fixed upon a stem and working in a chamber" in a case or chest, and an auxiliary valve; and in the fourth claim also a case or chest, which contains the whole device, and is immaterial.

In both of these claims an auxiliary valve is named as an element. In the first it is described as "actuated by the piston of the triple valve and independent of the main valve thereof;" and in the fourth as "actuated by the piston-stem and controlling communication between passages leading to connections with the main air-pipe and with the brake-cylinder."

To what liberality of construction these claims are entitled depends to a certain extent upon the character of the invention, and whether it is what is termed in ordinary parlance a "pioneer." This word, although used somewhat loosely, is commonly understood to denote a patent covering a function never before performed, a wholly novel device, or one of such novelty and importance as to mark a distinct step in the progress of the art, as distinguished from a mere improvement or perfection of what had gone before. Most

conspicuous examples of such patents are: the one to Howe of the sewing-machine; to Morse of the electrical telegraph; and to Bell of the telephone. The record in this case would indicate that the same honorable appellation might be safely bestowed upon the original air-brake of Westinghouse, and, perhaps also, upon his automatic brake. In view of the fact that the invention in this case was never put into successful operation, and was to a limited extent anticipated by the Boyden patent of 1883, it is perhaps an unwarrantable extension of the term to speak of it as a "pioneer," although the principle involved subsequently and through improvements upon this invention became one of great value to the public. The fact that this invention was first in the line of those which resulted in placing it within the power of an engineer, running a long train, to stop in about half the time and half the distance within which any similar train had stopped, is certainly deserving of recognition, and entitles the patent to a liberality of construction which would not be accorded to an ordinary improvement upon prior devices. At the same time, as hereinafter observed, this liberality must be exercised in subordination to the general principle above stated; that the function of a machine cannot be patented, and, hence, that the fact that the defendants' machine performs the same function is not conclusive that it is an infringement.

The device made use of by the defendants is exhibited in Patents Nos. 481,134 and 481,135, both dated August 16, 1892, and both of which were granted after the commencement of this suit. * * *

In both the complainants' and defendants' devices there is (1) a feeding-in valve to charge the auxiliary reservoir; (2) a valve which complainants call their "main valve," and which the defendants denominate a "graduating valve," which is opened by the preliminary traverse of the piston to admit reservoir-air to the brake-cylinder; (3) a release-valve which discharges air from the brake-cylinder to the atmosphere; and (4) a quick-action valve—41 in the complainants' patent, and 22 in the defendants'—which is opened by the further traverse of the piston to admit train-pipe air to the brake-cylinder. In defendants' patent, it may also be used to admit auxiliary-reservoir air to the brake-cylinder. * * *

As the graduating-valve of the Boyden patent practically does all the work in ordinary cases, and the puppet-valve is only called into action in emergency cases, the latter is practically an auxiliary valve, by which, we understand, not necessarily an independent valve, nor one of a particular construction, but simply a valve which in emergency cases is called into the assistance of the graduating valve. In this particular, the puppet-valve of the Boyden device performs practically the same function as the slide-valve 41 of the Westinghouse. It is not material in this connection that it is a puppet-valve, while the other is a slide-valve, since there is no invention in sub-

stituting one valve or spring of familiar shape for another; (Imhaeuser v. Buerk, 101 U. S., 647, 656;) nor, that in one case the piston pushes the valve off its seat, and in the other pulls it off; nor is it material that this puppet-valve may have been used in prior patents to perform the function of a main valve, so long as it is used for a different purpose here. Indeed, this valve seems to have been taken bodily from Westinghouse patent No. 141,685, where it was used as a main valve, and the stem-valve 18 with its ports *i*, *j*, *k*, added for ordinary uses, and the puppet-valve thus converted from a main valve to an auxiliary valve. * * *

But even if it be conceded that the Boyden device corresponds with the letter of the Westinghouse claims, that does not settle conclusively the question of infringement. We have repeatedly held that a charge of infringement is sometimes made out, though the letter of the claims be avoided. (Machine Co. v. Murphy, 13 O. G., 366; 97 U. S. 120; Ives v. Hamilton, 92 U. S. 341; Morey v. Lockwood, 8 Wall. 230; Elizabeth v. Pavement Company, 97 U. S. 137; Sessions v. Romadka, 145 U. S. 29; Hoyt v. Horne, 145 U. S. 302.) The converse is equally true. The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principle of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent.

"An infringement [says Mr. Justice Grier in Burr v. Duryee, 1 Wall, 531, 572] involves substantial identity, whether that identity be described by the terms 'same principle,' same 'modus operandi,' or any other. * * * The argument used to show infringement assumes that every combination of devices in a machine which is used to produce the same effect, is necessarily an equivalent for any other combination used for the same purpose. This is a flagrant abuse of the term 'equivalent.'"

We have no desire to qualify the repeated expressions of this court to the effect that, where the invention is functional, and the defendant's device differs from that of the patentee only in form, or in a rearrangement of the same elements of a combination, he would be adjudged an infringer, even if, in certain particulars, his device be an improvement upon that of the patentee. But, after all, even if the patent for a machine be a pioneer, the alleged infringer must have done something more than reach the same result. He must have reached it by substantially the same or similar means, or the rule that the function of a machine cannot be patented is of no practical value. To say that the patentee of a pioneer invention for a new mechanism is entitled to every mechanical device which produces the same result is to hold, in other language, that he is en-

titled to patent his function. Mere variations of form may be disregarded, but the substance of the invention must be there. As was said in Burr v. Duryee (1 Wall. 531, 573), an infringement—

"is a copy of the thing described in the specifications of the patentee, either without variation, or with such variations as are consistent with its being in substance the same thing. If the invention of the patentee be a machine, it will be infringed by a machine which incorporates in its structure and operation the substance of the invention; that is, by an arrangement of mechanism which performs the same service or produces the same effect in the same way, or substantially the same way. * * * That two machines produce the same effect will not justify the assertion that they are substantially the same, or that the devices used are, therefore, mere equivalents for those of the other."

Not only is this sound as a general principle of law, but it is peculiarly appropriate to this case. Under the very terms of the first and fourth claims of the Westinghouse patent, the infringing device must not only contain an auxiliary valve, or its mechanical equivalent, but it must contain the elements of the combination, "substantially as set forth." In other words, there must not only be an auxiliary valve, but substantially such a one as is described in the patent, i. e., independent of the triple valve. Not only has the Boyden patent a puppet instead of a slide valve—a matter of minor importance—but it performs a somewhat different function. In the Westinghouse patent the valve is not in the line of travel between the auxiliary reservoir and the brake-cylinder, and admits train-pipe air only. In the Boyden patent, it is in the line of travel, both from the auxiliary reservoir and from the train-pipe, and admits both currents of air to the brake-cylinder. The by-passage, to which the auxiliary reservoir is merely an adit, is wholly wanting in the Boyden device, both currents of air uniting in chamber C and passing to the brake-cylinder together, through the puppet-valve.

But a much more radical departure from the Westinghouse patent is found in the partition 9, separating the valve-chamber C from the piston-chamber D. * * *

Conceding that the function of the two devices are practically the same, the means used in accomplishing this function are so different that we find it impossible to say, even in favor of a primary patent, that they are mechanical equivalents. While the puppet-valve, which, for the purposes of this case, we may term the auxiliary valve, is in its operation independent of the main valve, the word "independent" in the claims of the Westinghouse patent evidently refers to a valve auxiliary to the triple valve, and independently located as well as operated. The difference is that in one case the air from the train-pipe is introduced into the brake-cylinder separately and independently from the air from the auxiliary reservoir;

while in the other case they unite in the chamber C and pass through the same valve to the brake-cylinder. In the Westinghouse patent there is one valve operated by the direct thrust of the piston, opening a by-passage, in the other, there is a puppet-valve also opened by the piston, and another valve, 26, opened by the pressure maintained upon the outside of the partition 9.

It is claimed, however, by the complainants that Boyden was not the inventor of the differential pressure theory; that there is such a differential pressure in their own patent, caused by the fact that the air from the auxiliary reservoir in passing to the brake-cylinder travels through a restricted port, 35, and, as the entrance to the brake-cylinder is through a much larger port, the air is taken up by it much more rapidly than it is supplied by the restricted port, which reduces the pressure in the by-passage so much that when the quick-action valve 41 is opened, the pressure from the train-pipe air is sufficient to open the valve 49 and admit a full volume of train-pipe air, at a pressure of fifty-five pounds, to the brake-cylinder. The fact, however, that no suggestion is made in the patent of such a function of the restricted port 35, indicates either that none such had been discovered, or that it was not considered of sufficient importance to mention it. Indeed, it seems to have been an afterthought, suggested by the necessity of an answer to the defendants' argument, based upon their partition 9. That when the auxiliary valve is opened there must be a difference in pressure above and below the check-valve 49, in order to open it, is manifest; yet, this is rather an incident to the Westinghouse device than the controlling feature that it is made in the Boyden patent. There is no partition in the proper sense of the word—certainly none located as in the Boyden device—between the chambers D and C, and no aperture in such partition opened for the express purpose of maintaining this differential pressure. If such differential pressure existed to the extent claimed in the Westinghouse patent, it certainly was not productive of the results flowing from the same device in the Boyden patent.

We are induced to look with more favor upon this device, not only because it is a novel one and a manifest departure from the principle of the Westinghouse patent, but because it solved at once in the simplest manner the problem of quick action, whereas the Westinghouse patent did not prove to be a success until certain additional members had been incorporated into it. The underlying distinction between the two devices is that in one, a separate valve and separate by-passage are provided for the train-pipe air, while in the other, the patentee has taken the old triple (or quadruple) valve, and by a slight change in the functions of two of its valves and the incorporation of a new element (partition 9), has made a more perfect brake than the one described in the Westinghouse patent. If

credit be due to Mr. Westinghouse for having invented the function, Mr. Boyden has certainly exhibited great ingenuity in the discovery of a new and more perfect method of performing such function. If his patent be compared with the later Westinghouse patent No. 376,837, which appears to have been the first completely successful one, the difference between the two, both in form and principle, becomes still more apparent, and the greater simplicity of the Boyden patent certainly entitles it to a favorable consideration. If the method pursued by the patentee for the performance of the function discovered by him would naturally have suggested the device adopted by the defendants, that is in itself evidence of an intended infringement; but, although Mr. Boyden may have intended to accomplish the same results, the Westinghouse patent, if he had had it before him, would scarcely have suggested the method he adopted to accomplish these results. Under such circumstances, the law entitles him to the rights of an independent inventor.

Upon careful consideration of the testimony we have come to the conclusion that the Boyden device is not an infringement of the complainants' patent, and the decree of the Circuit Court of Appeals is, therefore, affirmed.

DISSENTING OPINION.

Mr. Justice Shiras, with whom concurred Mr. Justice Brewer, dissented and filed the following opinion:

I am unable to concur in the reasoning and conclusion of the Court, and shall briefly state my views.

The history of the art discloses that the patent in suit was what is called a "pioneer invention." In it, for the first time, was brought to light a method or process which, by the co-operation of the air from the train-pipe with that from the car-reservoir, created the "quick-action" brake. The patent, in its specification and claims, clearly described a machine or mechanical combination whereby the invention was exemplified or rendered operative.

It is not an unwarrantable extension of the term to speak of this invention in suit as a pioneer, since it is practically conceded in this case, and justly observed by the court below, "one of the highest value to the public," and conspicuously one "which entitles the proprietor to a liberal protection from the courts in construing the claim." The very fact that this invention resulted in placing it within the power of an engineer, running a long train, to stop in about half the time and half the distance within which any similar train had been stopped, is certainly deserving of recognition. The claims of such patents have from time out of mind been allowed a liberal construction, and considered as entitled to the fullest benefit of the doctrine of mechanical equivalents.

It in no wise detracts from the merit of this invention that later devices have been adopted which render its practical operation more efficient. The very term, "pioneer patent," signifies that the invention has been followed by others. A pioneer patent does not shut but opens the door for subsequent invention.

The particular patent in suit was, as I understand it to be admitted, an entire success in supplying passenger-trains and short freight-trains with a "quick-action" brake; but while it enabled even the longest freight-trains to stop in half the time and half the distance previously occupied, there remained difficulties which required further devices to give to the invention the perfect success which it has now attained.

Being of the character so described as a pioneer, the patent in suit is entitled to a broad or liberal construction. In other words, the invention is not to be restricted narrowly to the mere details of the mechanism described as a means of carrying the invention into practical operation.

I cannot assent to what is, perhaps, rather intimated than decided in the opinion of the Court that what is called a "process in order to be patentable must involve a chemical or other similar elemental action." The term process or method, as describing the subject of a patent, is not found in the statutes. No reason is given in the authorities, and I can think of none in the nature of things, why a new process or method may not be patentable, even though a mechanical device or a mechanical combination may be necessary to render the new process practicable. It seems to be used by the courts as descriptive of an invention which, from its novelty and priority in the art to which it belongs, is not to be construed as inhering only in the particular means described, in the Letters Patent, as sufficient to exemplify the invention and bring it into practical use.

Thus in the case of Winans v. Denmead, (15 How., 330,) the patent was for a new form of the body of a car for the transportation of coal, thus avoiding certain practical difficulties or disadvantages in such cars as previously made. To the argument on behalf of the infringer, that the claim of the patent was confined to a single form, and only through and by that form to the principle which it embodies, this Court said, per Mr. Justice Curtis: * * * [See infra.]

McCormick v. Talcott, 20 How. 402, was also a case of a mechanical patent, and it was said by Mr. Justice Grier, who delivered the opinion of the Court:

"If the patentee be the original inventor of the device or machine, he will have a right to treat as infringers all who make machines operating on the same principle and performing the same functions by analogous means or equivalent combination, even though

the infringing machine may be an improvement of the original and patentable as such."

In Morley Machine Co. v. Lancaster, (129 U. S., 263,) there was also a question of an alleged invention of a primary character, and wherein the invention was embodied in a mechanical combination; and it was held that, in a pioneer patent, such as that of Morley, the patentee, the special devices set forth by Morley were not necessary consituents of the claims; that his patent was to receive a liberal construction, in view of the fact that he was a pioneer in the construction of an automatic button-sewing machine, and that his patent was not to be limited to the particular device or instrumentalities described by him.

In that case extended and approving reference was made to the case of Proctor v. Bemis, (36 Ch. Div., 740,) which was a case of an invention embodied in a mechanical contrivance, and the following language of Lord Justice Bowen was quoted:

"Now, I think it goes to the root of this case to remember that this is, as was described by one of the counsel, really a pioneer invention; and it is by the light of that, as it seems to me, that we ought to consider whether there have been variations or omissions and additions, which prevent the machine which is complained of from being an infringement of the plaintiff's. With regard to the additions and omissions, it is obvious that additions may be an improvement and that omissions may be an improvement; but the mere fact that there is an addition, or the mere fact that there is an omission, does not enable you to take the substance of the plaintiff's patent. The question is not whether the addition is material or whether the omission is material, but whether what has been taken is the substance and essence of the invention."

These were cases wherein the discovery or invention was made effective through machines or mechanical combinations, and wherein it was held that the merit of the process or method was not to be confined, in the case of a pioneer patent, to the mere form described in the specification as sufficient to make the invention practically operative.

Neilson's patent (Web. Pat. Cas., 275), was a noted case, in which the true distinction was drawn between a mere principle, as the subject of a patent, and a process by which a principle is applied to effect a new and useful result. The Court of Exchequer, in answering the objection that Neilson's patent was for a principle, said:

"It is very difficult to distinguish it from the specification of a patent for a principle, and this at first created in the minds of some of the court much difficulty; but, after full consideration, we think the plaintiff does not merely claim a principle, but a machine embodying a principle, and a very valuable one. We think the case

must be considered as if, the principle being well known, the plaintiff had first invented a mode of applying it by a mechanical apparatus to furnaces; and his invention consists in this—by interposing a receptacle for heated air between the blowing apparatus and the furnace. In this receptacle he directs the air to be heated by the application of heat externally to the receptacle, and thus he accomplishes the object of applying to the blast, which was before of cold air, in a heated state to the furnace."

And when the case came before the House of Lords, Lord Campbell said:

"After the construction first put upon the patent by the learned judges of the Exchequer, I think the patent must be taken to extend to all machines, of whatever construction, whereby the air is heated intermediately between the blowing apparatus and the blast-furnace. That being so, the learned judge was perfectly justified in telling the jury that it was unnecessary for them to compare one apparatus with another, because, confessedly, that system of conduit-pipes was a mode of heating air by an intermediate vessel between the blowing apparatus and the blast-furnace, and, therefore, it was an infringement of the patent." (Web. Pat. Cas. 715.)

Very applicable to the present case is the doctrine of Tilghman v. Proctor (102 U. S. 767). It was there held, overruling the case of Mitchell v. Tilghman, (19 Wall., 284,) that a patent may be validly granted for carrying a principle into effect; and if the patentee suggests and discovers not only the principle, but suggests and invents how it may be applied to a practical result by mechanical contrivances and apparatus, and shows that he is aware that no particular sort or modification of form of apparatus is essential to obtain benefit from the principle, then he may take his patent for the mode of carrying it into effect, and is not under the necessity of confining himself to one form of apparatus.

Having discussed the previous cases, particularly that of Neilson and of O'Reilly v. Morse, (15 How., 62,) Mr. Justice Bradley said:

"Whoever discovers that a certain useful result will be produced in any art by the use of certain means is entitled to a patent for it, provided he specifies the means. But everything turns on the force and meaning of the word 'means.' It is very certain that the means need not be a machine, or an apparatus; it may be a process. A machine is a thing. A process is an act, or a mode of acting. The one is visible to the eye—an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed. Either may be the means of producing a useful result. * * * Perhaps the process is susceptible of being applied in many modes and by the use of many forms of apparatus. The inventor is not bound to describe them all in order to

secure to himself the exclusive right to the process, if he is really its inventor or discoverer. But he must describe some particular mode, or some apparatus, by which the process can be applied with at least some beneficial result, in order to show that it is capable of being exhibited and performed in actual experience."

The Telephone Cases (126 U. S. 1, 533), contain an apt illustration of these principles. Mr. Chief Justice Waite, in discussing the case, said: * * * [See infra.]

The conclusion justified by the authorities is that whether you call Westinghouse's discovery, that "quick action" may be accomplished by the co-operation of the main pipe air and that from the car-reservoir, a process, or a mode of operation, yet if he was the first to disclose it and to describe a mechanical means to give practical effect to the invention, he must be regarded as a pioneer inventor, and as entitled to protection against those who, availing themselves of the discovery, seek to justify themselves by pointing to mere differences in form in the mechanical devices used.

Much stress was laid in the argument on an alleged disclaimer by the patentee while the application was pending in the patent-office, whereby it is said Westinghouse must be understood to have abandoned the second claim, or, at any rate, to have consented that that claim should be interpreted by the courts as if it contained an auxiliary valve as a material element in the claim.

There are cases, no doubt, in which it has been held that when a claimant has, under objection in the patent-office, withdrawn certain claims, or has modified them by adding or striking out terms or phrases, and accepts a patent which does not grant the abandoned or unmodified claims, he cannot be heard to insist upon such a construction of the allowed claims as would cover what had been previously rejected. (Shepard v. Carrigan, 116 U. S. 593; Roemer v. Peddie, 132 U. S. 313; Corbin Lock Co. v. Eagle Lock Co., 150 U. S. 38.)

An examination of the cited cases, however, will disclose, as I think, that they turned upon matters of construction. In other words, were cases where it was questionable what the patent, as actually granted, meant. In such cases, as in other cases of ambiguity, it may be allowable to consult the application and file wrapper, and possibly written communications, which may throw light upon claims that are ambiguous or capable of different constructions.

But where the claims allowed are not uncertain or ambiguous, the courts should be slow to permit their construction of a patent, actually granted and delivered, to be affected or controlled by alleged interlocutions between the officers in the patent-office and the claimant. No doubt, in proceedings to revoke or cancel a patent granted by inadvertence or by fraudulent representations, it would be competent to show what had taken place in the patent-office pend-

ing the application. But when we consider that often the employes in the patent-office are inexperienced persons, and that the mass of the business is so vast that it is impossible for the commissioner or the chief examiner to review it, except in a perfunctory way, it can be readily seen how dangerous it would be to modify or invalidate a patent, clear and definite in its terms, by resorting to such uncertain sources of information.

However this may be, I do not perceive that the matters alleged in the present case are entitled to any weight in the construction of the patent. Even if the letter of the claimant's attorney, written on January 19, 1887, can be looked to as helping us to understand the meaning of a patent granted on March 29, 1887, it only appears to be an argument as to the meaning or legal effect of the language used in the claims, and does not amount to a withdrawal or modification of them.

Accordingly the second claim of the patent is before us for construction on its own terms, and, to avoid protracting this discussion, the opinion of Judge Morris in the circuit court is referred to and adopted as a sound construction of that claim. (66 Fed. Rep., 997.) This claim is not, as I read it, open to the objection that it aims to patent a principle. It sets forth the discovery that by a co-operation of the air from the auxiliary reservoir and that from the main air-pipe, the action of the brakes is quickened and the air vented from the main air-pipe directly to the brake-cylinder.

But, even if the second claim must, as argued in the opinion of the Court, be read, by reason of the letter of the claimant's attorney, as if it called for the auxiliary valve described in the first and fourth claims, and even if, when not so read, it can be regarded as void because simply for a function or principle, nevertheless the invention, as described in the other claims and specification, is clearly set forth, and, under the evidence as to the state of the art, is entitled to be regarded as a pioneer. Regarding the second claim as a mere statement of the idea or invention and the other claims as describing a form or combination of mechanism which embodies the invention and renders it operative, all the requisites of the law are sufficiently complied with.

The only remaining question is that of the infringement, and that is readily disposed of. For it is conceded in the opinion of the majority of the Court that, if the patent in suit is entitled to a broad construction as a pioneer, embodying a new mode of operation, not limited to the particular means described in the specification, then the defendant's device is an adoption of the idea or principle of the Westinghouse patent with a mechanical equivalent or substitute for the auxiliary valve.

Upon the whole I am of the opinion that the decree of the Circuit Court of Appeals should be reversed and that the cause should

be remanded with directions to restore the decree of the circuit court.

Mr. Justice Brewer concurred in the dissenting opinion.

Mr. Justice Gray and Mr. Justice McKenna also dissented from the opinion and from the decision of the Court.

68. SIMONDS ROLLING MACH. CO. v. HATHORN MFG. CO., 93 Fed. 958, 36 C. C. A. 24 (1899, First Circuit).

Before Colt, Circuit Judge, and Webb and Aldrich, District Judges.

Colt, Circuit Judge. This suit was brought for infringement of two patents, No. 319,754, dated June 9, 1885, and No. 419,292, dated January 14, 1890. The first patent was issued to George F. Simonds for dies "for forging articles circular in cross section," such as car axles, and the second to the complainant, as assignee of Simonds, for the method of making irregular shaped metal articles or "of making wrought-metal forgings that are circular in cross-sectional area." The court below held that the first claim of the die patent was limited to irregular shaped articles, and did not cover dies for making balls; that the second claim must be strictly construed, and therefore was not infringed; and that the method patent was valid, and infringed by the defendants. 90 Fed. 201. The complainant appeals from so much of the decree below as limits the scope of the first claim of the die patent, and holds that the defendants do not infringe the second claim. The defendants appeal from so much of the decree as declares that they infringe the first claim of the die patent and the method patent.

