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## INSTRUMENTATION SYSTEMS CENTER

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JUN 11 1974

June 7, 1974

Mr. Gersten Sadowsky  
Patent Attorney  
Div. of Procurement and Patents  
U. S. Dept. of Interior  
Interior Bldg.  
Washington, D. C. 20240

Reference: Invention - Magnetic Ore Separator by R. W. Boom, Y. M. Eyssa  
and J. Sutton, Contract No. Grant 00112149  
Interior Case No. MIN-2195

Dear Mr. Sadowsky:

In regard to the interfering patents by Bannister 3503504 and Aubrey 3608718 mentioned in your letter of February 5, 1974, we have the following comments. The critical date for filing this patent is September 25, 1974, one year after the date at which the written thesis was filed with the Graduate School and the Library at the University of Wisconsin. The date of the oral examination in June could not constitute publication since the written thesis was not available at that time. That oral examination included only the four or five members of the examining committee.

The Aubrey patent discusses the separation of a slurry by means of a deflection of magnetic particles in a quadrupole field in conjunction with additional wash water. Our separator does not require wash water as does the Aubrey patent. The principal of our separation device is that the magnetic force operates in one direction and gravity or another similar force operates in the other direction. We thus require two forces opposing each other with the magnetic force supplied by a magnetic field configuration. The Aubrey patent is not based on this two opposing force principal. Our advantages over the Aubrey patent include the following:

1. The volume of separation per conductor volume or conductor cost is larger. This means that we have made more economical use of the conductor to form a magnet.
2. We get higher fields and higher field gradients both of which make the deflection process better.
3. Our particles do not stick to a surface. This eliminates trapping of nonmagnetic particles.

We understand that the reason the Aubrey development work was dropped is the excessive sliming of surfaces in the separator. Our device with the turbulent flow keeps the surfaces of the separator clean and therefore will

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not suffer from the same problem. The Screen or baffles shown in our Fig. 2 of the patent report is not necessary. These screens may be included or ignored in your patent application. The successful demonstration of our model was accomplished without screens or baffles. However, in the future one could imagine that these stainless steel screens with the mesh size larger than the particle size might be still advantageous and should therefore be claimed or included as additional background.

Regarding the second patent item by Bannister we see no resemblance between his patent and ours. His design consists of an array of small solenoids on small parallel plates quite dissimilar to our single wire magnet. In operation it sticks magnetic particles to a surface and then washes them off later quite similar to the MIT process which of course is quite different from our continuous flow separator. Finally, both the field and the field gradients at the top of the solenoid are smaller than at the edge of a straight wire such as we have in our separator.

In conclusion we feel that the configuration of our magnet is patentable. One of the advantages is the turbulent motion which cleans internal surfaces. Another advantage is the economical high field and high field gradient we achieve by separating near the surface of the wire. Although we mentioned the cryogenic and superconducting magnet advantages we make no particular claims regarding these cryogenic magnets. A field formed by any means as described in our invention should be satisfactory, whether it is superconducting or not.

Let me apologize for not replying to your letter of February 5th sooner. Via all the phone calls we have had concerning this patent and rights to this patent, I apparently overlooked a formal answer to the questions you brought up Feb. 5th. However, if we can in fact file this patent up until September 25th then I hope this information will have reached you in time.

We enclose a sketch from one of our more recent quarterly reports of the centrifugal magnetic separator. Here again the principal of two forces is followed, the magnetic force attracts magnetic particles toward the wire, the centrifugal forces push nonmagnetic particles toward the outer perimeter. Note that the separation is achieved by a simple divider in the exit channel. There is no screen or mesh separator used in this device.

Sincerely yours,



R. W. Boom  
Professor, Metallurgical Engineering

Encl. 1