It is apparent that the method and the die patents are not for the same invention. The former covers the method, irrespective of the specific means or instrumentalities employed; the latter covers certain specific features of dies used in carrying out the method. These are distinct inventions. The main defense to both patents relied upon in the court below and on this appeal is the alleged anticipation of Simonds' method and dies by the prior English patent granted to William Bundy. Preliminary to the consideration of this question, it may be observed that Simonds' method was radically new in the metal-forging art. It revolutionized the branch of the art to which it relates. It is practically and commercially successful. The Simonds method patent is for "making wrought-metal forgings which are circular in cross-sectional area." It deals with the forging of hot metal. It contains a description of the method, the mode of operation, and refers to different forms of dies which may be employed in carrying out the method. The dies illustrated in the drawings are so shaped as to roll balls, car axles, and other articles circular in cross section. The dies are used in pairs, and have raised

working parts. They rotate and shape the blank between them. They travel in parallel lines in opposite directions. At the beginning of the operation the forward ends of the dies are opposite one another, and at the end of the operation the rear ends are opposite one another. * * *

The claim of the method patent is as follows:

"The method herein described of making rolled-metal forgings by acting upon all parts of a metal bar in spiral lines, so as at each part in succession and upon such lines to cause the bar to rotate, and to strain and spread the metal axially, and compress it to the required shape and size."

The Bundy English patent was granted in 1806. It was for an invention of "machines or instruments for the purpose of making leaden bullets and other shot." It was not for forging hot metal. It does not appear that leaden bullets were ever made with the Bundy machine, or that it made any impression on the art of metal working.

* * *

There is certainly a close resemblance between the Bundy dies for making lead balls and (apparently) their mode of operation, and the Simonds dies for forging balls and their mode of operation. But the complainant contends that there are important differences, which may be stated as follows: Bundy makes only leaden bullets. Simonds forges various articles circular in cross section from a heated metal blank. Bundy cuts away the surplus lead by sharp cutting edges, and shapes the remainder. Simonds spreads or crowds away the surplus hot metal, and compacts the outer surface of the article forged. Bundy provides corrugations within the grooves to rotate the leaden balls. Simonds places his corrugations outside the grooves so as to rotate the mass of the heated blank. Bundy made no impression on the art. Simonds' patent is the foundation of a new industry. We are not prepared to say that the cutting and molding of the cold lead by the Bundy dies is the same as the spreading and compacting of the hot metal by the Simonds forging dies. Nor are we fully convinced that in mode of operation and result the dies are essentially different.

If the question of identity of method and result is doubtful, the doubt must be resolved in favor of the successful patentee, who has in a practical way materially advanced the art. Washburn v. Gould, 3 Story 122, 144 Fed. Cas. No. 17,214. In Bundy the corrugations for causing the rolling of the metal are located at the bottom of the forming groove of the die, while in Simonds' they are located outside the forming groove. It appears that dies with Bundy corrugations would be inoperative for forging hot metal. Further, Bundy speaks of the sides of the grooves of the two molds being "sufficiently sharp" to press and "cut away" the lead. This does not accurately

describe the Simonds die for spreading, crowding, and compacting the surplus hot metal on the outer surface of the forged article. Again, and perhaps of greater consequence, we are not fully satisfied from the evidence in the record relating to the experiments which were made that the Bundy patent describes practically operative means for making lead bullets. It can, at least, be said, we think, that the Bundy patent does not disclose practically operative means for forging metal articles circular in cross section. Upon the whole we do not find in the Bundy patent a description of the Simonds method in such "full, clear, and exact terms" as are necessary to anticipate the Simonds patents. Hanifen v. Godshalk Co., 28 C. C. A. 507, 84 Fed. 649; Heap v. Tremont & S. Mills, 27 C. C. A. 316, 82 Fed. 449, 452; Consolidated Car-Heating Co. v. American Electric Heating Corp., 82 Fed. 993, 997, on appeal 29 C. C. A. 386, 85 Fed. 662, 665. As it is not seriously contended that any prior patent in the forging art anticipates the Simonds method, it follows that the Simonds method patent is valid, and that the defendants infringe this patent.

We come next to the die patent. This patent is entitled, "Die for forging metal articles circular in cross section." The specification says that the inventor has "invented certain improvements in faces for car-axle dies designed to be used in pairs." The specification further says:

"My invention consists in dies designed to be used in pairs, and provided with forming surfaces raised upon the plane face of the die, and with reducing and spreading surfaces running diagonal to the line of movement of the die, and standing oblique to the plane of the die. My invention further consists, in providing the reducing and spreading surfaces above mentioned, when necessary, with corrugations or irregularities, to engage the metal and insure the rotation of the work."

The claims are as follows:

"(1) Dies adapted to form metal articles circular in cross-sectional area, with the working parts raised upon a plane surface, and provided with forming surfaces running in line with the movement of the die, to give the shape required, and diverging reducing and spreading surfaces to force the metal laterally, substantially as described. (2) Dies adapted to form metal articles circular in cross-sectional area, having forming surfaces to give the shape required, and reducing and spreading surfaces to force the metal laterally, provided with corrugations or irregularities, to engage the mass of metal and insure its rotation, substantially as set forth."

We agree with the court below that the second claim is narrow, and is limited to the corrugations "substantially as set forth." The defendants' dies not having the same corrugations, or the corrugations located in the same situation on the dies, do not infringe this

claim. This does not apply to Ball Dies No. 1, and Boot-Calk Dies No. 1, used only by defendant Hathorn, for they have the corrugations in the same location described by Simonds. As to the first claim, however, we do not think it excludes dies for making balls, and is limited to dies for forging car axles, boot calks, and other irregular shaped articles analogous to car axles. We are of opinion that this claim fairly covers "dies for forging metal articles circular in cross section," substantially as described, and that it embraces the dies for forging balls which are used by the defendants. This suit was brought against the Hathorn Manufacturing Company and three individual defendants. The court below limited its decree in favor of the complainant to the joint infringement of all the defendants. We see no sufficient reason, under the present bill, why the defendant Hathorn should not account for his several or individual infringements. We understand this to be the general rule. Herring v. Gage, 3 Ban. & A. 396, 402 Fed. Cas. No. 6,422; Tatham v. Lowber, 4 Blatchf. 86, 87, Fed. Cas. No. 13,765; New York Grape Sugar Co. v. American Grape Sugar Co., 42 Fed. 455. The decree of the circuit court is modified as to the construction of the first claim of patent No. 319,754, and as to the liability of defendant Hathorn for his several infringements, and the case is remanded to that court for proceedings not inconsistent with this opinion. Costs in this court are awarded to the complainant, the Simonds Rolling-Machine Company.

69. IN RE WESTON, 17 App. D. C. 431, 94 O. G. 1784; 1901 C. D. 290.

Morris, J.:

This is an appeal from a decision of the Commissioner of Patents, wherein, affirming the decisions of the lower tribunals of his office, he has refused a patent for an alleged process in the manufacture of a device used in the construction of electrical measuring instruments. The claims sought to be patented are nine in number, and they are described in the following terms:

"1. The described method of manufacturing a symmetrical movable coil for an electrical measuring instrument, consisting in first forming a supporting frame or spool by subjecting a short tube of metal to pressure until the desired conformation and shape is obtained, then winding the coil thereon and finally securing the pivot-pins thereto in the axial line of the coil. * * *

3. The described method of manufacturing a supporting frame or spool without joint or seam for an electrical coil, consisting in giving to a short section of tubing the desired configuration, then subjecting it to pressure until the desired curvature is obtained, and finally turning down the lateral edges thereof in such manner as to constitute the flanges of the frame or spool. * * *

7. The described method of securing the pivot-pins to the movable coil for an electrical measuring instrument in the mathematical axial line thereof, consisting in securing or locking the coil in a definite or fixed position and then detachably securing the pivot-pins to movable supports which have a fixed or definite relation to the mathematical axis of the supported coil and finally moving the supported pivot-pins into mechanical contact with the coil and permanently securing them thereto. * * *

9. The described method of securing the needle-supporting pivot to the movable coil of an electrical measuring instrument in such manner that the point of the needle shall have a definite or fixed relation to the axis of the coil, consisting in securing or locking the coil in a definite or fixed position and then detachably securing the needle supporting pivot to a movable support which has a definite or fixed relation to the mathematical axis of the supported coil, then rotating the pivot to a definite point and finally securing it permanently to the coil."

Five of these claims, being those numbered 5, 6, 7, 8 and 9, were allowed by the Primary Examiner, apparently with some reservation of further inquiry into them. His decision in this regard is in these words:

"The remaining claims are allowed, as at present advised—"

or, as he expresses it in another place—

"the remaining claims may, as advised, be allowed."

But the claims numbered 1, 2, 3 and 4 he rejected, on the ground that they were not patentable. From his decision in rejecting these four claims an appeal was taken to the Board of Examiners; and the Board of Examiners affirmed the action of the Primary Examiner. Upon a further appeal from the Board of Examiners to the Commissioner of Patents, the Commissioner affirmed the decision of the board, although he seems to have had some difficulty in reconciling the action of the Primary Examiner in the refusal of some of the claims with his allowance of the others. From the decision of the Commissioner the case comes to us by appeal.

The application, it will be noticed, in each and all of the four claims brought here for our consideration is for a method or process, and not either for the thing produced or for the mechanism by which it is produced. Both the mechanism and the product, it is understood, which are connected with the process for which a patent is now sought have already been patented to the present appellant. The question, therefore, for determination is the greatly-vexed one, how far a method or a process is patentable, and when it is a subject of patentability.

The general question was decided in the affirmative by the Supreme Court of the United States in the case of Cochrane v. Deener,

11 O. G. 687, 94 U. S. 780, 787, in which that Court by Mr. Justice Bradley said: * * * [See infra.]

The process in that case was for the manufacture of flour, and the patent, which had been issued for it, was sustained.

In the previous case of Corning v. Burden, (15 How., 252,) in an opinion written for the Supreme Court by Mr. Justice Greer, the distinction was indicated between a process which was patentable and the mere function of a machine which was not patentable. There the Court said: * * * [See infra.]

In that case the patent under consideration was for—

"a new and useful machine for rolling puddler's balls and other masses of iron, in the manufacture of iron—"

and it was held to be a patent for a machine, and not for a process, although it was stated that the language of the claim was equivocal.

Subsequently the whole subject came up for consideration anew in the Supreme Court in the case of Risdon Iron and Locomotive Works v. Medart, (71 O. G., 330; 158 U. S., 68,) in which the patent under consideration was for an alleged process in the manufacture of belt-pulleys, and the Court by Mr. Justice Brown said. * * * [See infra.]:

The Court thereupon cited and discussed the cases of Neilson v. Harford, (1 Web. Pat. Cas. 331;) Household Coal and Iron Company v. Neilson, (1 Web. Pat. Cas. 673;) O'Reilly v. Morse, (15 How. 62;) Corning v. Burden, (15 How. 252;) Mowry v. Whitney, (1 O. G. 499; 14 Wall., 620;) Tilghman v. Proctor, (19 O. G. 859; 102 U. S. 707;) New Process Fermentation Co. v. Maus, (39 O. G. 1419; 122 U. S. 413;) Bell Telephone Co. Case, (126 U. S. 1,) and Wyeth v. Stone, (1 Story 273,) quoting at large from the opinion of Mr. Justice Greer in the case of Corning v. Burden as stating the true distinction to be observed in such cases. Then it proceeded to say:

"Although the cases are not numerous, this distinction between a process and a function has never been departed from by this Court, and has been accepted and applied in a large number of cases in the circuit courts. The following processes have been held not to be patentable; an improvement in sewing machines, by which the soles and uppers of boots and shoes could be sewed together without any welt by a certain kind of stitches, (McKay v. Jackman, 12 Fed. Rep. 615;) a process for washing shavings in breweries, (Brainard v. Cramme, 12 Fed. Rep. 621; an improved method of treating seed by steam, (Gauge v. Kellogg, 23 Fed. Rep. 891;) a process for crimping heel-stiffenings of boots and shoes, (Hatch v. Moffit, 15 Fed. Rep. 252.) See also, Sickels v. Falls Company, (4 Blatchf.) 508), and Excelsior Needle Co. v. Union Needle Co., (32 Fed. Rep. 221.)"

The alleged process, for which the patent had been issued which was under consideration in the case of Risdon Iron and Locomotive Works v. Medart, purported to be—

"an improved process for the manufacture of belt-pulleys formed of a wrought-metal rim and a separate center, usually a spider and usually made of cast metal."

And, as it is argued that it was entirely analogous to that which is involved in the case before us, it may be stated to have consisted of six several steps: first, centering the pulley center or spider; second, grinding the ends of the arms concentrically with the axis of the pulley; third, boring the center; fourth, securing the rim to the spider; fifth, grinding the face of the rim concentric with the axis of the pulley; sixth, grinding or squaring the edges of the rim. "This process," the Court said, "is a purely mechanical one;" and accordingly it held the patent to be void.

The decision in the case of Risdon Iron and Locomotive Works v. Medart seems to have been understood by some courts and to some extent by the patent-office as restricting the patentability of processes to those which involved chemical or other elemental action. But that this was an erroneous impression sufficiently appears from the subsequent case of Westinghouse v. Boyden Power Brake Company, (83 O. G., 1067; 170 U. S., 537,) which was a case of alleged infringement, and in which the patent under consideration was for a fluid-pressure automatic-brake mechanism, the object of which was stated in the specification to be—

"to enable the application of brake-shoes to car-wheels by fluid-pressure to be effected with greater rapidity and effectiveness than heretofore, more particularly in trains of considerable length, as well as to economize compressed air in the operation of braking, by utilizing in the brake-cylinders the greater portion of the volume of air which in former practice was directly discharged into the atmosphere."

The controversy in the case to some extent turned upon the question whether one of the claims of the patent was to be regarded as being one for a process, or merely for novelty of mechanism. The Court held that the whole theory of the specification and claims was based upon the alleged novelty of the mechanism; but at the same time it proceeded also to discuss the question of the patentability of process, and in so doing reviewed a number of the preceding cases, including that of Corning v. Burden, and Risdon Iron and Locomotive Works v. Medart. The Court in its opinion said as follows:

"The complainant's case must rest either upon the theory that the admission of compressed air directly from the train-pipe to the brake-cylinder is patentable as a function, or that the means em-

ployed by the defendants for that purpose are a mechanical equivalent for the auxiliary valve—"
described in the patent.

And then it proceeded to state that the first theory was based on the second claim of the patent, and it said:

"The difficulty we have found with this claim is this, that, if it be interpreted simply as a claim for the function of admitting air to the brake-cylinder directly from the train-pipe, it is open to the objection, held in several cases to be fatal, that the mere function of a machine cannot be patented."

Then, after citing and discussing the cases of Corning v. Burden, (15 How., 252;) Burr v. Duryee, (1 Wall., 531;) Fuller v. Yentzer, (94 U. S., 288;) and Risdon Iron and Locomotive Works v. Medart, (71 O. G., 330; 158 U. S. 68,) the opinion, which, it may be remarked, was written by the same Justice who wrote the opinion in the case of Risdon Iron and Locomotive Works v. Medart, continued as follows:

"These cases assume, although they do not expressly decide, that a process to be patentable must involve a chemical or other similar elemental action; and it may still be regarded as an open question whether the patentability of processes extends beyond this class of inventions. Where the process is simply the function or the operative effect of a machine, the above cases are conclusive against its patentability; but where it is one which, though ordinarily and most successfully performed by machinery, may also be performed by simple manipulation, such, for instance, as the folding of paper in a peculiar way from the manufacture of paper bags, or a new method of weaving a hammock, there are cases to the effect that such a process is patentable, though none of the powers of nature be invoked to aid in producing the result. (Eastern Paper Bag Co. v. Standard Paper Bag Co., 41 O. G., 231; 30 Fed. Rep., 63; Union Paper Bag Machine Co. v. Waterbury, 39 Fed. Rep., 389; Travers v. American Cordage Co., 70 O. G., 277; 64 Fed. Rep., 771.) This case, however, does not call for an expression of our opinion on this point, nor even upon the question whether the function of admitting air directly from the train-pipe to the brake-cylinder be patentable or not, since there is no claim made for an independent process in this patent, and the whole theory of the specification and claims is based upon the novelty of the mechanism."

In view of the disclaimer in the last sentence of any intention to express an opinion on the subject of the patentability of processes, it is intimated in the argument of the case before us that the previous intimation on the subject is *obiter dictum*, and has not therefore the effect of modifying the opinion in the case of Risden Iron and Locomotive Works v. Medart. But we deem it unnecessary to go into that consideration: for we find no real antagonism between the two

cases. In the one illustrations have been cited of processes decided not to be patentable; in the other there is mention of processes that have been held patentable; and the general subject of patentability of processes, other than those involving chemical or other elemental action, is left an open question.

It may be noticed that in the case of Westinghouse v. Boyden Power Brake Co., four of the Justices dissented; and in the dissenting opinion written by Mr. Justice Shiras it was said:

"I cannot assent to what is, perhaps, rather intimated than decided in the opinion of the Court that what is called a process in order to be patentable must involve a chemical or other similar elemental action. The term 'process' or 'method,' as describing the subject of a patent, is not found in the statutes. No reason is given in the authorities, and I can think of none in the nature of things, why a new process or method may not be patentable, even though a mechanical device or a mechanical combination may be necessary to render the new process practicable."

It seems to us from all these authorities the deductions to be drawn are these: First, that processes involving a chemical or other elemental action, if new and useful, are patentable; second, that a process, which amounts to no more than the mere function of a machine, is not patentable; third, that a process or method of a mechanical nature, not absolutely dependent upon a machine, although perhaps best illustrated by mechanism, may, if new and useful, be the proper subject of a patent, even though it involves no chemical or other elemental action.

In this last class of cases, possibly a very large class, and thus far certainly a very indefinite class, the criterion of patentability, so far as it seems possible yet to state any definite criterion, would seem to be that the process may be performed by hand or by other mechanism than that exhibited, although perhaps not with equal efficiency. That we must at all events recognize the existence of such a class would seem to be beyond doubt. To this effect are the cases of Melvin v. Potter, (91 Fed. Rep. 151;) Travers v. American Cordage Co., (70 O. G., 277; 64 Fed. Rep. 771;) Union Paper-Bag Machine Co. v. Waterbury, (39 Fed. Rep. 389;) Eastern Paper-Bag Co. v. Standard Paper-Bag Co., (41 O. G. 231, 30 Fed. Rep., 63;) Covert v. Travers Brothers' Co., (75 O. G. 349;) American Fibre Chamois Co. v. Buckskin Fibre Co., (75 O. G. 833;) and Jackson v. Birmingham Brass Co., (75 O. G. 677,) and the Commissioner of Patents has very properly recognized such a classification in ex parte Rogers and Winslow, (87 O. G. 699), where he has made the same deductions from the authorities which we have here made.

Now, if the appellant's claims here in controversy are patentable, they must fall into this last class; and we understand it to be his contention that they do so fall. Otherwise, they must be relegated

to the second class, in which patentability is inadmissible. What then is the appellant's method or process: And wherein does its novelty as a method consist independently of the mechanism which is used to illustrate it? The novelty and the utility of the mechanism as such seem to be conceded; and the only question is whether there is anything more involved in the claims than the mere function of such mechanism.

The appellant's claims numbered 3 and 4 need scarcely enter into our consideration at all; for plainly they involve merely well-known mechanical operations. They consist merely in drawing a section of sheet metal over a mandrel and subjecting it to pressure until a desired configuration is acquired, and then turning down the lateral edges. This is a simple and well-known mechanical operation, and we fail to find in it any element of patentable novelty. Whether a spool to be used in an electrical apparatus was ever so constructed before the appellant constructed one, is of no consequence; for the claim here is for a process, and the process is well known, and therefore not patentable. That the appellant's apparatus effects the purpose more thoroughly and more effectively than it was accomplished before, is only evidence that he has a better apparatus for the purpose. The result is merely the function of the mechanism.

The claims numbered 1 and 2 embrace the elements of claims numbered 3 and 4, and others also in addition thereto, the first of which is that of winding the coil around the spool, after the spool has been fashioned in the manner stated in claims numbered 3 and 4. But the winding of a coil around a spool so fashioned is not new. As in the matter of the configuration of the spool itself, the appellant's mechanism may effect this result more thoroughly and more efficiently than before; but the method itself as a process is not new. It is only the function of the machine that gives it the character of an improvement.

So, neither the fashioning of a spool of sheet metal in the mode stated in the appellant's claims, nor the winding of a coil around such spool after it has been fashioned, nor both together, can be held to constitute a novel and patentable process. The patentability of the appellant's claims, therefore, must be found, if at all, in the other elements, of which there is in the first claim only one, that of securing the pivot-pins in the axial line of the coil; and in the second claim, in addition to this last, the further element of "simultaneously adjusting the needle-supporting pivot in such manner that the point of the needle is located in the central plane of the coil, or in a plane at a definite angle thereto." And we think that these elements in combination constitute a patentable process.

The purpose is to make a symmetrical movable coil for an electrical measuring instrument. This is effected by taking a spool of sheet metal with a certain configuration, winding the coil thereon,

and securing the pivot-pins thereto in the axial line of the coil, at the same time adjusting the needle-supporting pivot in a certain specified manner. Why should not this adjustment of pivots and pivot-pins to accomplish an important result, which could not be accomplished without such adjustment, be regarded as a process? The question is not whether the mechanism exhibited by the applicant is competent to effect the result, but what the result is that is to be effected, and whether such result is the function exclusively of the mechanism.

As has been well argued by counsel for the appellant, there are three things involved in many, perhaps in most of what are known as pioneer inventions—the thing produced, the mechanism by which it is produced, and the process of production; and the last is very often the most important part of the invention or discovery, for the reason that the first mechanism used is very often crude, the thing produced equally so, and the process only is that which effects the great change in the art of science to which it appertains. In such cases, as Mr. Justice Brown said in the case already cited of Risdon Iron and Locomotive Works v. Medart, the inventor or discoverer might lose the benefit of his real invention or discovery, if he were not entitled to a patent for the process invented or discovered. And so, there is, of course, no question that, in a proper case, an inventor may have a patent for his process, irrespective of the mechanism used and of the result of the process. The process, however, is an intangible thing, while the mechanism and the thing produced are tangible. But after all, it is the idea, the intangible thing, that is of permanent importance and most valuable.

Now, the thing to be produced in the present case is a coil for an electrical measuring instrument. The appellant has discovered that by taking a spool of sheet metal, with the coil properly wound around it, and adjusting it in a certain manner on pivot-pins and adjusting the needle in a certain manner through the instrumentality of the pivot which supports it, he can accomplish the desired purpose. Now this we understand to be a process or method for effecting a result: it is a process or method for the adjustment of coils for electrical measuring instruments in such manner as that they will accurately measure the electrical current passing through them. And this process or method, while it may require the use of delicate mechanism for its actual development and manifestation and to effect the desired adjustment, seems to us to be, as a mental operation, entirely independent of such mechanism. It may be that the mechanism employed is incapable of any other function. It may even be that the process could not well be performed for any useful purpose by any other mechanism. But it does not necessarily follow from this that the process should be regarded as the mere function of the mechanism exhibited for its practical manifestation. The

process is first in the logical order of things; the mechanism is only a sequence. The applicant's discovery, for which he here seeks a patent, is that, if he caused a metal spool with a coil of wire wound around it to be adjusted in a certain manner on pivot-pins, he could have a new and useful mode for the construction of electrical measuring apparatus. It does not appear to us that the mechanism which he uses for the purpose of such adjustment is a necessary part of his process. He might possibly effect the purpose by mere manipulation. It is not impossible that he might effect it by mechanism of a radically different character from that which he exhibits. Ordinarily a process can be carried into practical effect by mechanism only; and it is the function of such mechanism to effect the process. But the process and the function of the mechanism are not for that reason one and the same thing in law or in our conception of the discovery.

We cannot see that this case differs in principle from that of the Eastern Paper-Bag Co. v. Standard Paper-Bag Co., (41 O. G. 231: 30 Fed. Rep., 63,) where it was discovered that, if a piece of paper was folded in a certain manner, an ingenious, new and useful paper bag would be the result. Of course, mechanism was immediately devised whereby to manufacture the bag in great quantity for commercial purposes; and it was the function of such mechanism to effect the process. And yet it was held that the process, as distinguished from the function of the machine, was patentable, and the patent which had been granted therefor was upheld.

Numerous other cases have been cited to us wherein the patent-office has issued patents for processes of a merely mechanical character, as distinguished from processes of elemental or other similar action; and it seems to us that, in the absence of any distinct and positive utterance from the Supreme Court of the United States limiting patentability to processes of the latter character, it is not improper that the practice should be continued. The criterion of patentability in such cases would seem to be, not that the process or method in question is independent of the special mechanism by which it is given practical effect, but that it is clearly conceivable as a mental operation independently of any such mechanism. As in the Paper Bag case the peculiar adjustment of the piece of paper so as to form the bag was the matter of discovery, so here we understand the adjustment of the metal spool with its coil of wire on its pivot at a definite angle, to be the subject-matter of discovery. We think the one is a process as much as the other.

Nor is this case in our opinion one of mere mechanical contrivance, which would naturally have occurred to any mechanic skilled in the art. It is always a potent, although of course, not always a complete answer to this argument that no one has accomplished the specified result before the actual claimant. But, apart from this, we fail to see here in the state of the electrical art how

any mechanic, by mere mechanical skill, as distinguished from the inventive faculty, could have reached the result effected by the applicant. The several steps of the process are of a mechanical character; but this is a very different thing from the merely mechanical improvement of an existing device.

In pursuance, no doubt, of the reasoning which has led us to this conclusion, was the action of the Primary Examiner of the patent-office in allowing in this case the applicant's claims numbered 7 and 8, which also are purely claims for processes. In the view which we take of the matter, we find no difference in principle between claims numbered 1 and 2 and claims numbered 7 and 8; and it would seem that the Commissioner of Patents was of the same opinion, with this difference, however, that he, in his construction of the law, would seem to have regarded them all as unpatentable, while we think that they are patentable.

There may be question, however, in the view which we take of the unpatentability of the spool alone, as set up in claim numbered 3, and of the unpatentability of the spool with the coil wound around it, as set up in claim numbered 4, whether the claims numbered 1 and 2 before us differ substantially from claim numbered 7. But claims numbered 1 and 2 are before us for adjudication, and claim numbered 7 is not, while it is properly included in the record.

In view of what we have said, we must hold that the applicant's claims numbered 1 and 2 are patentable, and that those numbered 3 and 4 are not patentable. Therefore, the decision of the Commissioner as to the claims numbered 3 and 4 is affirmed; and his decision as to those numbered 1 and 2 is reversed.

The clerk of the court will certify this opinion and the proceedings in the cause in this court to the Commissioner of Patents according to law.

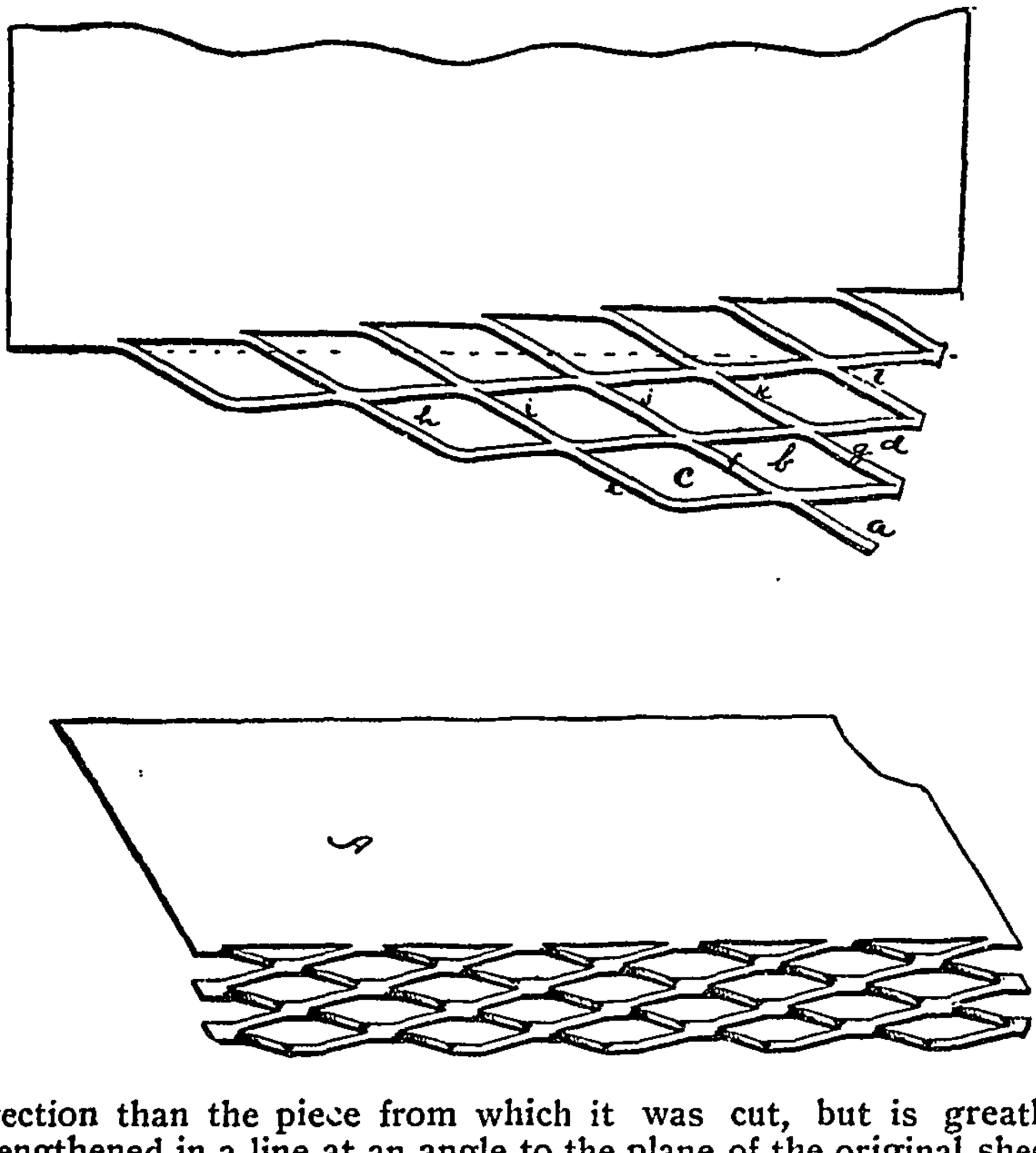
(Mr. Justice Shepard dissented as to the reversal.)

70. THE EXPANDED METAL COMPANY v. BRADFORD, 214 U. S. 366, 53 L. ed. 1034, 29 Sup. Ct. 652 (1909).

[The upper figure illustrates the invention of the Golding and Durkee patent No. 320,242. The inventors thus describe the process:

"The process consists in the employment of a flat piece of metal of any desired size, and beginning at one side and corner and making an incision within the side of the metal, thus forming a strand which is simultaneously pressed away from the plane of the metal in a direction at or near a right angle, the position the stand assumes depending upon the distance it is moved from the plane of the metal. a in the drawing shows the first cut made. The next step in this process is to make additional incisions, as is shown at c, b, and d, further within the

plate of metal, and leaving uncut sections at the ends of the cuts, and simultaneously with the cutting the strands are pressed away from the plane of the metal at the angle and to the desired position, as above described. Thus each row of meshes is simultaneously cut and formed from a blank piece of metal without buckling or crimping the blank. In the act of cutting and forming the meshes, the finished article is contracted in a line with the cuts or incisions, and consequently it is shorter in this direction than the piece from which it was cut, but is greatly lengthened in a line at an angle to the plane of the original sheet plate or blank.



"The object of beginning to cut within one side and the corner is, that the cut farthest within the metal will produce a strand, which as it is cut and bent downward or away from the plane of the uncut metal will allow the strands in advance of it to be freely cut and bent away from the plane of the metal simultaneously therewith. It is evident that the meshes could not

be cut and simultaneously formed if the cuts were made in a single direct line across the metal, for the reason that as the meshes are made the article which they form is contracted to a length less than the original length of the metal from which it is cut."

(In criticism of the presentation of this application and the oversight of the patent office it may be observed that the drawing contains reference letters not mentioned in the specification.)

The second figure is from the patent in suit, Golding No. 527,242. In this instance knives are used to make a series of slits in a straight line at equal listances apart across the sheet and at the same time the severed portions of the metal are carried downward. This operation is performed by bending the severed portions at a time when the ends of the portions are seslits in a straight line at equal distances apart across the sheet without materially shortening it. The sheet is then fed forward and the slitting and stretching operation repeated in such manner that the slits are in every case made back of the part unsevered by the preceding operation. Thus there is no contraction in the length of the metal and the expansion is obtained by the stretching distention or elongation of the severed strand. The first operation across the plate will form the half diamond shape which is indicated immediately against the back of the plate in the figure. The succeeding operations form the full diamond shape illustrated in the figure.

The claim of the patent 527,242 reads as follows:

The herein described method of making open or reticulated metal work, which consists in simultaneously slitting and bending portions of a plate or sheet of metal in such manner as to stretch or elongate the bars connecting the slit portions and body of the sheet or plate, and then similarly slitting and bending in places alternate to the first mentioned portions, thus producing the finished expanded sheet metal of the same length as that of the original sheet or plate, substantially as described.

It will be observed that this method or process does not involve "chemical or other similar elemental action," and that in a measure it defines the patentable novelty by a statement of the effect or result as in the phrase, "simultaneously slitting and bending portions of a plate or sheet of metal in such manner as to stretch and elongate the bars connecting the slit portions and the body of the sheet or plate."]

Mr. Justice Day delivered the opinion of the Court.

These cases involve opposing decisions as to the validity of Letters Patent of the United States No. 527,242, dated October 9, 1894, granted to John F. Golding for an alleged improvement in the method of making expanded sheet metal. In case No. 66, here on

writ of certiorari to the Circuit Court of Appeals for the Third Circuit, a decree of the Circuit Court of the United States for the Eastern District of Pennsylvania, sustaining the patent, was reversed, and the patent held invalid. The opinion of the circuit judge sustaining the patent is found in 136 Fed. 870. The case in the court of appeals is found in 146 Fed. 984. After the decree in the Circuit Court of Appeals for the Third Circuit, the Expanded Metal Company having filed a bill against the General Fireproofing Company in the Circuit Court of the United States for the Northern District of Ohio, the case was heard and the patent held invalid on the authority of the case in the Circuit court of Appeals for the Third Circuit. (157 Fed. 564.) The Circuit Court of Appeals for the Sixth Circuit reversed the United States Circuit Court for the Northern District of Ohio, and held Golding's patent valid and infringed. (164 Fed. 849.) These writs of certiorari bring these conflicting decisions of the courts of appeal here for review.

The patent in controversy relates to what is known as expanded sheet metal. Expanded metal may be generally described as metal open-work, held together by uncut portions of the metal, and constructed by making cuts or slashes in metal and then opening them so as to form a series of meshes or lattice-work. In its simplest form sheet metal may be expanded by making a series of cuts or slits in the metal in such relation to each other as to break joints, so that the metal, when opened or stretched, will present an open-mesh appearance. It may be likened to the familiar woven-wire open-work construction, except that the metal is held together by uncut portions thereof, uniting the strands, and the whole forms a solid piece.

In the earlier patents different methods are shown for cutting the metal, which cuts were afterward opened by a separate operation of pulling or stretching. These crude methods are shown in the earlier American and English patents which appear in the record. While nothing more than such methods was accomplished in the art there was little general or commercial use for expanded metal.

It was apparent that if a method could be devised by which the metal could be simultaneously cut and expanded, such method would be a distinct advance in the art, and this record discloses that the desirable result of simultaneously performing these operations was accomplished in the Golding and Durkee patent No. 320,242. In that patent the operation was performed by means of knives arranged in a step order, the sheet to be fed obliquely. * * *

With this patent as the advanced state of the art, Golding set about making further improvements and the result was the patent in suit. The specifications of the patent in suit state:

"In the manufacture of what is now generally known as expanded sheet metal, it has been customary to first cut the slits in the sheet metal at short distances apart, and to open the metal at the cuts thus

formed by bending the severed portions or strands in a direction at right angles substantially to the plane of the sheet. It has also been made by simultaneously cutting and opening the metal by means of cutters set off or stepped relatively so to make the slashes or cuts in different lines in the manner set forth in patent No. 381,230 or No. 381,231, of April 17, 1888. In both of these methods the product is somewhat shorter and materially wider than the original sheet, but practically no stretching or elongation of the metal forming the strands is caused.

"In my present invention I seek to avail myself of the ability of the metal to stretch or distend as well as of its ability to bend under strain or pressure, and the invention consists in the improved method of making expanded metal, viz., by simultaneously cutting and opening or expanding the metal at the cuts by stretching the severed portions."

In the method further described in the specifications the expanded metal is shown to be made by the use of knives making a series of slits in a straight line at equal distances apart across the sheet and at the same time carrying downward the severed portions of the metal. And this operation is performed by bending the severed portion at a time when its ends are securely attached to the main sheet, thereby expanding the sheet without materially shortening it. The sheet is then fed forward, and the slitting and stretching operation is repeated in such a manner that the slits are in every case made back of the portion unsevered by the preceding operation, or, in other words, as the specification states, the slits and unsevered portions alternate in position in each successive operation, the bends given to the severed portions or strands being in direction at right angles to the plane of the sheet, there is no contraction in the length of the metal, and the expansion is obtained by the stretching distention, or elongation of the severed strand. This patent contains the single claim, which is as follows:

"The herein-described method of making open or reticulated metal work, which consists in simultaneously slitting and bending portions of a plate or sheet of metal in such manner as to stretch or elongate the bars connecting the slit portions and body of the sheet or plate, and then similarly slitting and bending in places alternate to the first-mentioned portions, thus producing the finished expanded sheet metal of the same length as that of the original sheet or plate, substantially as described."

It is thus apparent that the method covered by the claim of the patent is accomplished by the two operations indicated and performed in the manner pointed out in the specifications. The first operation of cutting, bending and stretching the strands simultaneously produces a series of stretched loops or half-diamonds.

* * *

This series of half-diamonds is then supplemented by the second operation, which consists in making a second series of cuts and expansions for stretching the strands back of and opposite the parts of the metal left uncut by the first operation. The result is that the series of one-half diamonds is converted into the series of full diamonds and because of the manner in which the stretching is done, while the ends of the strands are still firmly attached to the sheet, there is no material shortening of the length of the sheet. * * *

What has Golding accomplished by this alleged improvement? These records leave no doubt that there are substantial advantages in the method of the patent in suit. As the sheet is not shortened, the completed product is regular in form and ready for many uses to which the shortened sheet of the old method could not be put. The metal worked upon can be much heavier than that which could be successfully manipulated by the old process. The meshes are formed in a uniform and regular way, so that a line drawn through their intersections in one direction is at right angles with a line drawn through their intersections in the other direction. There is no irregularity in the width of the strands. Put to the test of actual use, this record discloses that while the method of the Golding and Durkee patent is still in use in some places in this country, the method disclosed in the patent in controversy is largely in use in the United States, Great Britain and Continental Europe; that it has greatly increased the use of expanded metal in this country, and opened new fields for use where sheets of a regular shape can be used to a greater advantage than they could be when made under the old process.

The learned Circuit Court of Appeals for the Third Circuit seems to have regarded the invention as consisting merely of the improvement of the process in the manufacture of expanded metal by stretching certain portions of the metal when the slit is cut and the mesh is opened. A broad claim of that character was made in the Patent Office, and the file-wrapper and contents show that it was disallowed by the Examiner. The claim in its present form, framed by the Examiner as sufficient to cover the real invention of the patent, was accepted by the applicant, and is now the claim of the patent.

If all that Golding did was to show a method of simultaneously cutting and stretching the metal, the Examiner was doubtless right in holding it to have been anticipated by former inventions, notably the patent to Ohl, No. 475,700, and in a degree in the previous patents to Golding and to Golding and Durkee.

But the patent in suit, embraced in the claim allowed, shows more than a mere method of making open meshes by simultaneously cutting and stretching the metal. It shows a method by which the metal is first cut and stretched in the manner indicated to make the half-diamond, and then a second operation, co-ordinating with the first and completing the mesh by the manner in which it is performed in

connection with the first. It is the result of the two operations combined which produces the new and useful result covered by the claim allowed in the Patent Office, and, which, when read in connection with the specifications, shows substantial improvement in the art of making expanded metal-work.

But it is said that the patent in suit discloses no means of practically operating the method shown, and therefore, as said by the learned judge in the third circuit, "it is but the expression of a happy thought," but the requirement of the patent law, in order to make a method or process patentable, is that the patent shall indicate to those skilled in the art the adaptation of means to put it into practice.

We think this record amply discloses, while no complete mechanism is pointed out in the specifications, enough to indicate to those skilled in such matters a mechanism whereby the method of the patent can be put into operation. As said by Judge Severens, delivering the opinion of the court in No. 606, in the Circuit Court of Appeals for the Sixth Circuit:

"But here the inventor has gone on to point out that the slitting and bending is to be done by a stationary cutter under the sheet, and upper cutters to co-operate in shearing the slit. These upper cutters are so constructed as to bend down the strand to the proper distance. It is not stated just what the form shall be, but only ordinary skill in mechanics would suggest that the outer side of the cutter might be beveled or a shoulder might be formed thereon to carry down the strand when severed.

"Mechanism for the shifting of the sheet and of the knives was already in use in machines for expanding metal, and, indeed, was common in the mechanical arts. Moreover, experts have here testified that these devices could be arranged by any skilful mechanic, and we have no reason to doubt it."

Golding testifies that he at first executed his process by hand. Other witnesses, skilled in the art, say that they could do likewise from the information found in the patent.

The important thing in this patent is a method of procedure, not the particular means by which the method shall be practiced. Golding's machine patent was not applied for for more than a year and a half after the issue of the patent in suit.

It is suggested that Golding's improvement, while a step forward, is nevertheless only such as a mechanic skilled in the art, with the previous invention before him, would readily take; and that the invention is devoid of patentable novelty. It is often difficult to determine whether a given improvement is a mere mechanical advance, or the result of the exercise of the creative faculty amounting to a meritorious invention. The fact that the invention seems simple after it is made does not determine the question; if this were the rule many of the most beneficial patents would be stricken down. It may

be safely said that if those skilled in the mechanical arts are working in a given field and have failed after repeated efforts to discover a certain new and useful improvement, he who first makes the discovery has done more than make the obvious improvement which would suggest itself to a mechanic skilled in the art, and is entitled to protection as an inventor. There is nothing in the prior art that suggests the combined operation of the Golding patent in suit. It is perfectly well settled that a new combination of elements, old in themselves, but which produce a new and useful result entitles the inventor to the protection of a patent. (Loom Company v. Higgins, 105 U. S. 580-591.)

To our minds, Golding's method shows that degree of ingenuity and usefulness which raises it above an improvement obvious to a mechanic skilled in the art, and entitles it to the merit of invention. Others working in the same field had not developed it, and the prior art does not suggest the combination of operations which is the merit of Golding's invention.

It is lastly contended, and this is perhaps the most important question in the case, that in view of the former declaration and opinions of this Court, what is termed a process patent relates only to such as are produced by chemical action, or by the operation or application of some similar elemental action, and that such processes do not include methods or means which are affected by mere mechanical combinations, and a part of the language used in Corning v. Burden, 15 How. 252, and Risdon Locomotive Works v. Medart, 158 U. S. 68, is seized upon in support of this contention. We have no disposition to question the decision in those cases.

An examination of the extent of the right to process patents requires consideration of the object and purpose of the Congress in exercising the constitutional power to protect for a limited period meritorious inventions or discoveries. Section 4886 of the Revised Statutes provides:

"Any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof * * * may obtain a patent therefor."

This is the statute which secures to inventors the right of protection, and it is not the province of the courts to so limit the statute as to deprive meritorious inventors of its benefits. The word "process" is not used in the statute. The inventor of a new and useful art is distinctly entitled to the benefit of the statute as well as he who invents a machine, manufacture, or composition of matter. The word "process" has been brought into the decisions because it is supposedly an equivalent form of expression or included in the statutory designation of a new and useful art.

What then is the statutory right to a patent for a "process" when the term is properly considered? Curtis, in his work on the law of patents, says:

"A process may be altogether new, whether the machinery by which it is carried on be new or old. A new process may be invented or discovered, which may require the use of a newly-invented machine. In such case, if both the process and the machine were invented by the same person, he could take separate patents for them. A new process may be carried on by the use of an old machine, in a mode in which it was never used before. * * * In such a case, the patentability of the process in no degree depends upon the characteristic principle of the machine, although machinery is essential to the process, and although a particular machine may be required. (Curtis, 4th ed., sec. 14.)"

In Robinson on Patents (vol. 1, sec. 167) it is said:

"While an art cannot be practiced except by means of physical agents, through which the force is brought in contact with or directed toward its object, the existence of the art is not dependent on any of the special means employed. It is a legal, practical invention in itself. Its essence remains unchanged, whatever variation takes place in its instruments as long as the acts of which it is composed are properly performed."

And Walker on Patents (4th ed., sec. 3) states that valid process patents may be granted for—

"operations which consist entirely of mechanical transactions, but which may be performed by hand or by any of several different mechanisms or machines."

It is undoubtedly true, and all the cases agree, that the mere function or effect of the operation of a machine cannot be the subject-matter of a lawful patent. But it does not follow that a method of doing a thing, so clearly indicated that those skilled in the art can avail themselves of mechanism to carry it into operation, is not the subject-matter of a valid patent. The contrary has been declared in decisions of this Court. A leading case is Cochrane v. Deener, 94 U. S. 780, in which this court sustained a process patent involving mechanical operations, and in which the subject was discussed by Mr. Justice Bradley, speaking for the Court. On page 787 that learned justice said:

"That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. * * * Either may be pointed out; but if the patent is not confined to that particular tool or machine, the use of the others would be an infringement, the general process being the same. A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful,

it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable, while the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.

This clear and succinct statement of the rule was recognized and applied (Mr. Justice Bradley again speaking for the Court) in the case of Tilghman v. Proctor, 102 U. S. 707. In the course of the opinion the learned justice tersely says:

"A machine is a thing. A process is an act, or a mode of acting. The one is visible to the eye—an object of perpetual observation. The other is a conception of the mind, seen only by its effects when being executed or performed. Either may be the means of producing a useful result."

That this Court did not intend to limit process patents to those showing chemical action or similar elemental changes is shown by subsequent cases in this Court.

In Westinghouse v. Boyden Company, 170 U. S. 537, the opinion was written by the same eminent justice who wrote the opinion in Risdon Locomotive Works v. Medart, 158 U. S., supra, and, delivering the opinion of the Court, he said:

"These cases (158 U. S. 68, and 103 U. S. 461) assume, although they do not expressly decide, that a process to be patentable must involve a chemical or other similar elemental action, and it may be still regarded as an open question whether the patentability of processes extends beyond this class of inventions."

And added these significant words:

"Where the process is simply the function or operative effect of a machine, the above cases are conclusive against its patentability; but where it is one which, though ordinarily and most successively performed by machinery, may also be performed by simple manipulation, such, for instance, as the folding of paper in a peculiar way for the manufacture of paper bags, or a new method of weaving a hammock, there are cases to the effect that such a process is patentable, though none of the powers of nature be invoked to aid in producing the result. (Eastern Paper-Bag Co. v. Standard Paper-Bag Co., 30 Fed. Rep. 63; Union Paper-Bag Machine Co. v. Waterbury, 39 Fed. Rep. 389; Travers v. Am. Cordage Co., 64 Fed. Rep. 771.) This case, however, does not call for an expression of our opinion upon this point, nor even upon the question whether the function of admitting air directly from the train-pipe to the brake-cylinder be patentable or not, since there is no claim made for an independent process in this patent, and the whole theory of the specification and claims is based upon the novelty of the mechanism."

And the same learned justice wrote the opinion of the Court in Carnegie Steel Co. v. Edward Thompson, 185 U. S. 403, and sustained a process patent. If by any construction that process could be said to involve a "chemical or other similar elemental action," no stress was laid upon that fact. This Court, speaking through Mr. Chief Justice Waite, sustained a patent in the Bell Telephone Cases, 126 U. S. 1, for a method of transmitting electrical undulations similar in form to the vibrations of the air accompanying vocal sounds, and at the same time the patent for the apparatus by which the method was operated was sustained.

In Leeds & Catlin v. Victor Talking Machine Company, decided at this term (213 U. S. 301, 308), this court said:

"A process and an apparatus by which it is performed are distinct things. They may be found in one patent; they may be made the subject of different patents."

We therefore reach the conclusion that an invention or discovery of a process or method involving mechanical operations, and producing a new and useful result, may be within the protection of the Federal statute, and entitle the inventor to a patent for his discovery.

We are of opinion that Golding's method was a substantial improvement of this character, independently of particular mechanisms for performing it, and the patent in suit is valid as exhibiting a process of a new and useful kind.

As to the infringement, little or no question was made in case No. 606. In case No. 66 the circuit court held that there was some evidence of infringement, enough at least to warrant the decree sustaining the patent and awarding an accounting. With this conclusion we agree. It follows that the decree of the Circuit Court of Appeals for the Third Circuit (No. 66) should be reversed and that of the Circuit Court of Appeals for the Sixth Circuit (No. 606) should be affirmed, and the cases remanded to the Circuit Courts of the United States for the Eastern District of Pennsylvania and the Northern District of Ohio, respectively, for further proceedings consistent with this opinion.

71. BERARDINI v. TOCCI, 190 Fed. 329 (C. C. N. Y. 1911, Patents Nos. 889,094 and 889,095).

Hough, D. J. * * *

It would, I think, be quite possible, if the earlier patent were for a combination of elements producing a new result, to show, first, that the elements were not new, and that the result was not new; but the patent must be judged according to its wording, and claims 1 to 6 thereof are not for any "composition of matters," nor a manufacture, nor a machine, but they are for (eo nomine) a "code message," and it necessarily follows that a code message must be an art within the meaning of Rev. Stat.,] 4886, as amended by Act

March 3, 1897, c. 391, § 1, 29 Stat. 692 (U. S. Comp. St. 1901, p. 3382).

It might be enough to bluntly hold that a code message cannot be an art, but that perhaps is interpreting the mere language of the claims too narrowly. It is therefore thought better to inquire what is an "art" within the meaning of the patent laws.

"In the sense of the patent law an art is not a mere abstraction. A system of transacting business, disconnected from the means for carrying out the system, is not, within the most liberal interpretation of the term, an art. Advice is not patentable." Hotel Security, etc., Co. v. Lorraine Co., 160 Fed. 469, 87 C. C. A. 451, 453, 24 L. R. A. (N. S.) 665.

A patent will not be "held valid for a principle, or for an idea, or any other mere abstraction." Fuller v. Yentzer, 94 U. S. 288, 24 L. Ed. 103.

Speaking of a patent which resulted in famous litigation, Shepley, J., said:

"It must be sustained, if it be sustained, as a patent for an art. The statute term 'art,' used, as it is in the sense of the employment of means to a desired end or the adaptation of powers in the natural world to the uses of life, is perhaps a better term than the word 'method' used by the patentee, or the word 'process,' the term of description used by the experts. A process eo nomine is not made the subject of a patent in the act of Congress; an art may require one or more processes or machines in order to produce a certain result or manufacture. It is for the discovery or invention of some practical method or means of producing an essential result or effect that a patent is granted, not for the result or effect itself. 'Process' or 'method,' when used to represent the means of producing a beneficial result, are in law synonymous with 'art,' provided the means are not effected by mechanism or mechanical combination." Piper v. Brown, 4 Fish. Pat. Cas. 175. Fed Cas. No. 11,180.[1]

[1] Note.—The patent that was involved in this case was also tested in Piper v. Moon, 10 Blatchf. 264, Fed. Cas. No. 11,182. Brown v. Piper, 91 U. S. 37, 23 L. Ed. 196, the decision of Shepley, J., was reversed, but without affecting the importance of the above-quoted discussion of the meaning of the statutory word "art."

If, therefore, this patent be construed as not merely for a thing called a "code message," but for a system of transmitting code messages, for a process or method of cable communication in cipher, the question arises whether such a process or such an art is patentable upon the evidence. Numerous cases have been cited relating to patents for index books, checks, and check books, and certain arrangements of printing upon books of account. Johnson v. Johnston, (C. C.) 60 Fed. 618; Carter Crume Co. v. American Salesbook Co., (C. C.) 124 Fed. 903; Thomson v. Citizens' Bank, 53 Fed. 250, 3 C. C. A. 518; Waring v. Johnson, (C. C.) 6 Fed. 500; Dugan v.

Gregg, (C. C.) 48 Fed. 227; Safeguard Acct. Co. v. Wellington, (C. C.) 86 Fed. 146. Upon examination each of these cases holds no more than a particular book, pamphlet, or sheet of paper treated to a particular style of printing, or arranged in a particular manner, could be patented as an article of manufacture, which is as much as to say that the paper, ink, and perhaps binding, when arranged as a composition of matter, became patentable by the presence of utility, novelty, and invention.

Such is not and cannot be the case here. No particular code message can be produced which in every exemplar thereof is the single subject of this patent. Indeed, the claims are misnomers. The patent is not intended to be for a code message, in the sense that patents have been granted for books of a peculiar kind. The patent is really for a system of devising code messages, and as such (upon a most liberal reading of the claims) it is in my judgment obnoxious to the remarks above quoted from Hotel Security Co. v. Lorraine Co. The patent is really for advice. It is for an art only in the sense that one speaks of the art of painting, or the art of curving the thrown baseball. Such arts, however, ingenious, difficult, or amusing, are not patentable within any statute of the United States.

72. SMITH v. NICHOLS, 88 U. S. 112, 22 L. ed. 566 (1874).

Mr. Justice Swayne stated the case more particularly, and delivered the opinion of the court.

* * *

The original patent was issued to the complainant on the 5th of April, 1853. On the 28th of March, 1867, it was extended for seven years. It was subsequently reissued in three divisions, as follows: Reissue No. 2656, June 18th, 1867, division A, for improvements in weaving; reissue No. 3014, June 20th, 1868, division B, for improvement in woven fabrics; and reissue No. 2844, January 14th, 1868, division C, for improvements in looms for weaving. Division B is the only one to be considered in this case. * * *

The claim is thus expressed:

"What, therefore, I claim as my invention in this subdivision of my patent is—

"The corded fabric, substantially as hereinbefore described, in which the cords are elastic and held between the upper and under weft threads, and separated from each other by the interweaving of the upper and under weft threads with the warp threads in the spaces between the cords, and only there, substantially as above shown."

* * *

The evidence before us leaves to the complainant none of the particulars claimed as of his invention, except perhaps greater tight-

ness of the weaving, a firmer grasping of the elastic cords by the weft theads half round, above and below, and greater beauty and value of the fabric. The entire ground of the controversy between the parties is reduced to this narrow isthmus, and the question presented for our determination is one rather of law than of fact.

A patentable invention is a mental result. It must be new and shown to be of practical utility. Everything within the domain of the conception belongs to him who conceived it. The machine, process, or product is but its material reflex and embodiment. A new idea may be ingrafted upon an old invention, be distinct from the conception which preceded it, and be an improvement. In such case it is patentable. The prior patentee cannot use it without the consent of the improver, and the latter cannot use the original invention without the consent of the former. But a mere carrying forward or new or more extended application of the original thought, a change only in form, proportions, or degree, the substitution of equivalents, doing substantially the same thing in the same way by substantially the same means with better results, is not such invention as will sustain a patent. These rules apply alike, whether what preceded was covered by a patent or rested only in public knowledge and use. In neither case can there be an invasion of such domain and an appropriation of anything found there. In one case everything belongs to the prior patentee, in the other, to the public at large.

The question before us must be considered in the light of these rules. All the particulars claimed by the complainant, if conceded to be his, are within the category of degree. Many textile fabrics, especially those of cotton and wool, are constantly improved. Sometimes the improvement is due to the skill of the workmen, and sometimes to the perfection of the machinery employed. The results are higher finish, greater beauty of surface, and increased commercial value. A patent for the better fabric in such cases would, we apprehend, be unprecedented. The patent in the present case rests upon no other or better foundation.

73. HOTCHKISS v. GREENWOOD, 11 How. (U. S.) 248, 13 L. ed. 683 (Patent No. 2,197).

Nelson, J.

This is a writ of error to the circuit court of the United States for the district of Ohio.

The suit was brought against the defendants for the alleged infringement of a patent for a new and useful improvement in making door and other knobs of all kinds of clay used in pottery, and of porcelain.

The improvement consists in making the knobs of clay or porcelain, and in fitting them for their application to doors, locks, and furniture, and various other uses to which they may be adapted; but

more especially in this, that of having the cavity in the knob in which the screw or shank is inserted, and by which it is fastened, largest at the bottom and in the form of dovetail, or wedge reversed, and a screw formed therein by pouring in metal in a fused state; and, after referring to drawings of the article thus made, the patentees conclude as follows:—

"What we claim as our invention, and desire to secure by letters-patent, is the manufacturing of knobs, as stated in the foregoing specifications, of potter's clay, or any kind of clay used in pottery, and shaped and finished by moulding, turning, burning, and glazing; and also of porcelain."

On the trial, evidence was given on the part of the plaintiffs tending to prove the originality and usefulness of the invention, and also the infringement by the defendants; and on the part of the defendants, tending to show the want of originality; and that the mode of fastening the shank to the knob, as claimed by the plaintiffs, had been known and used before, and had been used and applied to the fastening of the shanks to metallic knobs.

And upon the evidence being closed, the counsel for the plaintiffs prayed the court to instruct the jury that, although the clay knob, in the form in which it was patented, may have been before known, and used, and also the shank and spindle by which it is attached may have been before known and used, yet if such shank and spindle had never before been attached in this mode to a knob of potter's clay, and it required skill and invention to attach the same to a knob of this description, so that they would be firmly united, and make a strong and substantial article, and which, when thus made, would become an article much better and cheaper, than the knobs made of metal or other materials, the patent was valid, and the plaintiffs would be entitled to recover.

The court refused to give the instruction, and charged the jury that, if knobs of the same form and for the same purposes as that claimed by the patentees, made of metal or other material had been before known and used: and if the spindle and shank, in the form used by them, had been before known and used, and had been attached to the metallic knob by means of a cavity in the form of dovetail and infusion of melted metal, the same as the mode claimed by the patentees, in the attachment of the shank and spindle to their knob: and the knob of clay was simply the substitution of one material for another, the spindle and shank being the same as before in common use, and also the mode of connecting them by dovetail to the knob the same as before in common use, and no more ingenuity or skill required to construct the knob in this way than that possessed by an ordinary mechanic acquainted with the business, the patent was invalid, and the plaintiffs were not entitled to a verdict.

This instruction, it is claimed, is erroneous, and one for which a new trial should be granted.

The instruction assumes, and, as was admitted on the argument, properly assumes that knobs of metal, wood, etc., connected with a shank and spindle, in the mode and by the means used by the patentees in their manufacture, had been before known, and were in public use at the date of the patent; and hence the only novelty which could be claimed on their part was the adaptation of this old contrivance to knobs of potter's clay or porcelain; in other words, the novelty consisted in the substitution of the clay knob in the place of one made of metal or wood, as the case might be. And in order to appreciate still more clearly the extent of the novelty claimed, it is proper to add that this knob of potter's clay is not new, and therefore constiutes no part of the discovery. If it was, a very different question would arise; as it might very well be urged, and successfully urged, that a knob of a new composition of matter, to which this old contrivance had been applied, and which resulted in a new and useful article, was the proper subject of a patent.

The novelty would consist in the new composition made practically useful for the purposes of life, by the means and contrivances mentioned. It would be a new manufacture, and none the less so, within the meaning of the patent law, because the means employed to adapt the new composition to a useful purpose was old, or well known.

But, in the case before us, the knob is not new, nor the metallic shank and spindle, nor the dovetail form of the cavity in the knob, nor the means by which the metallic shank is securely fastened therein. All these were well known, and in common use, and the only thing new is the substitution of a knob of a different material from that heretofore used in connection with this arrangement.

Now it may very well be, that, by connecting the clay or porcelain knob with the metallic shank in this well known mode, an article is produced better and cheaper than in the case of the metallic or wood knob: but this does not result from any new mechanical device or contrivance, but from the fact that the material of which the knob is composed happens to be better adapted to the purpose for which it is made. The improvement consists in the superiority of the material, and which is not new, over that previously employed in making the knob.

But this, of itself, can never be the subject of a patent. No one will pretend that a machine made, in whole or in part, of materials better adapted to the purpose for which it is used than the materials of which the old one is constructed, and for that reason better and cheaper, can be distinguished from the old one, or, in the sense of the patent law, can entitle the manufacturer to a patent.

The difference is formal, and destitute of ingenuity or invention. It may afford evidence of judgment and skill in the selection and adaptation of the materials in the manufacture of the instrument for the purposes intended, but nothing more.

I remember having tried an action in the circuit in the district of Connecticut some years since, brought upon a patent for an improvement in manufacturing buttons. The foundation of the button was wood, and the improvement consisted in covering the face with tin, and which was bent over the rim so as to be firmly secured to the wood. Holes were perforated in the center, by which the button could be fastened to the garment. It was a cheap and useful article for common wear, and in a good deal of demand.

On the trial, the defendant produced a button, which had been taken off a coat on which it had been worn before the Revolution, made precisely in the same way, except the foundation was bone. The case was given up on the part of the plaintiff. Now the new article was better and cheaper than the old one; but I did not then suppose, nor do I now, that this could make any difference, unless it was the result of some new contrivance or arrangement in the manufacture. Certainly it could not, for the reason that the materials with which it was made were of a superior quality, or better adapted to the uses to which the article is applied.

It seemed to be supposed, on the argument, that this mode of fastening the shank to the clay knob produced a new and peculiar effect upon the article, beyond that produced when applied to the metallic knob, inasmuch as the fused metal by which the shank was fastened to the knob prevented the shank from acting immediately upon the knob, it being inclosed and firmly held by the metal; that for this reason the clay or porcelain knob was not so liable to crack or be broken, but was made firm and strong, and more durable.

This is doubtless true. But the peculiar effect thus referred to is not distinguishable from that which would exist in the case of the wood knob, or one of bone or ivory, or of other materials that might be mentioned.

Now if the foregoing view of the improvement claimed in this patent be correct, it is quite apparent that there was no error in the submission of the questions presented at the trial to the jury; for unless more ingenuity and skill in applying the old method of fastening the shank and the knob were required in the application of it to the clay or porcelain knob than were possessed by an ordinary mechanic acquainted with the business, there was an absence of that degree of skill and ingenuity which constitute essential elements of every invention. In other words, the improvement is the work of the skillful mechanic, not that of the inventor.

We think, therefore, that the judgment is and must be affirmed.

74. SMITH v. GOODYEAR DENTAL VULCANITE CO., 93 U. S. 486, L. ed. 952 (Patent No. 18,763).

Mr. Justice Strong delivered the opinion of the Court. * * *

It plainly shows a purpose of the inventor to secure what had not been secured before,—a combination of a plate with artificial teeth, or with gums and teeth, in such a manner as to be free from the objections and defects or inconveniences attending the method before practiced of attaching such teeth to a metallic plate fitted to the roof of the mouth. Some of these objections are stated; such as expense, hurting the mouth, impeding mastication, and obstruction to perfect articulation. In carrying out the purpose proposed, the materials employed were all old. The teeth, the wax, the plaster, the moulds, the soft rubber, and the hard rubber, were none of them new. It is also true that the steps in the process were not all new. Plaster had been used for formation of moulds. The process of forming a plate by the use of such moulds was well known, and so was the process of converting a vulcanizable compound into vulcanite by heating it and allowing it to cool in moulds. But the process of Dr. Cummings extended beyond the use of known materials and the employment of the processes mentioned. It was vulcanizing soft rubber in a mould, and in contact with artificial teeth inserted in place into it while it remained in a soft condition. It was well described by the circuit judge as "the making of a vulcanite dental plate out of a vulcanizable compound, into which the teeth were embedded in its plastic condition, and the rubber compound, with the teeth thus embedded in it, afterwards vulcanized by heat, so that the teeth, gums, and plate should be perfectly joined without any intervening crevices, and the plate should possess the quality of hard rubber or vulcanite." The combination thus resulted in a manufacture which was "one piece." If, then, the claim be read, as it should be, in connection with the preceding part of the specification, and construed in the light of the explanation which that gives, the invention claimed and patented is "a set of artificial teeth as a new article of manufacture, consisting of a plate of hard rubber, with teeth, or teeth and gums, secured thereto in the manner described in the specification, by embedding the teeth and pins in a vulcanizable compound, so that it shall surround them while it is in a soft state, before it is vulcanized, and so that when it has been vulcanized the teeth are firmly and inseparably secured in the vulcanite, and a tight joint is effected between them, the whole constituting but one piece." It is evident this is much more than employing hard rubber to perform the functions that had been performed by other materials, such as gold, silver, tin, platinum, or gutta-percha. A new product was the result, differing from all that had preceded it, not merely in degree of usefulness and excellence, but differing in kind, having new uses and properties. It was capable of being perfectly fitted

to the roof and alveolar processes of the mouth. It was easy for the wearer, and favorable for perfect articulation. It was light and elastic, yet sufficiently strong and firm for the purposes of mastication. The teeth, gums, and plate constituting one piece only, there were no crevices between the teeth and their supporters into which food could gather, and where it could become offensive, and there could be no such crevices so long as the articles lasted. They were unaffected by any chemical action of the fluids of the mouth. Besides all this, they were very inexpensive as compared with other arrangements of artificial teeth. To us it seems not too much to say that all these peculiarities are sufficient to warrant the conclusion that the device was different in kind or species from all other devices. We cannot resist the conviction that devising and forming such a manufacture by such a process and of such materials was invention. More was needed for it than simply mechanical judgment and good taste. Were it not so, hard rubber would doubtless have been used in the construction of artificial sets of teeth, gums, and plates long before Cummings applied for his patent. To find a material, with a mode of using it, capable of being combined with the teeth in such a manner as to be free from the admitted faults of all other known combinations, had been an object long and earnestly sought. It had been a subject for frequent discussion among dentists and in scientific journals. The properties of vulcanite were well known; but how to make use of them for artificial sets of teeth remained undiscovered, and apparently undiscoverable, until Cummings revealed the mode. But when revealed its value was soon recognized, and no one seems to have doubted that the resulting manufacture was a new and most valuable invention. The eminent dentists and experts examined in this case uniformly speak of it as such. Not one has ventured to testify that it was not an invention. They speak of it as "a novel and desirable thing;" as "the greatest improvement in dentistry" made in many years; and as an invention which is "a great benefaction to mankind, whereby both health and comfort are promoted." The evidence also shows that it has wrought a revolution in dental practice, and that many thousands of operators are using it in preference to older devices. All this is sufficient, we think, to justify the inference that what Cummings accomplished was more than a substitution of one material for another; more than the exercise of mechanical judgment and taste,—that it was, in truth, invention. Undoubtedly, the results or consequences of a process or manufacture may in some cases be regarded as of importance when the inquiry is, whether the process or manufacture exhibits invention, thought, and ingenuity. Webster, on the subject-matter of patents, page 30, says: "The utility of the change, as ascertained by its consequences, is the real practical test of the sufficiency of an invention; and since the one cannot exist without

the other, the existence of the one may be presumed on proof of the existence of the other. Where the utility is proved to exist in any degree, a sufficiency of invention to support the patent must be presumed." We do not say the single fact that a device has gone into general use, and has displaced other devices which had previously been employed for analogous uses, establishes in all cases that the later device involves a patentable invention. It may, however, always be considered; and, when the other facts in the case leave the question in doubt, it is sufficient to turn the scale.

We have, therefore, considered this branch of the case without particular reference to Hotchkiss v. Greenwood, 11 How. 248. The patent in that case was for an improvement in making door and other knobs for doors, locks, and furniture, and the improvement consisted in making them of clay or porcelain, in the same manner in which knobs of iron, brass, wood, or glass had been previously made. Neither the clay knob nor the described method of attaching it to the shank was novel. The improvement, therefore, was nothexisted in other knobs. Hence it was ruled that the alleged iming more than the substitution of one material for another in constructing an article. The clay or porcelain door-knob had no properties or functions which other door-knobs made of different materials had not. It was cheaper, and perhaps more durable; but it could be applied to no new use, and it remedied no defects which provement was not a patentable invention. The case does decide that employing one known material in place of another is not invention, if the result be only greater cheapness and durability of the product. But this is all. It does not decide that no use of one material in lieu of another in the formation of a manufacture can, in any case, amount to invention, or be the subject of a patent. If such a substitution involves a new mode of construction, or develops new uses and properties of the article formed, it may amount to invention. The substitution may be something more than formal. It may require contrivance, in which case the mode of making it would be patentable; or the result may be the production of an analogous but substantially different manufacture. This was intimated very clearly in the case of Hicks v. Kelsey, 18 Wall. 670, where it was said: "The use of one material instead of another in constructing a known machine is, in most cases, so obviously a matter of mere mechanical judgment, and not of invention, that it cannot be called an invention, unless some new and useful result, as increase of efficiency, or a decided saving in the operation, be obtained."

But where there is some such new and useful result, where a machine has acquired new functions and useful properties, it may be patentable as an invention, though the only change made in the machine has been supplanting one of its materials by another. This

is true of all combinations, whether they be of materials or processes. In Crane v. Price, 1 Webst. Pat. Cas. 393, where the whole invention consisted in the substitution of anthracite for bituminous coal in combination with a hot-air blast for smelting iron ore, a patent for it was sustained. The doctrine asserted was, that if the result of the substitution was a new, a better, or a cheaper article, the introduction of the substituted material into an old process was patentable as an invention. This case has been doubted, but it has not been overruled; and the doubts have arisen from the uncertainty whether any new result was obtained by the use of anthracite. In Kneass v. Schuylkill Bank, the use of steel plates instead of copper for engraving was held patentable. So has been the flame of gas instead of the flame of oil to finish cloth. These cases rest on the fact that a superior product has been the result of the substitution,—a product that has new capabilities and that performs new functions. So in the present case the use, in the manner described, of hard rubber in lieu of the material previously used for a plate produced a manufacture long sought but never before obtained,—a set of artificial teeth, light and elastic, easily adapted to the contour of the mouth, flexible, yet firm and strong, consisting of one piece, with no crevices between the teeth and the plate impervious to the fluids of the mouth, unaffected by the chemical action to which artificial teeth and plates are subjected when in place, clean and healthy,—peculiarities which distinguish it from everything that had preceded it. These differences, in our opinion, are too many and too great to be ascribed to mere mechanical skill. They may justly be regarded as the results of inventive effort, and as making the manufacture of which they are attributes a novel thing in kind, and consequently patentable as such.

75. STOW v. CHICAGO, 104 U. S. 547, 26 L. ed. 816.

Mr. Justice Woods delivered the opinion of the court.

* * *

In this court he relies exclusively on the first and fourth patents set out in his bill. They will be separately considered. The first relied on is the reissue, No. 3274, dated Jan. 19, 1869, of an original granted to him, numbered 72,110, and dated Dec. 10, 1867.

(Reissue No. 3274). All, therefore, that there is left for the invention described in the first and third claims to cover is the making of the lower ends of a portion of the blocks of which the pavement is composed in wedge shape, and the driving of these wedge-shaped blocks below the general under-surface of the pavement into the sand or earth-bed on which it rests, so as to pack it and render it solid and unyielding. When thus reduced to what it really is, his invention is clearly and distinctly anticipated by the

English patent issued to David Stead, dated April 23, 1839, which is set out in full in the record. * * *

It is true that this specification does not in terms say that the purpose of driving the wedge-shaped block or pile through the space left by the octagonal blocks is to pack the earth or sand foundation, but that it does so as effectually as the use of similar blocks in a similar way under the patent of appellant, is too clear for argument. A patentee who is the first to make an invention is entitled to his claim for all the uses and advantages which belong to it. Woodman v. Stimpson, 3 Fish. Pat. Cas. 98.

It is shown that Stead invented this device. Whether he perceived and stated all its advantages is immaterial. Graham v. Mason, 5 id. 1; Tucker v. Spaulding, 13 Wall. 453.

Stead's specification, it is clear, covers (to use the language of Stow's reissued patent) "a pavement composed of wood laid on a foundation-bed of sand or loose earth," and having "a portion of the blocks of which it is composed driven down into said foundation-bed."

Everything, therefore, in the first and third claims of the appellant's reissued patent, which he sets up as new, was anticipated nearly thirty years by Stead's English patent. Appellant's patent, therefore, so far as it covers these claims, is void, and cannot be the foundation of any relief against the appellee.

The other patent which the appellant insists that the city infringed, is No. 134,404, dated Dec. 31, 1872, issued to him as the original inventor. * * *

The use of wood for street pavements, the laying of the blocks directly upon a sand foundation, the placing of the blocks in rows, leaving spaces between the rows, are all old devices. * * *

Nor is the filling with sand or gravel of the spaces between the blocks, or rows of blocks, of which the pavement is composed, a new device. * * *

All, therefore, that is left for the patent of the appellant, now under consideration, to cover, is the ramming of the gravel between the blocks, of which the pavement is composed, so as to drive the same into the sand foundation below the blocks, in order to pack it so that the pavement may sustain the weight of heavy vehicles without giving way. * * *

We have here every part of the invention described in the letters-patent under consideration, except that it does not appear that the gravel in the spaces between the rows was so compactly rammed as to drive it below the under-surface of the pavement into the earth foundation. All, therefore, that is left for the appellant's patent of 1872 to cover is the giving of a few more strokes with the rammer, whereby the gravel filling may be forced into the earth foundation of the pavement. Can this be called invention?

The testimony shows that the pavements which he charges infringe his patent of 1872 are constructed according to the plan adopted by Thompson in 1864, and it fails to show that in their construction the gravel filling was forced by the ramming into the earth foundation on which they were laid. So that if there is anything new or patentable embraced in his patent of 1872, that part of his device is not infringed by the city.

Therefore, without noticing the other defenses, we declare our opinion to be that he is not entitled to any relief against the city upon either of the patents on which his demand for relief is now based. His case as presented here has no ground to stand on.

Decree affirmed.

76. ATLANTIC WORKS v. BRADY, 107 U. S. 192, 27 L. ed. 438, 2 Sup. Ct. 225 (1883, Patent No. 72,360).

Bradley, J. This case arises upon a bill in equity filed by Edwin L. Brady against the Atlantic Works, a corporation of Massachusetts, having workshops and a place of business in Boston, praying for an account of profits for building a dredge-boat in violation of certain letters patent granted to the complainant, bearing date December 17, 1867, and for an injunction to restrain the defendants from making, using, or selling any dredge-boat in violation of said letters patent. * * *

The defendants, in their answer, denied the validity of the patent, and denied infringement of any valid patent of the complainant. They then stated the circumstances under which they came to construct the dredge-boat complained of, namely: That in October, 1867, the government of the United States advertised for proposals for building a dredge-boat for the mouth of the Mississippi river, according to certain plans and specifications; that the defendants, boats, examined the plans and specifications, and made proposals for building the boat according to the same, which were accepted, and being manufacturers and builders of marine engines and steam-they at once began the construction of the boat and completed it under the inspection and supervision of a United States officer, in conformity with the stipulations, and the boat went in charge of said officer to the mouth of the Mississippi river; that the said plans and specifications were made and furnished by Gen. McAlester, of the engineer corps of the United States, for the use of the government, and were the result of his own study, observations, and experience, and that, so far as they were original, he was the author of them. * * *

It is obvious, from reading the specifications, that the alleged invention consists mainly in attaching a screw (which the patentee calls a mud-fan) to the forward end of a propeller dredge-boat, provided with tanks for settling her in the water. It is operated by

sinking the boat until the screw comes in contact with the mud or sand, which, by the revolution of the screw, is thrown up and mingled with the current. The use of a series of tanks for the purpose of keeping the vessel level while she settles is an old contrivance long used in dry-docks, and is shown by the evidence to have been used in many light-draught monitors during the late war. The defendants themselves built one of these vessels—the Casco. * * *

The employment of their screws by propeller ships, driven stern foremost, for the removal of sand and mud accumulated at the mouths of the Mississippi, had frequently occurred years before the patentee's invention is alleged to have been made. Several French steamers, one of which was named the Francis Arago, had used this method there prior to the year 1859. In that year the Enoch Train, a double propeller,—that is, having two screws at her stern,—was used in the same way by certain contractors under the government for dredging the mouth of the Mississippi. * * *

The boat built by the defendants, which was called the Essayon, was operated in precisely the same way. Being built expressly for dredging, her dredging screw was placed at her stern, it is true; but her mode of operation was the same as that of the Enoch Train. * * *

The making of them with longer blades than those of the propelling screw, and sharpened at the points, would be a matter of course. No invention would be requisite for any of these arrangements. It seems to us that the whole principle of the Essayon's construction and furnishment, as well as that of the patent in question, was anticipated by the Enoch Train, if not by the French steamers, and that a patent for that principle, though qualified by the natural incidents and adjuncts of its application, ought not to be sustained.

The process of development in manufactures creates a constant demand for new appliances, which the skill of ordinary head-work men and engineers is generally adequate to devise, and which, indeed, are the natural and proper outgrowth of such development. Each step forward prepares the way for the next, and each is usually taken by spontaneous trials and attempts in a hundred different places. To grant a single party a monopoly of every slight advance made, except where the exercise of invention somewhat above ordinary mechanical or engineering skill is distinctly shown, is unjust in principle and injurious in its consequences.

The design of the patent laws is to reward those who make some substantial discovery or invention, which adds to our knowledge and makes a step in advance in the useful arts. Such inventors are worthy of all favor. It was never the object of those laws to grant a monopoly for every trifling device, every shadow of a shade of an idea, which would naturally and spontaneously occur to any skilled

mechanic or operator in the ordinary progress of manufactures. Such an indiscriminate creation of exclusive privileges tends rather to obstruct than to stimulate invention. It creates a class of speculative schemers who make it their business to watch the advancing wave of improvement, and gather its foam in the form of patented monopolies, which enable them to lay a heavy tax upon the industry of the country, without contributing anything to the real advancement of the art. It embarrasses the honest pursuit of business with fears and apprehensions of concealed liens and unknown liabilities to lawsuits and vexatious accountings for profits made in good faith.

But the Enoch Train did not exhibit all that was done in the matter of dredge-boats anterior to the alleged invention of Brady. If the application of dredging screws to the stem of a boat, driven by a propeller or otherwise, was not formerly exhibited in the Enoch Train, it was certainly exhibited in the invention of one Ephraim B. Bishop, which was patented in April, 1858, and was applied by Brady himself to a dredge-boat called the Wiggins Ferry, fitted up and operated by him at the mouth of the Mississippi in 1866. * * *

It is clear, then, that Brady did not invent the furnishing of vessels with water-tanks, so arranged as to sink them on an even keel; for these had been used long before in the light-draught monitors; he did not invent the use of revolving screws on a dredging-boat, for cutting and stirring up the mud and sediment; for these had been used for that purpose on the French steamers, and on the Enoch Train, in and prior to 1859; he did not invent the use of water-tanks in a dredging-boat for sinking the screws down to the bottom or bar to be dredged; for this plan had been adopted in the Enoch Train; he did not invent the application of screws to the forward end of a dredge-boat, so as to work in advance of the boat; for this had been virtually done on the Enoch Train, and was formerly done on the Wiggins Ferry, the plan of which had been invented by Bishop in 1858. What, then, did he invent? Did he make a selection and combination of these elements that would not have occurred to any ordinary skilled engineer called upon, with all this previous knowledge and experience before him, to devise the construction of a strong dredge-boat for use at the mouth of the Mississippi? We think not. We think that there is no reasonable ground for any such pretension.

But if a different conclusion could be reached, to our minds it is as certain as any fact depending on conflicting testimony can be, that Brady derived the ideas embraced in his patent from Gen. McAlester, the government officer, who in 1866 and 1867 had charge of the improvements at the mouth of the Mississippi river, and that he never conceived these ideas till they were communicated and explained to him by Gen. McAlester during the fitting up of

the Wiggins Ferry at New Orleans, and during the progress of her operations at the Southwest pass. * * *

Sufficient appears, however, notwithstanding the evidence adduced to the contrary, consisting mostly of the testimony of the complainant himself, to convince us that Brady derived his whole idea from the suggestions of Gen. McAlester; and that the plans for the construction of the Essayon originated entirely with that officer.

Our conclusion is that the patent sued on cannot be sustained, and that the decree of the circuit court must be reversed, and the cause remanded, with instructions to dismiss the bill of complaint.

Decree reversed accordingly.

77. PENNSYLVANIA R. R. CO. v. LOCOMOTIVE ENGINE SAFETY TRUCK CO., 110 U. S. 490, 28 L. ed. 222, 4 Sup. Ct. 220 (1884).

Gray, J. This is an appeal by the defendant below from a decree against it upon a bill in equity for the infringement of letters patent granted on February 11, 1862, to Alba F. Smith, for an improvement in trucks for locomotive engines. [Patent No. 34,377.] * * *

It is settled by many decisions of this court. which it is unnecessary to quote from or refer to in detail, that the application of an old process or machine to a similar or analogous subject, with no change in the manner of application, and no result substantially distinct in its nature, will not sustain a patent, even if the new form of result has not before been contemplated. Hotchkiss v. Greenwood, 11 How. 248; Phillips v. Page, 24 How. 164, 167; Jones v. Morehead, 1 Wall. 155, overruling S. C. nom. Livingston v. Jones, 1 Fisher, Pat. Cas. 521; Hicks v. Kelsey, 18 Wall. 670; Smith v. Nichols, 21 Wall. 112; Brown v. Piper, 91 U. S. 37; Roberts v. Ryer, Id. 150; Keystone Bridge Co. v. Phoenix Iron Co., 95 U. S. 274, 276; Planing-Machine Co. v. Keith, 101 U. S. 479, 491; Pearce v. Mulford, 102 U. S. 112; Heald v. Rice, 104 U. S. 737, 754-756; Atlantic Works v. Brady, 107 U. S. 192 [S. C. Sup. Ct. Rep. 225].

In the well-known case of Crane v. Price, in which the English court of common pleas upheld a patent for using anthracite, instead of bituminous coal, with the hot blast in smelting iron ore, the evidence, as Chief Justice Tindal remarked, proved beyond doubt that, in the result of the combination of the hot-air blast with the anthracite, not only was the yield of the furnace more, and the expense of making the iron less, but "the nature, properties, and quality of the iron were better" than under the former process by means of the combination of the hot-air blast with bituminous coal. 4 Man. & G. 580, 604; 5 Scott, N. R. 338, 389; I Webs. Pat. Cas. 393, 410. And the decision rests, as was pointed out by Chief Baron Pollock and Baron Parke, in Dobbs v. Penn, 3 Exch. 427, 432, 433, and by

Mr. Justice Bradley, in Hicks v. Kelsey, supra, upon the ground that a new metal or composition of matter was produced. As observed by Mr. Justice Bradley, "in compositions of matter a different ingredient changes the nature of the compound, whereas an iron bar in place of a wooden one, and subserving the same purpose, does not change the identity of a machine." 18 Wall. 674. So in Smith v. Goodyear Dental Vulcanite Co., in this court, as was observed by Mr. Justice Strong, in delivering its judgment: "A new product was the result, differing from all that had preceded it, not merely in degree of usefulness and excellence, but differing in kind, having new uses and properties." 93 U. S. 486, 494. See, also, Goodyear Dental Vulcanite Co. v. Davis, 102 U. S. 222.

Upon the principles which must govern this case, the decision of this court and of the highest courts of England are in full accord, as will appear by referring to three cases, fully argued and considered, all of which were carried to the exchequer chamber, and two of which were finally decided in the house of lords.

In Bush v. Fox, a patent for constructing the interior of a caisson or cylinder with successive chambers to work in, "in such manner that the work-people may be supplied with compressed air, and be able to raise the material excavated, and to make or construct foundations and buildings," under water, when a similar apparatus had already been used for working underground on land, was held by Chief Baron Pollock, by the court of exchequer chamber, and by the house of lords, to be void for want of novelty, after able arguments, in support of the patent by Sir Alexander Cockburn, then attorney general, and by Mr. Webster, the accomplished patent counsel, at the successive stages of the case. Macrory, Pat. Cas. 152, 167, 179; 9 Exch. 651; 5 H. L. Cas. 707.

So the court of queen's bench held that the finishing of yarns of wool or hair by a process previously applied to yarns of cotton and linen, by subjecting them, while distended and kept separate, to the action of rotatory beaters or burnishers, by which they would be burnished or polished on all sides, was not the subject of a patent, because, as Lord Campbell said, in order to sustain a patent for the application of an old process to a new purpose, "there must be some invention in the manner in which the old process is applied;" "here there is no novelty in the mode of application," "but merely the application of a known process by a known means to another substance." Brook v. Aston, 27 Law. J. (N. S.) Q. B. 145; S. C. 4 Jur. (N. S.) 279; S. C. (with the opinion less fully reported), 8 El. & Bl. 478. The judgment was unanimously affirmed in the exchequer chamber. Of the opinions there delivered, it is sufficient to quote from that of Baron Martin, who, after expressing his concurrence in the statement of Mr. Justice Willes, in Patent Bottle Envelope Co. v. Seymer, 28 Law J. (N. S.) C. P. 22, 24; S. C. 5

C. B. (N. S.) 164, 173, that "the application of a well known tool to work previously untried materials, or to produce new forms, is not the subject of a patent," added, "When a machine is well known, it becomes in fact a tool." 28 Law J. (N. S.) Q. B. 175, 176; 5 Jur. (N. S.) 1025, 1027.

But perhaps the most important English case is that of Harwood v. Great Northern Ry. Co., 2 Best & S. 194, 222, and 11 H. L. Cas. 654. In that case a patent was obtained for "improvements in fishes and fish-joints for connecting the rails of railways." In the specification the patentee stated that in securing the joints of rails it had been found advantageous to attach to each side of the rails, by means of bolts and rivets, pieces of iron commonly called "fishes;" and described his invention as consisting in making the fishes with a groove or recess in their outer surfaces, so as to receive the square heads of the bolts or rivets, and to prevent them from turning round while the nuts on the other side were being screwed on or off, and also to avoid the danger of the flanges of the wheels of the carriages striking against the heads; and he claimed "the constructing fishes for connecting the rails of railways, with a groove adapted for receiving the heads of the bolts or rivets employed for securing such fishes, and the application of such fishes for connecting the rails of railways." In an action for the infringement of that patent, it appeared that fishes for connecting the rails of railways had never before been made with a groove or recess in their outer surfaces, so as to receive the square heads of the bolts. But it was proved that in the construction of several railway bridges, beams of timber had been laid horizontally, one above the other, and fastened or bolted together with bolts and nuts; horizontal bars or plates of iron placed beneath, parallel to and in contact with the beams, and fastened or bolted by the same bolts and nuts, and each of these bars or plates of iron constructed with a groove in its under surface, which received the square heads of the bolts, and which served the double purpose of strength and of preventing the heads of the bolts from turning round. In those bridges there were no joints to be fished by the bars or plates of iron, nor were there corresponding bars or plates of iron above the horizontal beams of timber. But it was also proved that a bridge, known as the Hackney bridge, having too great a span to be conveniently crossed by a single beam, had been constructed with two horizontal longitudinal beams of timber on each side, the ends of which met and were joined together in the middle of the bridge by scarf-joints: that beneath those beams were transverse planks, constituting the flooring of the bridge, and beneath the planks were bars of grooved iron, like those used in the other bridges, carried under the scarf-joints, and under the whole length of the horizontal beams; that above and immediately over each scarf-joint, extending 18 inches beyond each end of the joint,

and resting immediately upon the longitudinal beam, was a horizontal flat plate of iron 13 feet in length; and that the bolts passed upwards through the grooved iron bars, the transverse planking, and the longitudinal beams, and also, at the middle of the bridge, through the plates of iron over the scarf-joints.

A verdict supporting the patent was obtained under the rulings of Lord Chief Justice Cockburn, and affirmed by the court of queen's bench. But its judgment was unanimously reversed in the exchequer chamber in a considered judgment delivered by Mr. Justice Willes; and the judgment of reversal was affirmed by the house of lords, in accordance with the opinions of Lord Chancellor Westbury, Lord Cranworth, and Lord Wensleydale, and of a majority of the judges who attended, upon the ground, as stated by the lord chancellor, that the application of the channelled iron horizontally under the timbers of a bridge being well known, "the channelled iron was applied in a manner which was notorious, and the application of it to a vertical fish would be no more than the application of a well-known contrivance to a purpose exactly analogous or corresponding to the purpose to which it had been previously applied." 11 H. L. Cas. 683. And all who gave opinions in the house of lords concurred with the court of exchequer chamber in the proposition of law that the mere application of an old contrivance in an old way to an analogous subject, without any novelty in the mode of applying such old contrivance to the new purpose, is not a valid subject-matter of a patent. 2 Best & S. 228; 11 H. L. Cas. 666, 672, 682, 684, 685.

In the case at bar, the old contrivance of a railroad truck, with the swiveling king-bolt, transverse slot, and pendent divergent links, already in use under railroad cars, is applied in the old way, without any novelty in the mode of applying it, to the analogous purpose of forming the forward truck of a locomotive engine. This application is not a new invention, and therefore not a valid subject of a patent.

The decree of the circuit court must therefore be reversed, and the case remanded, with directions to dismiss the bill.

78. THOMPSON v. BOISSELIER, 114 U. S. 1, 29 L. ed. 76, 5 Sup. Ct. 1042 (1885, Patent No. 21,734).

Blatchford, J.: * * *

The third claim of the Carr reissue is as follows: "Third. I claim, in a valve for water-closets, a cup-leather for controlling the motion of said valve in closing gradually, substantially as specified, said cup-leather moving freely in one direction, and closing against the containing cylinder in the other direction, and the leakage of water in said cylinder allowing the movement of said cup-leather as set forth." * * *

All that Carr did, if anything, was to add his form of orifice to the valve and cup-leather of the pump-plunger. But the idea of having openings extending from one side to the other of a bucket, and thus regulating the closing of a water-valve by the slow escape of the water from the upper side of the bucket, through such openings, was fully exhibited in the apparatus of Hulme.

The claim involves, therefore, as an element in it, the means of leakage set forth. It says that the use of the cup-leather is "for controlling the motion of said valve in closing gradually, substantially as specified." But it is the gradual escape of the water through the small orifice which controls the motion of the valve. The cup-leather does not control such motion. The only action of the cup-leather is the same which it had in the old pump-plunger: to hold up a column of water and act as a packing to prevent the return passage of the water. In this condition of things it would seem that the only point of invention, if it could be dignified by that name, was the special means of leakage shown by Carr, of having a screw through the cap, with part of the screw filed away; and which is not used by the defendants, who use the same means of leakage as Hulme did.

The provision of the constitution (article 1, § 8, subd. 8,) is that congress shall have power "to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." The beneficiary must be an inventor and he must have made a discovery. The statute has always carried out this idea. Under the act of July 4, 1836, (5 St. 119, § 6,) in force when these patents were granted, the patentee was required to be a person who had "discovered or invented" a "new and useful art, machine, manufacture, or composition of matter," or a "new and useful improvement in any art, machine, manufacture, or composition of matter." In the act of July 8, 1870, (16 St. 201, § 24,) the patentee was required to be a person who had "invented or discovered any new and useful art, machine, manufacture, or composition of matter, or any new and useful improvement thereof;" and that language is reproduced in section 4886 of the Revised Statutes. So, it is not enough that a thing shall be new, in the sense that in the shape or form in which it is produced it shall not have been before known, and that it shall be useful, but it must, under the constitution and the statute, amount to an invention or discovery.

To refer only to some more recent cases, adjudged since these suits were decided below, this principle was applied in Vinton v. Hamilton, 104 U. S. 485, where, a cupola-furnace being old, and a cinder-notch being old, and the use of a cinder-notch to draw off cinders from a blast-furnace being old, and the cinder-notch, in drawing off the cinder from a cupola-furnace, performing the same

function as in the blast-furnace, it was held that the application of the cinder-notch to the cupola-furnace would occur to any practical man, and that there was nothing patentable in such application.

In Hall v. Macneale, 107 U. S. 90; S. C. 2 Sup. Ct. Rep. 73, a cored conical bolt, in a safe, with a screw-thread on it, having existed before, and also a solid conical bolt, it was held to be no invention to add the screw-thread to the solid conical bolt.

In Atlantic Works v. Brady, 107 U. S. 192, 200; S. C. 2 Sup. Ct. Rep. 225, it was said, that it is not the object of the patent laws to grant a monopoly for every trifling device which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufactures: and this doctrine was applied in Slawson v. Grand St. R. Co., 107 U. S. 649; S. C. 2 Sup. Ct. Rep. 663; in King v. Gallun, 109 U. S. 99; S. C. Sup Ct. Rep. 85; in Double-pointed Tack Co. v. Two Rivers Manuf'g Co., 109 U. S. 117; S. C. 3 Sup. Ct. Rep. 105; in Estey v. Burdett, 109 U. S. 633; S. C. 3 Sup. Ct. Rep. 531; in Bussey v. Excelsior Manuf'g Co., 110 U. S. 131; S. C. 4 Sup. Ct. Rep. 38; in Pennsylvania R. Co. v. Locomotive, etc., Truck Co., 110 U. S. 490; S. C. 4 Sup. Ct. Rep. 220; in Phillips v. City of Detroit, 111 U. S. 604; S. C. 4 Sup. Ct. Rep. 580; in Morris v. McMillin, 112 U. S. 244; S. C. 5 Sup. Ct. Rep. 218; and in Hollister v. Benedict & Burnham Manuf'g Co., 113 U. S. 59; S. C. 5 Sup. Ct. Rep. 717.

In the case last cited the thing claimed was new, in the sense that it had not been anticipated by any previous invention, and it was shown to have superior utility, yet it was held not to be such an improvement as was entitled to be regarded, in the patent law, as an invention. The claim was "A stamp, the body of which is made of paper or other material, and having a removable slip of metal or other material, displaying thereon a serial number, or other specific identifying mark, corresponding with a similar mark upon the stub, and so attached that the removal of such slip must mutilate or destroy the stamp." The part designed to become a stub when the stamp proper was separated therefrom, and displaying a serial number, was well known; and so was a constituent part of the stamp proper designed to be permanently attached to a barrel. The third element, namely, a constituent part of the stamp proper displaying the same identifying serial number as the stub, which part, after the stamp proper had been affixed to the barrel, bore such relation to the permanent part, that it could be removed therefrom so as to retain its own integrity, but to mutilate, and thereby cancel, the stamp, by its removal, was not new, so far as the contents of such constituent part were identical with those on the stub. But the question turned on that feature of the third element whereby a removable part of the stamp proper, the contents of which identified the stamp with the stub after the stamp had been attached, could be so re-

moved as to retain its own integrity, but mutilate, and thereby conceal, the stamp, by its removal. This was held not to be a patentable invention; and "not to spring from that intuitive faculty of the mind put forth in the search for new results, or new methods, creating what had not before existed, or bringing to light what lay hidden from vision;" but to be only "the display of the expected skill of the calling," and involving "only the exercise of the ordinary faculties of reasoning upon the materials supplied by a special knowledge, and the faculty of manipulation which results from its habitual and intelligent practice;" and to be "in no sense the creative work of that inventive faculty which it is the purpose of the constitution and patent laws to encourage and reward."

On these principles claim 3 of the Carr reissue must, in view of the state of the art, either be held not to involve a patentable invention, or if it does, not to have been infringed. * * *

From these considerations it results that the decrees in the Missouri suits must be affirmed; and those in the New York suits must be reversed, with directions to dismiss the bills, with costs.

79. ARON v. MANHATTAN R. CO., 132 U. S. 84, 33 L. ed. 272 (1889).

Blatchford, J. This is a suit in equity, brought by Joseph Aron against the Manhattan Railway Company, in the circuit court of the United States for the southern district of New York, to recover for the infringement of letters patent No. 288,494. * * *

The drawings annexed to the patent represent two ordinary railway cars, with platforms adjoining each other, and the usual entrances from the station platform, and gates of the ordinary construction for closing such entrances. The gates are hinged in the usual manner to posts which rise from the corners of the platforms, and close against the usual jambs which project from the sides of the cars. The platforms are provided with the usual guard-railings, extending inward from the above-mentioned posts to similar posts which are located a sufficient distance apart to leave a passage-way from one car to the other. When the gates are thus arranged, it is necessary, in order to close or open both gates, for the guard to pass from one platform around the inner post to the opposite platform, thus causing some delay in opening and closing one of the gates, adding to the labor of the guard, and causing annoyance to the passengers. In order to avoid this, each of the gates is provided, at a suitable distance from its hinge, with a curved lever, which extends rearward, and terminates a short distance outside of the guard-railing. This lever is connected by a link, *e*, with a rod, *f*, which slides in or on a suitable bearing secured to the guard-railing, and is provided at its inner end with a handle by which it can be operated. The guard or attendant, while standing in the passage-way,

can, by grasping the two handles, and pushing or pulling the rods, *f*, open or close both gates simultaneously, and without loss of time. * * *

The opinion of Judge Wallace is reported in 26 Fed. Rep. 314. The only question he considered was that of the patentable novelty of the improvement, saying: "A brief reference to the prior state of the art will indicate that the combinations referred to in the several claims are merely an application to a new situation of old devices which had previously been applied to analogous uses. Devices to open and close an aperture at a distance from the operator, in a great variety of forms, were old. As illustrations of those things which are matters of common knowledge, and of which the court will take judicial notice, it is sufficient to allude to the strap used by the driver at the front of the omnibus to open and close the rear door; to the devices for opening or closing valves at a distance, in steam and hydraulic apparatus; and to the devices used at railway switches for opening and closing the rails. Referring to the prior state of the art, as shown by various prior patents which have been introduced in evidence, it appears also that mechanism to open and close the entrance to passenger cars at a point distant from the operator was likewise old; as where the operator standing upon the front platform employed such mechanism to open or close a door at the rear platform. One prior patent alone—the one granted to John Stephenson, September 15, 1874—shows five methods of closing and opening the rear door of street-cars from the front platform. Mechanism for closing and opening apertures at a distance from the operator, in which the same devices were employed as are employed by the patentee, was old, and is disclosed in a number of earlier patents, which have been put in evidence. It will suffice to refer to two only. The patent to Woolensak of March 11, 1873, for an improvement in transom-lifters, describes the means for opening and closing the transom as consisting of a sliding rod, which is connected by a pivoted link to the arm of the transom frame. The patent to Carrigan, granted April 16, 1878, for an improvement in blind-adjusters, whereby outside blinds are opened and closed without lifting the window-sash, describes as the mechanism employed a sliding bar connected by a pivoted link with a hinged shutter. In both of these patents the aperture to be opened and closed at a distance from the operator—in the one case a shutter, and in the other a transom—is opened and closed, as is the case in the patent in suit, by pushing or pulling the sliding rod or bar. In both of these patents there is likewise described a locking device, by means of which the sliding rod or bar is retained in a fixed position, so that the shutter or the transom will remain fastened when opened or closed, at the option of the operator; thus showing opening, closing, and locking apparatus in all essentials like that of the patent in suit.

Moreover, the patent to Carrigan shows this apparatus arranged to open and close the two shutters of the window, at the option of the operator, simultaneously, the sliding bars being so arranged as to be pushed or pulled each by one hand of the operator. Mechanism for opening and closing apertures distant from the operator, in which the devices used for the purpose are the mechanical equivalents of those employed by the patentee, is shown to be old by a large number of patents which have been put in evidence. This particular exhibit of the prior state of the art demonstrates that what the patentee did was to adapt well-known devices to the special purpose to which he contemplated their application. It was necessary that the gate should swing inward to open, and outward to close; that the sliding rod should be located where it would be out of the way of passengers entering or leaving the platform; and that the end or handle of the rod should be located where it could be conveniently operated by the attendant, without inconveniencing outgoing or incoming passengers. The new situation required adequate modifications of existing devices for opening and closing an aperture at a distance from the operator, appropriate to the new occasion. Accordingly, the patentee located the rods on bearings secured to the guard-rails, with their handles near the passage-way formed by the space or opening near the middle of the guard-rail. If this required invention his improvement was the proper subject of a patent. He did nothing more, and nothing less, than this. It seems impossible to doubt that any competent mechanic familiar with devices well-known in the state of the art, could have done this readily and successfully, upon the mere suggestion of the purpose which it was desirable to effect. When it was done as to one car platform, it was only requisite to duplicate it upon another, to make the improvement of the patentee in all its length and breadth. The patentee is entitled to the merit of being the first to conceive of the convenience and utility of a gate opening and closing mechanism which could be operated efficiently by an attendant in the new situation. His right to a patent, however, must rest upon the novelty of the means he contrives to carry his idea into practical application. It rarely happens that old instrumentalities are so perfectly adapted for a use for which they were not originally intended as not to require any alteration or modification. If these changes involve only the exercise of ordinary mechanical skill, they do not sanction the patent; and in most of the adjudged cases, where it has been held that the application of old devices to a new use was not patentable, there were changes of form, proportion, or organization of this character which were necessary to accommodate them to the new occasion. The present case falls within this category."

We concur in these views, and affirm the decree of the circuit court.

80. BUTLER v. STECKEL, 137 U. S. 21, 34 L. ed. 582, 11. Sup. Ct. 25 (1890).

Blatchford, J. This is a suit in equity, brought in the circuit court of the United States for the northern district of Illinois, March 28, 1883, by Theodore H. Butler, George W. Earhart, and William M. Crawford, against George Steckel and Frederick Steckel, to recover for the infringement of letters patent No. 274,264, granted to the plaintiffs March 20, 1883, on an application filed July 6, 1882, for an "improvement in bretzel cutters." * * *

It is urged by the appellants that the circuit court erred in finding as a fact that dies existed which cut cakes in the shape of the capital letter B and the character &, with two or more scrap passages, but we find that the evidence establishes that fact. In view of the testimony as to the state of the art, it required no invention to make a single die to cut dough, on a flat surface, into any particular shape desired, whether the shape of a bretzel or any other shape. Smith v. Nichols, 21 Wall. 112, 119; Dunbar v. Myers, 94 U. S. 187, 199; Pomace Holder Co. v. Ferguson, 119 U. S. 335, 338, 7 Sup. Ct. Rep. 382, and cases there cited; Peters v. Manufacturing Co., 130 U. S. 626, 628, 629, 9 Sup. Ct. Rep. 643; Watson v. Railway Co., 132 U. S. 161, 167, 10 Sup. Ct. Rep. 45. All that it was necessary to do was to take the bretzel as a pattern, and make a die to correspond in shape with it. The bretzel presented all the lines and creases, points and configurations, that were required in the die. The question was one, not of invention, but simply of mechanical skill and limitation. The perforations in the die for the passing upward of the scraps, and the expelling studs for pushing off the bretzel from the die, and all the details specified in the second claim of the patent, were old in machines that had been used by bakers for many years. All that was necessary was to take out the old cutter, and put in one in the reverse form of a bretzel. The rest of the machine had been used in the same way, in connection with other forms of dies. There is nothing in the suggestion that bretzel dough is different from other doughs, in respect to the action of a die upon it. In regard to the point taken that the existence of invention in this case is shown by the fact that a large number of persons had before attempted unsuccessfully to make a machine to cut bretzels, and had expended considerable money and time for that purpose, it is to be said, as stated by the circuit court, that most of them were engaged in trying to draw out and twist the dough by machinery, rather than to cut out the form of a bretzel by a single die from a flat sheet, or else were endeavoring to cut bretzels with dies set in revolving cylinders. It also appears that those efforts were largely made in attempts to cut out the bretzel by two opposite dies, and that, as soon as the idea occurred of cutting the dough by a single die from a flat sheet, success came at once, by merely

changing the shape of the old single die. It also appears, as suggested by the circuit court, that there was a prejudice against machine-made bretzels. The decree of the circuit court is affirmed.

81. WESTERN ELECTRIC CO. v. LA RUE, 139 U. S. 601, 35 L. ed. 294, 11 Sup. Ct. 670 (1891).

This was a bill in equity brought by La Rue, plaintiff in the court below, for the infringement of letters patent No. 270,767, issued to Edgar A. Edwards, January 16, 1883, for a new and useful improvement in telegraph keys. * * *

Mr. Justice Brown, after stating the facts as above, delivered the opinion of the court.

The invention covered by this patent consists in the use in a telegraph key of a flat strip of metal supported at either end upon posts by means of adjustable screws, and to the center of which the lever is fastened. The torsional action of this piece of metal serves as a spring support for the lever. The main object of the invention is the substitution of this torsional spring for the ordinary pivotal support previously used, which consisted of tapering pivots or gudgeons projecting from the sides of the lever into the bearings. The testimony indicates that the pivots require very exact construction and adjustment; that they are apt to wear loose in their sockets; and that inexperienced operators are apt to turn the screws, which carry these sockets, too far or not far enough, thereby rendering the motion of the lever either too difficult or too easy. For this somewhat objectionable pivotal support, the patentee substitutes a flat torsional spring, fastened at either end by ordinary screws to the top of posts or supports. Upon the middle of this spring is riveted the lever of the key, which carries regulating screws for controlling the extent of its vibrations. The specification describes the manner in which, by means of this torsional spring, the lever is enabled to play freely between its points of contact without the use of the ordinary retractile spring. * * *

So far as the testimony discloses, La Rue was the first to apply the principle of the torsional spring to telegraphic instruments, although springs of similar description had been previously used in clocks, doors, and perhaps some other article of domestic furniture. Prior to his invention, telegraph keys were pivoted upon trunnions, and were regulated in their movements either by a coil spring, as shown in the old style of Morse key, or by a flat steel spring to which they were riveted, as in the old style of Western Union key, or the key itself was constructed in the form of a flat spring riveted at one end to the bed or plate, as shown in the Warner spring lever key and in the Exhibit spring lever key.

The pole changer, which is an instrument used by telephone companies for the purpose of calling up their subscribers, consists

of a lever which vibrates back and forth by the aid of a flat spring, to which it is attached in much the same manner as the pendulum of an old-fashioned clock is connected with the spring upon which it swings. There is also a flat piece of metal which is attached to the armature, and stands vertically when the instrument lies upon the table, and which has apparently a certain torsional action; but it is evidently not depended upon for anything more than a supporting fulcrum for the armature and lever. It is stated by experts to exert some retractile force, but not enough to make the instrument operate in the way it is designed to.

The Exhibit adjustable torsional spring is not the flat spring of the patent, nor has it the adjusting screws, nor the supporting posts with the fastening screws, nor in fact any of the features, of the patent in suit. It is merely a wire attached to two supports, across the center of which, between the supports, a bar or lever extends, which is attached to the wire, and is supported thereby. But the ends of this wire pass through comparatively large holes in the end supports, and thereby have considerable freedom of movement. The very fact that the holes are larger than the wire indicates that the wire can exert no torsional force. It is a crude and apparently imperfect device, and contains no suggestion of the flat torsional spring peculiar to the patent in suit. Indeed, there is nothing in any of these exhibits which shows the use of a torsional spring in a telegraphic instrument; and, while the invention does not seem to be one of great importance, we think the adaptation of this somewhat unfamiliar spring to this new use, and its consequent simplification of mechanism, justly entitles the patentee to the rights of an inventor.

The question of infringement turns upon the construction to be given to the third claim of the patent, which is, in terms, for the combination, in a telegraph key, of a lever fulcrumed upon a torsional spring, with adjusting screws for regulating its movement. If this claim be limited strictly to a telegraph key, by which is understood the instrument which is used at the office of transmission for sending off messages, then it is clear that defendant does not infringe, since it makes use of a similar combination only in connection with a telegraph sounder, or instrument used at the receiving office for delivering or enunciating the message. It is evident, however, that both of these patentees understood that the combination described in their patents could be used in either connection, since Edwards says in his specification that he does not limit himself "to the application of torsional springs to telegraph keys alone, as it is obvious the torsional strip or spring may be applied to other electrical instruments. Thus it may replace the pivots or trunnions of the relay and sounder." Haskins also admits that "it has heretofore been proposed to support a lever of a

key or an armature upon a flat torsional spring," and says that his "torsion spring may be applied to the armature lever of any telegraphic receiving instrument, or to the lever of any telegraphic key, without departing from the spirit of the invention."

The use of the combination is practically the same in both instances. There are the same elements of a lever fulcrumed upon a torsional spring, and adjusting screws for regulating the amplitude of the lever movement, and the retractile resistance of the torsional spring. They are used for purposes which differ principally in name. The key transmits the message, the sounder receives it. The material part of the key is a lever which completes and breaks an electric circuit. The sounder consists merely of a lever which completes and breaks a magnetic circuit. In both cases, the lever is riveted to and supported by a flat torsional spring, which is itself supported at its ends upon upright posts, to which it is fastened by screws. The object of the spring in each instance is to allow the lever to play back and forth between the exceedingly narrow limits fixed by the set-screws. The employment of this spring in connection with the sounder is such a new or double use as would occur to an ordinary mechanic who had seen the Edwards key in operation. It brought into play no faculty of invention. While the promotion of an old device, such, for instance, as a torsional spring, to a new sphere of action, in which it performs a new function, involves invention, the transfer or adaptation of the same device to a similar sphere of action, where it performs substantially the same function, does not involve invention.

Against this new and analogous use of his combination the patentee is as much entitled to protection as if the word "sounder" had been expressly inserted in his claim. Since the case of Winans v. Denmead, 15 How. 330, it has been the settled doctrine of this court, as expressed in the opinion of Mr. Justice Curtis, page 343, that "the patentee, having described his invention, and shown its principles, and claimed it in that form which most perfectly embodies it, is, in contemplation of law, deemed to claim every form in which his invention may be copied, unless he manifests an intention to disclaim some of these forms." This is practically restated in different language in subsequent cases, and amounts to a declaration that the application of the patented device to another use, where such new application does not involve the exercise of the inventive faculty, is as much an infringement as though the new machine were an exact copy of the old. Sewall v. Jones, 91 U. S. 171, 183; Howe v. Abbott, 2 Story, 190; Walter v. Potter, Webst. Pat. Cas 585.

Some stress is laid by the defendant upon the fact that the "circuit-breaking" lever is made an ingredient of the first, second, and fourth claims of the patent, and that, as the sounder has no

circuit-breaking lever, but only an armature lever, there is no infringement. Assuming, however, what as a matter of fact seems doubtful, that the lever of the sounder is not a circuit-breaking lever, the objection loses all its force in view of the language of the third claim,—the only one found to be infringed,—in which the limitation of the circuit-breaking lever is omitted, and a "lever fulcrumed upon a torsional spring" is substituted.

The further objection that in the defendant's sounder a retractile spring is used in aid apparently of the torsional spring, suggests, rather than justifies, an argument that the torsional spring is useless, and that the sounder would be inoperative without the retractile spring. If such were the fact, it would be an excellent reason for discontinuing the use of the torsional spring, and thereby avoiding beyond all question the charge of infringing the patent. But, notwithstanding the testimony of Mr. Haskins that he found the best results to be obtained when the torsional spring was simply passive, allowing the armature to lie with its own weight upon the magnet, depending wholly upon the retractile spiral spring underneath to produce the upward movement, the fact seems to be that the defendant's sounder will operate about as satisfactorily if only the torsional spring is used. And even if the defendant does use the retractile spring in aid of the torsional spring, it could not thereby escape the charge of infringement. The object of the torsional spring is not only to do away with the necessity of a retractile spring, but to substitute for the ordinary pivotal bearings the torsional support. Giving Haskins' testimony its full weight, it still remains uncontradicted that he does use the torsional spring as a substitute for the trunnions or pivots theretofore used to support the lever.

The claim that defendant does not use the adjusting screws is equally without foundation. Indeed, this suggestion is disposed of by defendant's own expert, who testifies to finding adjusting screws having a relation to the sounder similar to that of the screws, H. H′, to the lever of the key in the patent, but he says that in the sounder they did not appear to have any effect upon the retractile force applied to the lever. It is evident, on examination, that their functions are practically the same in every particular.

The last defense—of want of utility—is also fully met by the fact that Haskins, an employe of the defendant, after the commencement of this suit, took out the patent for a telegraph sounder, the main element of which is the torsional spring of the Edwards patent, and that defendant, upon the accounting, stipulated that a decree might be entered for a royalty of 10 cents apiece on 1,100 sounders made and sold by the defendant embodying the Edwards invention. Under such circumstances, it does not lie in the mouth of the defendant to claim that the invention is useless. Walk.

Pat., § 85; Lehnbeuter v. Holthaus, 105 U. S. 94; Morgan v. Seaward, 1 Webst. Pat. Cas. 170.

The decree of the court below is affirmed.

82. KREMENTZ v. COTTLE CO., 148 U. S. 556, 37 L. ed. 558, 13 Sup. Ct. 719 (1894).

Fig. 1

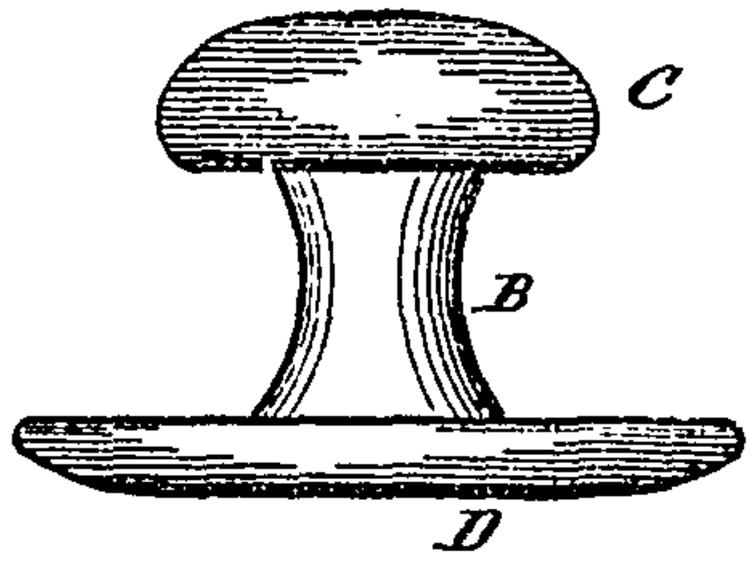


Fig. 2

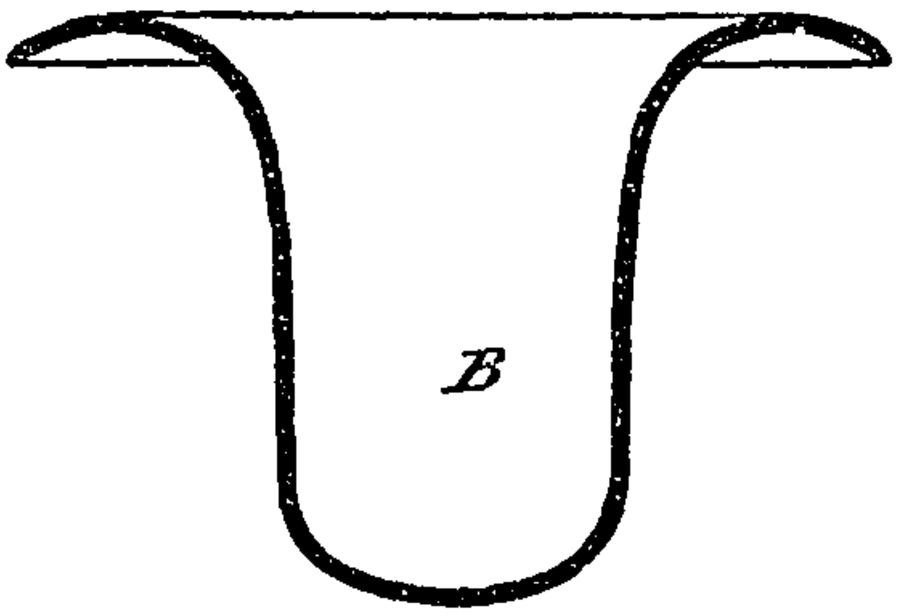


Fig. 3

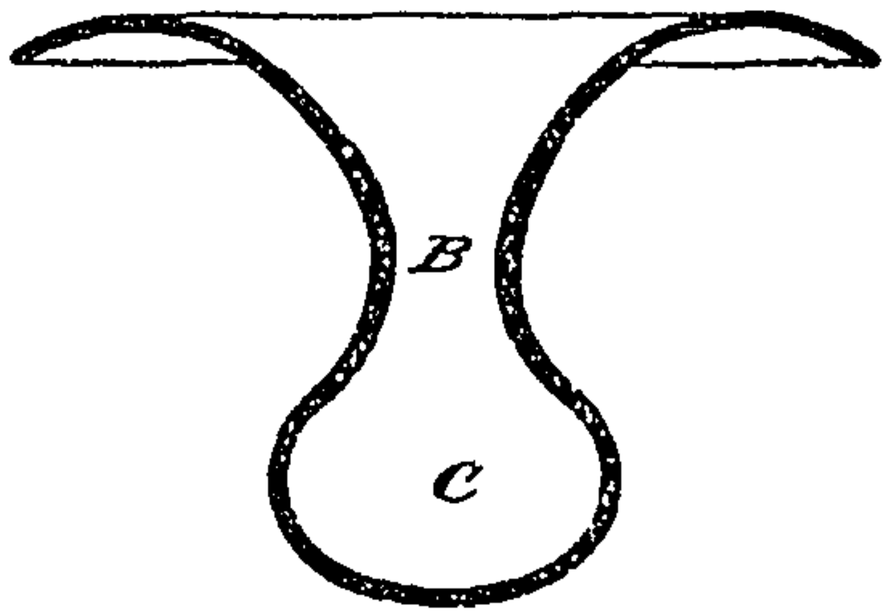


Fig. 4

Fig. 5

Fig. 6

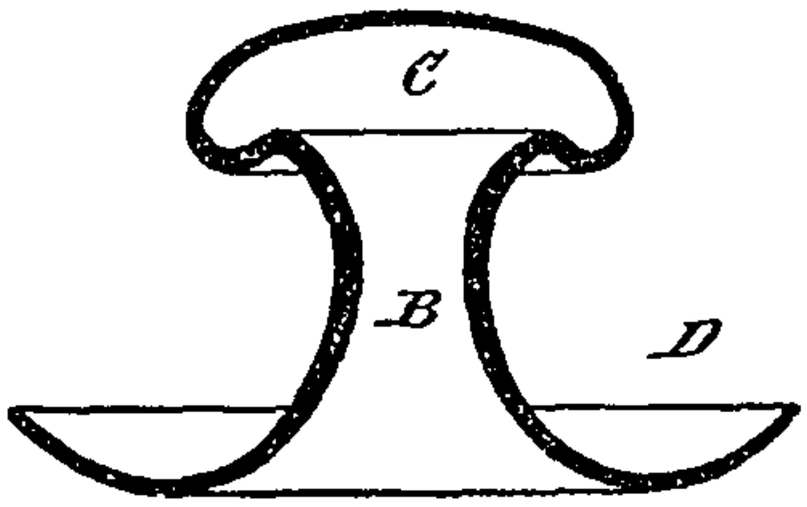
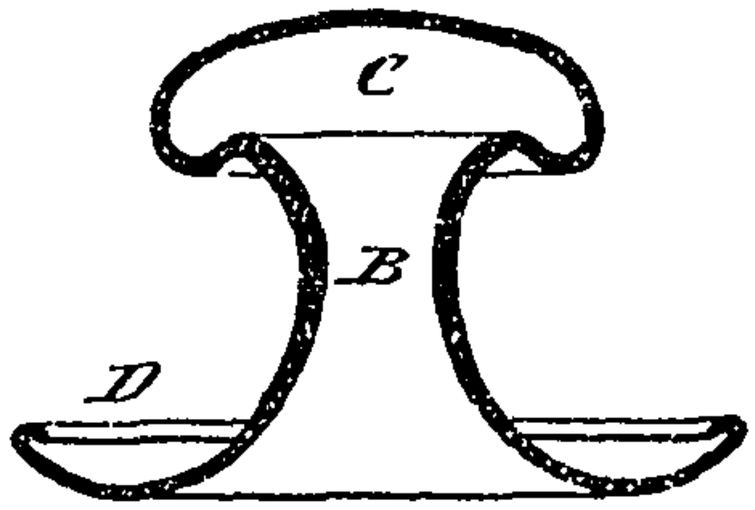


Fig. 7



[The patent thus describes the article, distinguishes from the prior art, and claims the invention.

"The collar-button is made of a single piece of metal, without soldering or joints, and the stem or shank as well as the head is hollow.

By means of suitable dies a metal plate is pressed into the shape shown in Fig. 2—that is, the plate is provided with a hollow stem, B, the sides of which are pressed together at about the middle, in some suitable manner, to form a head, C, at the end of the stem, as in Fig. 3; then the head is pressed toward the base plate or back, D, whereby the head will be upset, and will have the shape shown in Figs. 4 and 5., By this operation the head is hardened. The base plate or back D is then rounded out and finished, and its edge is turned over, as shown in Fig. 5. By finishing the back or plate it is hardened. All the parts of the button are thus hardened and will not wear off rapidly. As no parts are soldered together or connected otherwise, there is no danger of parts breaking off or becoming detached otherwise. Collar-buttons, sleeve-buttons, and other like buttons can be made in the manner herein described.

I am aware that a busk-fastening having a base, tubular shank, and a solid head has been struck up from a single piece of sheet metal; also, that a collar-button has been formed with the base and closed tubular shank in a single piece, and having a head soldered to said shank after its closed end has been cut off; and I do not desire to claim such constructions as of my invention. My invention is designed to improve said construction by forming a hollow head, a hollow stem, and a base from a single piece of struck-up sheet metal. The hollow head is much stronger than one formed solid and flat in the form of a flange, and the advantage of my construction over the button made of two parts is of course apparent at a glance. The objection to this latter class of buttons is that the heads bend on the tubular stems and expose their point of connection, and the heads will break off; and, furthermore, they are objectionable owing to the greater expense required in their manufacture, as skilled labor is required in soldering the parts together and in propely tempering them.

Having thus described my invention, what I claim as new, and desire to secure by letters-patent, is—

A collar or sleeve button having a hollow head and stem, the said head, stem, and the base plate or back of the said button being shaped and made of a single continuous piece of sheet metal, substantially as herein shown and described."

This case is one of the striking instances difficult to classify under the ordinary definitions of invention. It is a case in which the court, looking at the whole matter, concluded that the pat-

entee had done something new or made something new which was of value, and that therefore the patent should be sustained.]

Mr. Justice Shiras delivered the opinion of the Court.

This is an appeal from a decree of the Circuit Court of the United States for the Southern District of New York, dismissing a bill filed to restrain the infringement of Letters Patent of the United States No. 298,303, granted May 6, 1884, to George Krementz, of Newark, New Jersey, for a new and improved collar-button.

Complainant's evidence, tending to show that the collar-button made by the defendants was within the claim of the patent in suit, and constituted an infringement, was not contradicted or disputed, but it was held by the court below that the patent was invalid for want of novelty. (48 O. G. 1775; 39 Fed. Rep. 323.)

In his specification the patentee states that his invention consists in a collar-button having a hollow head and stem, the said button being formed and shaped out of a single continuous plate of sheet metal. * * *

The advantages attributed to the invention are the doing away with soldered joints, the lightness of the hollow stem and head, as compared with buttons having solid stems and head, and the cheapness arising from the use of less material, with equal or superior strength, which, when gold is used, is quite appreciable.

The learned Judge in the court below contended himself with comparing Krementz's invention with two earlier patents, one to Stokes, No. 171,882, granted January 4, 1876, and one to Keats, No. 177,353, granted May 9, 1876, in which patents, he thinks, are to be found the special features claimed by Krementz.

The Stokes patent was for an improvement in making a stud-fastening known as Thomson's unbreakable busk-fastening, and whereby, instead of fastening the parts of the stud together by rivets, the entire busk was made out of one piece of metal, by striking up or raising the stud out of a strip of malleable sheet metal. The structure thus produced is a solid rivet-like and flat head, intended to resist a great strain, and evidently not designed to be used as a collar-button where a well-defined round head, adapted to be used where there is no strain, is necessary and essential.

In the Keats process the button is not made of a continuous piece of sheet metal, but has side seams in the post, and has a base-plate composed of two separate parts, and the head is open on the under side. It could not be used as a collar-button, but is intended to be permanently fastened either to eyelet-holes, or to the fabric with which it is connected.

We cannot see in these devices, taken separately or together, an anticipation of the Krementz button. Indeed, the Court below concedes that:

"Krementz was the first to make a stud from a single continuous piece of metal in which the head was hollow and round in shape."

The learned Judge was, however, of the opinion that—

"any competent mechanic, versed in the manufacture of hollow sheet-metal articles, having before him the patents of Stokes and Keats, could have made these improvements and modifications, without exercising invention, and by applying the ordinary skill of the calling."

It is not easy to draw the line that separates the ordinary skill of a mechanic, versed in his art, from the exercise of patentable invention, and the difficulty is specially great in the mechanic arts, where the successive steps in improvements are numerous, and where the changes and modifications are introduced by practical mechanics. In the present instance, however, we find a new and useful article, with obvious advantages over previous structures of the kind. A button formed from a single sheet of metal, free from sutures, of a convenient shape, and uniting strength with lightness, would seem to come fairly within the meaning of the patent laws. The tools to be used in making the button are not described, but they are not claimed to be new. And the method or process of manufacture is described with sufficient particularity to enable any one skilled in the art to follow it. Buttons made of several pieces are liable to break at the soldered joints, and it is stated by an experienced witness that the metal by the process of soldering becomes soft and liable to bend. The different pieces are set together by hand, and are not always uniform or put together truly.

The view of the court below, that Krementz's step in the art was one obvious to any skilled mechanic, is negatived by the conduct of Cottle, the president of the defendant company. He himself was a patentee under letters granted April 16, 1878, for an improvement in the construction of collar and sleeve buttons, and put in evidence in this case. In his specification he speaks of the disadvantages of what he calls—

"the common practice to make the head, back, and post of collar and sleeve buttons separate, and to unite them by solder."

His improvement was to form a button of two pieces, the post and base forming one piece, and then soldering to the post the head of the button as the other piece. Yet, skilled as he was, and with his attention specially turned to the subject, he failed to see, what Krementz afterward saw, that a button might be made of one continuous sheet of metal, wholly dispensing with solder, of an improved shape, of increased strength, and requiring less material.

It was also made to appear that the advantages of the new button were at once recognized by the trade and by the public, and that very large quantities have been sold.

The argument drawn from the commercial success of a patented article is not always to be relied on. Other causes, such as the enterprise of the vendors, and the resort to lavish expenditures in advertising, may co-operate to promote a large marketable demand. Yet, as was well said by Mr. Justice Brown, in the case of Consolidated Brake-Shoe Co. v. Detroit Co. (47 Fed. Rep. 894)—
"when the other facts in the case leave the question of invention in doubt, the fact that the device has gone into general use and has displaced other devices which had previously been employed for analogous uses, is sufficient to turn the scale in favor of the existence of invention."

Webster Loom Co. v. Higgins, (105 U. S., 580), was a case where the patented device consisted in a slight modification of existing mechanism, and it was contended that this slight change did not constitute a patentable invention; but this view did not prevail, the Court saying:

"It is further argued, however, that supposing the devices to be sufficiently described, they do not show any invention, and that the combination set forth in the fifth claim is a mere aggregation of old devices already well known, and therefore it is not patentable. This argument would be sound if the combination claimed by Webster was an obvious one for atttaining the advantages proposed—one which would occur to any mechanic skilled in the art. But it is plain from the evidence and from the very fact that it was not sooner adopted and used, that it did not for years occur in this light to even the most skillful persons. It may have been under their very eyes, they may almost be said to have stumbled over it, but they certainly failed to see it, to estimate its value, and to bring it into notice. Who was the first to see it, understand its value, to give it shape and form, to bring it into notice and urge its adoption, is a question to which we shall shortly give our attention.

At this point we are constrained to say that we cannot yield our assent to the argument that the combination of the different parts or elements for attaining the object in view was so obvious as to merit no title to invention. Now that it has succeeded it may seem very plain to any one that he could have done it as well. This is often the case with inventions of the greatest merit. It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result never attained before, it is evidence of invention. It was certainly a new and useful result to make a loom produce fifty yards a day when it never before had produced more than forty, and we think that the combination of elements

by which this was effected, even if these elements were separately known before, was invention sufficient to form the basis of a patent."

Consolidated Valve Co. v. Crosby Valve Co., (113 U. S. 157;) Magowan v. New York Belting Co., (141 U. S. 332;) Barbed Wire Patent, (143 U. S., 275;) Gandy v. Main Belting Co., (143 U. S., 587,) are all to the same effect.

In the very recent case of Topliff v. Topliff, (145 U. S., 156,) where there was a contest between two patents, with but a slight difference between them, the Court said:

"Trifling as this deviation seems to be, it renders it possible to adopt the Auger device to any side-spring wagon of ordinary construction. While the question of patentable novelty in this device is by no means free from doubt, we are inclined, in view of the extensive use to which these springs have been put by manufacturers of wagons, to resolve that doubt in favor of the patentee and sustain the patent."

We think, therefore, we are within the principle and reasoning of these cases in reversing the decree of the court below, dismissing the bill and in remanding the record, with directions to proceed in the case in conformity with this opinion.

83. WASHBURN ETC., MFG. CO. v. THE BEAT 'EM ALL BARBED WIRE CO., 143 U. S. 275, 36 L. ed. 154, 12 Sup. Ct. 450 (1891).

Brown, J.:

[Patent No. 157,124, Glidden, November 24, 1874, Improvement in Wire Fences. Three prior patents are discussed by the court, and especially the Kelly patent of February 11, 1868. The patent in suit claimed:]

"A twisted fence-wire having the transverse spur-wire D bent at its middle portion about one of the wire strands a of said fence-wire, and clamped in position and place by the other wire strand z, twisted upon its fellow, substantially as described."

[The Kelley patent consisted of small flat pieces of iron and steel cut from a plate by machinery, each provided with a hole corresponding with the size of the wire, though a little larger, so that they could be introduced easily upon the wire, either by proper machinery or by hand. These pieces after being strung on the wire at distances about six inches apart were compressed laterally upon the wire by a blow of a hammer, or otherwise, so as to flatten the hole and also correspondingly flatten the wire at the point where the barb was located. The patentee said also that he could increase the strength of the wire by laying another wire of the same or different size alongside of a thorn-wire, and could twist the two together by any suitable mechanism.

The court, in comparing the patent in suit and the Kelly patent, said:]

"In one case a flat bit of metal is used of an elongated diamond shape, through which a hole is pierced, by means of which it is strung upon the wire, requiring something more than the aid of a second wire twisted upon the first to render it immovable. In the other the barb is a piece of wire coiled about one of the fence wires, and held rigidly in place by the twisting of another wire about the first."

[The court was also impressed by the great commercial success of the Glidden device.

The court then proceeds:]

"Under such circumstances courts have not been reluctant to sustain a patent to the man who has taken the final step which has turned a failure into a success. *In the law of patents it is the last step that wins.* It may be strange that, considering the important results obtained by Kelly in his patent, it did not occur to him to substitute a coiled wire in place of the diamond shape prong, but evidently it did not; and to the man to whom it did ought not to be denied the quality of inventor. There are many instances in the reported decisions of this court where a monopoly has been sustained in favor of the last of a series of inventors, all of whom were groping to attain a certain result, which only the last one of the number seemed able to grasp. Conspicuous among these is the case of Webster Loom Co. v. Higgins, 105 U. S. 580, 591 (26: 1177, 1181), where an improvement in looms for weaving pile fabrics, consisting of such a new combination of known devices as to give to a loom the capacity of weaving fifty yards of carpet a day, when before it could only weave forty, was held to be patentable. It was said by the court, in answer to the argument that the combination was a mere aggregation of old and well known devices, that 'this argument would be sound if the combination claimed by Webster was an obvious one for attaining the advantages proposed—one which would occur to any mechanic skilled in the art. But it is plain from the evidence, and from the very fact that it was not sooner adopted and used, that it did not, for years, occur in this light to even the most skillful persons. It may have been under their very eyes, they may almost be said to have stumbled over it; but they certainly failed to see it, to estimate its value, and to bring it into notice. * * * Now that it has succeeded, it may seem very plain to any one that he could have done it as well. This is often the case with inventions of the greatest merit. It may be laid down as a general rule, though perhaps, not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result never attained before, it is evidence of invention.' "

[The cases of Consolidated S. V. Co. v. Crosby S. G. & V. Co., 113 U. S. 157, 179, 28 L. ed. 939, 946; Smith v. Goodyear D. V.

Co., 93 U. S. 486, 495, 23 L. ed. 952, 954, and Magowan v. N. Y. Belting, etc., Co., 141 U. S. 332, 343, 35 L. ed. 781, were then cited and quoted as examples in point.

The court then takes up the unpatented devices, that is the prior uses, introducing the discussion of the prior uses as follows:]

"We have now to deal with certain unpatented devices, claimed to be complete anticipations of this patent, the existence and use of which are proven only by oral testimony. In view of the unsatisfactory character of such testimony arising from the forgetfulness of witnesses, their liability to mistakes, their proneness to recollect things as the party calling them would have them recollect them, aside from the temptation to actual perjury, courts have not only imposed upon defendants the burden of proving such devices, but have required that the proof shall be clear, satisfactory, and beyond a reasonable doubt. Witnesses whose memories are prodded by the eagerness of interested parties to elicit testimony favorable to themselves are not usually to be depended upon for accurate information. The very fact, which courts as well as the public have not failed to recognize, that almost every important patent, from the cotton gin of Whitney to the one under consideration, has been attacked by the testimony of witnesses who imagined they had made similar discoveries long before the patentee had claimed to have invented his device, has tended to throw a certain amount of discredit upon all that class of evidence, and to demand that it be subjected to the closest scrutiny. Indeed, the frequency with which testimony is tortured, or fabricated outright, to build up the defense of a prior use of the thing patented, goes far to justify the popular impression that the inventor may be treated as the lawful prey of the infringer. The doctrine was laid down by this court in Coffin v. Ogden, 85 U. S., 18 Wall., 120, 124 (21: 821-823), that 'the burden of proof rests upon him,' the defendant, 'and every reasonable doubt should be resolved against him. If the thing were embryotic or inchoate; if it rested in speculation or experiment; if the process pursued for its development had failed to reach the other case there was only progress, however near that progress may have approximated to the end in view.' This case was subsequently cited with approval in Cantrell v. Wallick, 117 U. S., 689, 696 (29: 1017, 1019), and its principle has been repeatedly acted upon in the different circuits. Hitchcock v. Tremaine, 9 Blatchf., 550; Perham v. American B. O. & S. Mach. Co., 4 Fish. Pat. Cas., 468; American Bell Teleph. Co. v. People's Teleph. Co., 22 Fed. Rep., 309."

[The opinion then discusses minutely the various prior uses and the discussion is illuminating both as to the manner in which the evidence was presented and overcome, and the general tendency of

such testimony. In summing up this matter of prior use, the court said:]

"There was a vast amount of testimony of similar character tending to show the use of coiled barbs upon fence-wires, which it would serve no good purpose to discuss in detail. There was evidently prior to Glidden's application more or less experimenting in a rude way in and about Delaware county, upon the subject of barbed wires as applied to wire fences, and we think it is quite probable that coiled barbs were affixed to single wires before the Glidden application was made. We are not satisfied, however, that he was not the originator of the combination claimed by him of the coiled barb, locked and held in place by the intertwisted wire. It is possible that we are mistaken in this; that some one of these experimenters may have, in a crude way, hit upon the exact device patented by Glidden, although we are not satisfied from the testimony, whether or by whom it was done. It is quite evident, too, that all or nearly all of these experiments were subsequently abandoned. But it was Glidden, beyond question, who first published this device; put it upon record; made use of it for a practical purpose; and gave it to the public, by which it was eagerly seized upon, and spread until there is scarcely a cattle-raising district in the world in which it is not extensively employed. Under these circumstances, we think the doubts we entertained concerning the actual inventor of this device should be resolved in favor of the patentee.

The decree of the circuit court will, therefore, be reversed, and the case remanded with instructions to enter a decree for the plaintiff for an accounting, and for further proceedings in conformity with this opinion."

[Mr. Justice Field dissented, upon the ground that there was no novelty in the invention.]

84. CONSOLIDATED BRAKE-SHOE CO. v. DETROIT STEEL, ETC., CO., 59 Fed 902 (1894, C. C. E. D. Michigan, Patent No. 292,861).

Swan, District Judge, (after stating the facts) said: The single question arising upon this record is as to the patentability of the Ross railway brake shoe. The defense admits this to be the only issue, and insists that the prior state of the art and the simplicity of the device both negative the validity of the patent. The proofs taken in the cause since the granting of the injunction, by Judge Brown, afford no ground for varying the conclusions which he then reached. The drawing of the Ross shoe in the patent office was made by his attorney, and shows that the lug or rib on the inner side of the flange was not carried down to the wheel, as is done in the shoe as constructed. Ross' first application was rejected in the patent office on this, and the further ground that the extension

of the inner lug or rib to the wheel was not described in the specification, and therefore the Steel patent answered Ross' claim of invention. The error in the drawing was that of Ross' attorney. The patentee's own drawing showed the projection of the wheel. The examiner, however, was in error in the statement that the extension of the rib, C, to the tread of the wheel, was not described in this specification. This expressly states that "between the grooves in the shoe is a rib, C, which forms a portion of one side of the flanged groove, and projects down to reach that portion of the wheel not worn much by the track." Notwithstanding this error or defect in the drawing, it is plain that this explicit language not only sets forth unmistakably the inventor's idea, but also, in view of the declared purpose of the device,—to produce uniformity of wear in the surface of the wheel,—no mechanic of ordinary skill could have failed to make the device from the specifications alone. The specifications are addressed to those skilled in the kind of appliances described by the inventor. Familiar, presumably, with the state of the art and the deficiencies of the appliances in use, it would be evident to them at once that the deliberate phraseology of the specification—which, in substance at least, is the inventor's own—was rather to be followed than an inaccurate drawing, which on its face, in the state of the art, suggested its practical identity with the Steel shoe. The drawing, therefore, is entitled to no weight in disparagement of Ross' invention.

His shoe is designed and adapted to get its friction surface only from those portions of the tread of the wheel not worn by the rail, and thus to avoid increasing the rail wear upon the tread proper. The inventor evidently believed, and it is the claim of his original and amended specification, that the wear of the shoe upon the wheel would practically equal, and thus offset, that of the track upon the wheel tread proper. His specifications indicate this, for, after describing the operation of the shoe, he adds, as a result:

"Those portions of the wheel which are not worn by the rail are worn down by the shoe, and the tread is thereby kept longer in its proper shape, as, while the track is wearing down one portion, the shoe is wearing down the other, thereby effecting a large saving in the wear of the wheel itself, and also in the matter of re-turning the tires or wheels."

While there is a marked similarity, which to a casual observer amounts almost to identity, in form and use, in the Ross and Steel devices, there is a substantial difference between them, which not only determined, in the patent office, the patentability of Ross' device, but has caused the former to supersede Steel's both in Great Britain and in this country. The Stilmant and Brill patents which are pleaded in defense may be laid out of consideration altogether. There is nothing anticipatory of Ross' invention in either. The is-

sue is solely between Ross and Steel. The aim of each was to produce a brake shoe which would so operate upon the wheels of railway cars as to obviate, as much as possible, the effect of the rail wear upon the tread of the wheel, and insure its constant profile. Both accepted, as a necessity for reducing the velocity or bringing to rest the moving car, the application of the restraining power or frictional energy directly upon the face or periphery of the wheel, and relied upon the grinding down, by the application of the shoe, of those parts of the tire upon which its pressure was exerted, to equalize the frictional wear of the tread proper by the track. To accomplish this result, Steel gave his device two bearings on the wheel,—one on the outside of the tread, spanning it from its outer edge with a groove or channel which extended to the upper part of the inside of the flange, at which point he formed another groove or channel in the brake block or shoe, which engaged the rim or periphery of the flange, thereby constituting the second bearing of the shoe. Ross' shoe claims three bearings, viz.: one on the outside of the tread, one on the inside, between the tread and the flange, and the third upon the periphery of the flange. The second of these bearings affords the distinctive feature of difference between the two appliances. In Steel's specifications he states expressly that "When the brake block is brought into operation, so as to stop or retard the motion of the train, it does not act upon the part, D, D, of the tire," (that is, the face of the wheel between the outer bearings and the inside of the flange, as he delineates it in his drawing,) "which is subject to the ordinary wear and tear of rolling, but it acts upon those portions which are not so worn away,—that is to say, the portions opposite the parts B and E of the block," (which are, respectively, B, the face of the wheel outside the tread, and E, the periphery of the flange.) He adds: "Under a modification of my said invention, the brake blocks may be constructed without the longitudinal channel, A," which spans the tread proper in both the Steel and Ross shoes; "that is to say, they are made solid at that part, the channel, E, however, being maintained as shown in the drawings." He states that what he claims as his invention is, "arranging or constructing brake blocks, with or without a longitudinal hollow or channel therein, and otherwise so shaping them as to bear upon the flange and those portions of the tire which are not worn in rolling."

Under this proposed modification it is argued that no one following out Steel's instructions could help making the Ross shoe, and that Ross' change in the shoe was neither a change in the principle of the invention nor a new idea; and, further, that "the invention was whole and complete as soon as Steel had told us to make a brake shoe that should be so shaped as to wear only on those parts of the wheel not worn by rolling;" and, further, that there is no

room, after that, for anything but the ordinary knowledge of the mechanic skilled in this particular art.

It is very doubtful if Steel's specification can be extended beyond the form of brake blocks set forth in his drawing, notwithstanding his claim that they may be constructed "either with or without a longitudinal hollow or channel therein." This suggestion, and its accompaniment,—"otherwise so shaping them as to bear upon the flange and those parts of the tire which are not worn in rolling,"—does not propose the substitution of a solid block extending to the flange, for the obvious reason that such a block must act upon the tread of the tire which is worn by the rail, while his leading idea, as expressed in his specification, is to avoid such contact, and to rely upon the wear of the block on other parts of the tire. How far the solid block should extend is not stated. He suggests no mode or form of "otherwise so shaping the blocks" as to avoid this double wear, and the phrase itself is vague and indefinite, conveying to those skilled in the art no idea of the form of the alternative. His invention should be limited to the device described in his specification. He could not close the field of invention to others by "an all-embracing claim, calculated, by its wide generalization and ambiguous language, to discourage further invention in the same department of industry." Carlton v. Bokee, 17 Wall. 472. Nor was the invention complete when Steel proposed to shape the brake block so as to wear only upon those parts of the wheel not worn by rolling. If the idea of such a construction must be credited to him, he failed to exemplify it so as to insure its object,—the even wear of the tire, and the avoidance of the cost of re-turning them. He evidently had no thought of the bearing upon the face of the wheel next to the flange, and made no provision for reducing its surface at that point to meet the wear of the tread, and thus preserve the normal contour of the wheel. Experience has also demonstrated, as shown by the testimony, that the necessary effect of the Steel shoe is to produce a ridge or shoulder on the inner face and in the throat of the flange. Without quoting at length from the testimony, it is enough to say that the Steel shoe has failed to meet the need of the railroads, both in this country and Great Britain, and has been discarded as impracticable, indeed detrimental, if not dangerous. Starting with the same idea of applying the resistance to the parts of a tire not worn by the track, and after a long practical experience with the ordinary flat shoe and a practical test with the Steel shoe, Ross, in August, 1883, eight years after Steel's patent had been granted, formulated his conception in the device here in issue. It has been adopted on nearly three-fourths of the railroads in the United States, and is also in use in Great Britain. Ross was master mechanic of the New York, Lake Erie & Western Railroad Company at Buffalo from February, 1881, until April, 1885,

and as such had charge of all the repairs made on the locomotives of that company at its Buffalo shops. In August, 1882, his attention was called to the excessive wear of the tires of the rear drivers of a locomotive of the Mogul type by the action of the brake shoe with which it was equipped, which necessitated re-turning of the tires about every four months. He then suggested to Mr. Wilder, the superintendent of motive power, the use of a brake shoe which should have its friction surface only upon the outside of the tread and the periphery of the flange. Wilder objected that the proposed change would simply transfer the objectionable wear to the flange of the wheel, and possibly destroy it. In July, 1883, after the tires of this engine had been three times re-turned, he again mentioned to Wilder the rapid destruction of the tire, and consequent injury to the machinery, attributable to the shoe used, and, with Wilder's permission, made and applied substantially the Steel brake shoe. This he tested by use for about a month, but found that it produced a ridge or shoulder upon the flange, and also upon the outside of the tread. By continued experiments and close study of the subject he realized the necessity of a third bearing upon the inside of the tread and the throat of the flange, and this he obtained by extending a lug or projection bearing both upon the wheel and the top and inside of the flange. This obviated the ridge formed in the throat of the flange by the brake shoe then in use, and, preserving the groove of that part of the shoe fitting the flange, he practically equalized the friction surface of the shoe on the flange and the inside of the tread with that on the outer part of the tread, and thus secured the equal wear of those parts. He constructed and put in experimental use on the same locomotive a shoe of this pattern—the present Ross brake shoe—in August, 1883, and it remained in successful operation until he resigned his position on the New York, Lake Erie & Western Railroad, April 1, 1885. Ross' letters patent bear date February 5, 1884. From October, 1884, until April, 1887, there were sold by the licensees under it 462,110 lbs. of the Ross brake shoe, and since the last date, and during the years 1887, 1888, and 1890, the licensees have sold 11,727,542 lbs. of those shoes, making the total sale since September, 1884, to and including the year 1891, 12,189,652 lbs. The proofs show that 164 of the railroads of the United States made purchases of the Ross shoe in 1890 to a greater or less extent. With the exception of the Chicago, Burlington & Quincy Railroad, which has assumed the defense in this suit, the railroads of this country have acquiesced in the validity of the Ross patent. This shoe has become the standard brake shoe for locomotive driving wheels upon the Pennsylvania Railroad and its leased lines, and is mainly, if not exclusively, used on the Old Colony Road, the Boston & Albany Railroad, the Pittsburgh Railroad, and many of the eastern trunk lines, and also upon the

smaller roads of the Union. Seventy-five per cent. of the 30,000 locomotives in this country are equipped with it. The statistics of railroads for 1890 compiled by the interstate commerce commission give the number of general officers of railroads of the United States, in 1889, at 47,039; engineers, 30,217; machinists, 25,214; and other shopmen at 75,959; and the total number of all their employes at 704,743. These figures are, of course, considerably larger than those of previous years, as each successive year exhibits an extension of railway mileage, and consequently a corresponding ratio of increase in the number of employes. Excluding from consideration the total number of railway employes, and assuming that the general officers, as practical men, have studied the problems incident to the maintenance of railroad equipment, and that the engine men, machinists, and other shopmen are mechanics of average skill, and familiar with the rolling stock, its usage, wear, the cost and frequency of its repair, and the causes thereof, it is remarkable that, during the 40 years and more in which the expense of re-turning tires has been so large a factor in the maintenance of the equipment, and "sharp-flanges" and defective wheels have caused so many accidents, no one, in these armies of mechanics and experts, has discovered a preventive, or suggested an improvement on known appliances, until Ross had remedied their defects. Conceding that Steel's idea that the brake shoe should be made to bear only on the parts of the tire not worn by the rail is exemplified in the Ross shoe, whether this suggestion be styled a "principle" or an "idea," it was a mere abstraction and unpatentable: not a complete device or machine. Leroy v. Tatham, 22 How. 132; Burr v. Duryee, 1 Wall. 531; Fuller v. Yentzer, 94 U. S. 288.

Long before Bell patented the telephone it was the general belief of scientists that speech could be transmitted by electricity if the requisite electrical effect could be produced. Bell discovered and perfected the apparatus and the process by which this could be done; and, although the previous labors of Reis in the same field had brought him almost to the point of success, he failed to reach his goal. Over 20 years before Bell's invention an eminent scientist had said, in reference to the mode of transmitting speech by electricity: "Reproduce precisely these vibrations," to wit, the vibrations made by the human voice in uttering syllables, "and you will produce precisely the syllables;" yet Bourseul neither claimed nor invented the telephone. Like Bourseul, Steel told what to do, but not how to do it. His conception of counteracting the rail wear by the shoe friction was meritorious, but not inventive. Its crude expression in his brake block not only failed to meet its purpose, but added to the defects caused by the rail wear equally prolific sources of danger in the "sharp flange," and the failure to equalize the friction area of the shoe upon the flange with that on the

tread. These defects not only caused its supersedure by the Ross shoe, but condemned its usefulness and safety. Ross' device, though but slightly varied in form from that of Steel's, has not only demonstrated its utility in years of use by prolonging the life of the tire, and obviating the great expense of frequent re-turning and the loss of use of the locomotive during such repairs, but has promoted the safety of railway travel by conserving the efficiency and contour of the wheel. Now that 10 years of successful use have established its merits, and since it has practically supplanted all others, and has been accepted in Great Britain, the home of the Steel patent, and after the skill of the mechanics and railway employes of both countries had been challenged in vain for eight years by the defects of the Steel shoe to the need of an effective device, it is too late either to refer the merits of this appliance to the suggestions of its imperfect predecessor, or to declare it merely the work of a mechanic of ordinary skill. Without essaying to define the line between the skill of the mechanic and the ingenuity of the inventor, it may be safely affirmed that one who perfects a device of confessed utility, which satisfactorily supplies a long-existing and imperative need of any branch of industry, and which excels in operation and results other existing appliances, superseding them at home and abroad, and by its structure overcoming difficulties and objections which have for years baffled the ingenuity of his fellow craftsmen the world over, including Steel himself, for whose conceptions so much breadth is claimed, has proved beyond cavil that average mechanical skill was not equal to what he has accomplished. His success is his individual achievement, the product of his inventive faculty, not merely that of his training or vocation. The merit and originality of his device is not to be determined by the application of a measure to its parts, or the extent of the difference of form between it and a contrivance which fails to answer the same purpose, when that difference, as in this case, not only produces a desired local effect, but insures the proper operation of the entire device. The lug or projection in Ross' shoe bearing upon the wheel upon the flange and the inner side of the tread performs a double function. It preserves the normal shape of that part of the wheel and flange, and aids to equalize the friction surface of the shoe on each side of the tread. It also prevents the lateral vibration of the shoe. It is essential to the success of the device, and is lacking in the Steel brake block, which has no compensating feature. The difference between these contrasted devices is therefore not merely in form, but in their mechanical and economic results. This test, and the considerations above adverted to, establish the originality of Ross' shoe, and sustain its patentability.

Examples of patented inventions which have been upheld by the courts, although they differed very little in form, mechanism, or

operation from other appliances, are numerous. Krementz v. S. Cottle Co., 148 U. S. 556, 13 Sup. Ct. 719; Loom Co. v. Higgins, 105 U. S. 580; Consolidated Safety-Valve Co. v. Crosby Steam Gauge & Valve Co., 113 U. S. 157, 5 Sup. Ct. 513; Magowan v. Packing Co., 141 U. S. 332, 12 Sup. Ct. 71; The Barbed Wire Patent, 143 U. S. 275, 12 Sup. Ct. 443, 450; Gandy v. Belting Co., 143 U. S. 587-594, 12 Sup. Ct. 598; Topliff v. Topliff, 145 U. S. 156-163, 12 Sup. Ct. 825.

For the reasons given, and those mentioned by Mr. Justice Brown in awarding the injunction in this cause, there must be a decree for complainants, with a reference to a master to ascertain damages; and the injunction is made perpetual.

85. BRUNSWICK v. KLUMPP, 131 Fed. 255, 65 C. C. A. 447 (1904, Second Circuit).

Before Lacombe, Townsend and Coxe, Circuit Judges:

Lacombe, Circuit Judge. The suit was brought upon letters patent No. 599,447, granted February 22, 1898, to complainant, as assignee of Emil Reisky, for "improvement in bowling apparatus." It was heard upon pleadings and proofs, and the bill dismissed for lack of patentable invention. Appeal was taken to this court, and decree was reversed. Our opinion is reported in 111 Fed. 904, 50 C. C. A. 61. It sufficiently sets forth the specifications and the claim in controversy. We concurred with the judge who heard the cause in the conclusion that the "improvement" was one which should have been obvious to an ordinary skilled mechanic, but were constrained by the testimony to hold that there was patentable invention. That testimony is set forth in the opinion. It showed that the desirability of retarding the ball as it neared the home terminal of the returnway had been appreciated for many years; that many different devices to secure that result had been suggested, but that apparently no one of those who sought to secure the result had adopted the seemingly obvious one of making the ball reach the home terminal on an up grade. Had any such method been disclosed in the earlier art, the original decision would have been affirmed. It now appears that, apprehending proof of such a structure antedating the patent, the patentee has filed a disclaimer which recites that in the prior art there were ball returnways with "an upgrade near the player's end, merging into the terminal," and disclaims such part of the claim "as would include a returnway by which the homing of the ball was not accelerated." The bill presents the disclaimer as well as the patent, and, with the concession that in the prior art the returning ball had been retarded by an up grade, the case may properly be disposed of on demurrer; and, for the reasons set forth in our former opinion, we have reached the conclusion that the patent discloses no patent-

able invention, except possibly as to minor details of construction, which are subject of other claims, not here in controversy.

The decree is affirmed, with costs.

86. NATIONAL CASH-REGISTER CO. v. BOSTON CASH INDICATOR, ETC., CO., 156 U. S. 502, 39 L. ed. 511 (1895, Patent No. 271,363).

* * * This was a bill in equity for the infringement of letters patent No. 271,363, issued January 30, 1883, to James Ritty and John Birch for a "cash register and indicator." * * *

The only claim alleged to have been infringed is the first, which reads as follows:

"(1) In a registering and indicating machine, the combination, with a series of indicating tablets operated by a series of keys, of a series of rods, each provided with a detent or shoulder, and carrying one of the aforesaid tablets, and a supporting wing with connecting mechanism, whereby, upon operating any one of the keys, the wing is so moved as to permit the passage of the rod, and whereby, upon the release of the keys, the wing engages with and holds up the tablet rod and tablet, substantially as described." * * *

Mr. Justice Brown, after stating the facts in the foregoing language, delivered the opinion of the court.

In the past 15 years cash registers have become extensively used in retail shops, where each sale is small in amount, such as drug stores, cigar stands, restaurants, and other small establishments, for the purpose of affording a convenient deposit for the cash received, and of preserving a record of every sale made during each day, and of the amount received therefor. The correspondence between the amount indicated by the register and the amount in the drawer shows whether each sale has been properly accounted for. It thus enables the proprietor to ascertain at the close of each day's business the amount of sales, and also operates as a check upon the dishonesty of clerks, who are held accountable for the amount of money indicated by the register.

To fulfill all its requirements, the cash register and indicator should perform the following functions:

(1) It should register the number of sales. This is done upon somewhat the same principle as a steam engine records its own revolutions.

(2) It should also register the amount of each sale, and to this end it is provided with a series of keys, representing different amounts, from five cents to five dollars, by the pressure of which keys a corresponding amount is registered, and added to the previous aggregate of small amounts upon a revolving cylinder.

(3) It should also indicate to the customer the proper amount of his purchase by exposing a tablet containing such amount in large figures, which tablet should remain in sight until the next sale

is made. If the amount of such sale is a dollar, and a fraction of another dollar, two such tablets are exposed, the aggregate of which represents the proper amount. It is necessary in each case that the tablet should remain exposed until another key is touched, when it ought to disappear, that the next customer may recognize the amount of his purchase. The customer is thus made to a certain extent an involuntary detective of the action of the clerk making the sale.

(4) The pressure upon the key should also ring a bell, to call the attention of the customer to the exposed indicator or tablet.

(5) The pressure of the key is also intended to unlock, and, by the aid of a spring, to throw open, the money drawer, which should be shoved back and closed after each sale is made.

(6) In some machines a record is made of the number of times the lid is opened, that the proprietor may know whether the box has been tampered with.

If the mechanism does its work properly, it should operate as a complete check upon any attempt at embezzlement, by the salesman, of the funds. * * *

To sum up the state of the art, then, at the date of the Ritty and Birch patent: The use of keys to raise vertical rods carrying tablets was not only well known, but lies at the foundation of every cash register to which our attention has been called. It was also old to use a pivoted wing or bar to catch a projection or elbow of the vertical rod, for the purpose of holding the tablet exposed to view until another tablet was raised. So, too, the use of a sliding bar actuated in one direction by a spring, and in the other by a projection from the vertical rod or its tablet, was a recognized equivalent of the pivoted wing. And, finally, a connecting mechanism, operated by each one of the keys by means of a bar over or underneath them, had been previously used for ringing the bell, opening the cash drawer, and in other machines for other purposes.

What, then, was the contribution of this patent to the art? It was found that not only must the machine be constructed with extreme and almost impossible accuracy in order to operate as desired, relying on the shoulders alone to move the wing, but that when the machine was put to use, some of the keys would be used much oftener than others, and the shoulders on the tablet rods belonging to these keys would become worn so that, when one of these keys was operated immediately after one that was less frequently used, the shoulder on its rod would not move the wing back far enough to release the tablet rod of the infrequently used key, which was resting on the wing. So, too, any accumulation of dust, dirt, or oil upon the projections or bar would render their operation uncertain. The consequence was that two tablets might be in view of the customer at the same time. This not only failed to indicate to the

customer the amount of his purchase, but afforded to the salesman an opportunity of deceiving the proprietor as to the actual amount of his sales. Indeed, it requires no expert to see that where all the rods are constructed alike, and the fall of one rod is made to depend exclusively upon the elevation of another, the mechanism would soon become so worn as to be inoperative. To obviate this, Ritty and Birch subdivided the power exerted by the keys in the operation of the pivoted wing, and caused such wing to be put in motion, not only by the elbow of the rod, but by the simultaneous, though wholly independent, action of a bell-crank lever, which receives its impulse from the bar beneath the keys, and, with its other arm, shoves back the upper side of the wing far enough to permit the tablet to fall and resume its original position in time to suffer the wing to fall back and catch the elbow of the last tablet rod, and hold it up. It is insisted, however, that, as the connecting mechanism had been previously used upon the other side of the machine to ring the bell and to open the cash drawer, the employment of a similar mechanism for actuating the pivoted wing was a case of mere double use, and, if patentable at all, must be restricted to the exact device used, and cannot be construed to cover a similar train of mechanism for moving the sliding bar.

It did, however, require thought to conceive the idea (1) that a remedy for the existing defects in the machine lay in the independent operation of the wing; and (2) that such operation could be secured by a mechanical connection with the keys. Given these conceptions, it was more a matter of mechanical skill than of invention to devise such connection, since a similar train of mechanism had been operated by the keys for other purposes. It is insisted, however, that inasmuch as such mechanical connection was well known before, and had been used for analogous purposes, it is a mere case of double use to employ a similar contrivance to actuate the wing. While the use was to a certain extent an analogous one, and the mechanism was probably suggested by that employed to ring the bell, there was nothing to suggest that the object to be attained, viz.: the more perfect action of the tablet rods, could be accomplished by subdividing the force exerted by the keys, and bringing a portion of their power to bear directly upon the wing itself, instead of devoting the whole of such power to the act of raising the rods, and depending solely upon the elbows of the rods to operate the wing. There is no conflict here with the principle laid down by this court in Knapp v. Morss, 150 U. S. 221, 227, 14 Sup. Ct. 81, and Wollensak v. Sargent, 151 U. S. 227, 14 Sup. Ct. 291, that the end or purpose sought to be accomplished by a device is not the subject of a patent, but only the new and useful means for obtaining that end, since the end or purpose to be accomplished in this case was not the moving of the wing, but the more perfect

operation of the rods; and the means used to accomplish it was a subdivision of the power exerted by the keys, and the application of a portion of it directly to the wing itself. The fallacy of defendant's argument in this connection lies in the assumption that the object to be accomplished was the moving of the wing, whereas this was only a means for the ultimate purpose, viz., the more satisfactory operation of the rods. Indeed, this use of the connecting mechanism can hardly be termed analogous to such as similar mechanisms had been previously used for; but, even if it were, the results are so important, and the ingenuity displayed to bring them about is such, that we are not disposed to deny the patentees the merit of invention. The combination described in the first claim was clearly new.

The cases cited by defendant upon the subject of double use are not applicable; such, for instance, as Brown v. Piper, 91 U. S. 37, in which a claim for preserving fish and other articles in a closed chamber, by means of a freezing mixture, was held to have been anticipated by a similar patent for preserving bodies, and also by the ordinary ice-cream freezer; Pennsylvania R. Co. v. Locomotive Truck Co., 110 U. S. 490, 4 Sup. Ct. 220, in which a patent for employing a certain truck for locomotive engines was held to be invalid, in view of the employment of a similar truck for railroad cars; Aron v. Railroad Co., 132 U. S. 84, 10 Sup. Ct. 24, wherein a patent for simultaneously opening two gates at the end of two adjoining passenger coaches was held invalid in view of previous patents for opening a single gate, and devices to open and close apertures at a distance from the operator; Wollensak v. Sargent, 151 U. S. 221, 14 Sup. Ct. 291, wherein a patent for opening and closing a transom over a door by means of a vertical rod was held to have been anticipated by a patent for opening and closing a series of passenger car ventilators or transoms by a horizontal rod; Blake v. City and County of San Francisco, 113 U. S. 679, 5 Sup. Ct. 692, wherein the adaptation of an automatic valve, previously known and in use to a steam fire engine, was held not to involve invention; and St. Germain v. Brunswick, 135 U. S. 227, 10 Sup. Ct. 822, wherein a revolving rack for billiard cues was held to be anticipated by such revolving contrivances as dining tables and bottle castors. In all these cases the prior uses were such obviously analogous ones that there could be no doubt of the invalidity of the patent.

In the defendant's machine the sliding bar of the Campbell and Pottin patents is substituted for the pivoted wing of the Russell and the Ritty and Birch patents, but as before observed, they were well-known equivalents for each other, and the mechanism by which they had theretofore been operated was also well known. They were apparently subject to certain defects in their operation, which impaired their efficiency, and required the use of an independent

means to secure the release of the first rod before the second one was raised into place. Whether this were done by the simultaneous action of the elbow of the rod and that of the connecting mechanism upon the wing, as in the Ritty and Birch patent, or by the prior action of such mechanism, as in defendant's device, is immaterial, so long as such action is independent of the action of the rods themselves. We have already stated how this was accomplished by the Ritty and Birch patent. Defendant also employed a universal bar operated by each key, corresponding with the bar, K, of plaintiff's patent, but located above the keys instead of beneath them, and back of the shaft upon which the keys are pivoted instead of in front of it. The operation of the keys is therefore to raise this bar instead of depressing it. A rod projecting from the end of this bar engages with the arm of a bell-crank lever, the other arm of which is so connected with an arm of the sliding bar projecting downwards that the depression of the key moves the bar to one side far enough to release the tablet rod already raised before the lug on the second or rising rod has passed the sliding bar. When the second rod has risen to its full height, the sliding bar is released from the action of the bell-crank lever, and is drawn back to its place by a spring, in time to hold the second rod up by a lug on the bar, corresponding to the lug on the rod. The operation of the two devices is the same, except that in the Ritty and Birch patent the action of the connecting mechanism in pushing back the pivoted wing is simultaneous with, and to a certain extent aided by, the elbow of the rod, while in defendant's device the action of the connecting mechanism in moving the bar is exclusive of any assistance from the rod. But, as already observed, this simultaneous action is a wholly immaterial feature of the Ritty and Birch patent. While the details of the defendant's machine are quite different from that of the plaintiff, the underlying principle of releasing the first tablet before, or simultaneously with, the elevation of the second tablet by the aid of an independent train of mechanism put in motion by the depression of the key, is precisely the same. This principle being already known, the contrivance of a connecting mechanism which should operate to move a sliding bar, as the pivoted wing of the Ritty and Birch patent was moved, was a comparatively easy matter, though, perhaps, involving invention to a limited degree. In a word, there were two known methods of accomplishing the same result,—a pivoted wing and a sliding bar. Ritty and Birch invented a train of mechanism to operate the pivoted wing; defendant adopted a similar method to operate a sliding bar. Had defendant also invented a sliding bar, and applied this mechanism to it, the case would have fallen within our ruling in Aron v. Railroad Co., as the adoption of a different means of accomplishing the same result. But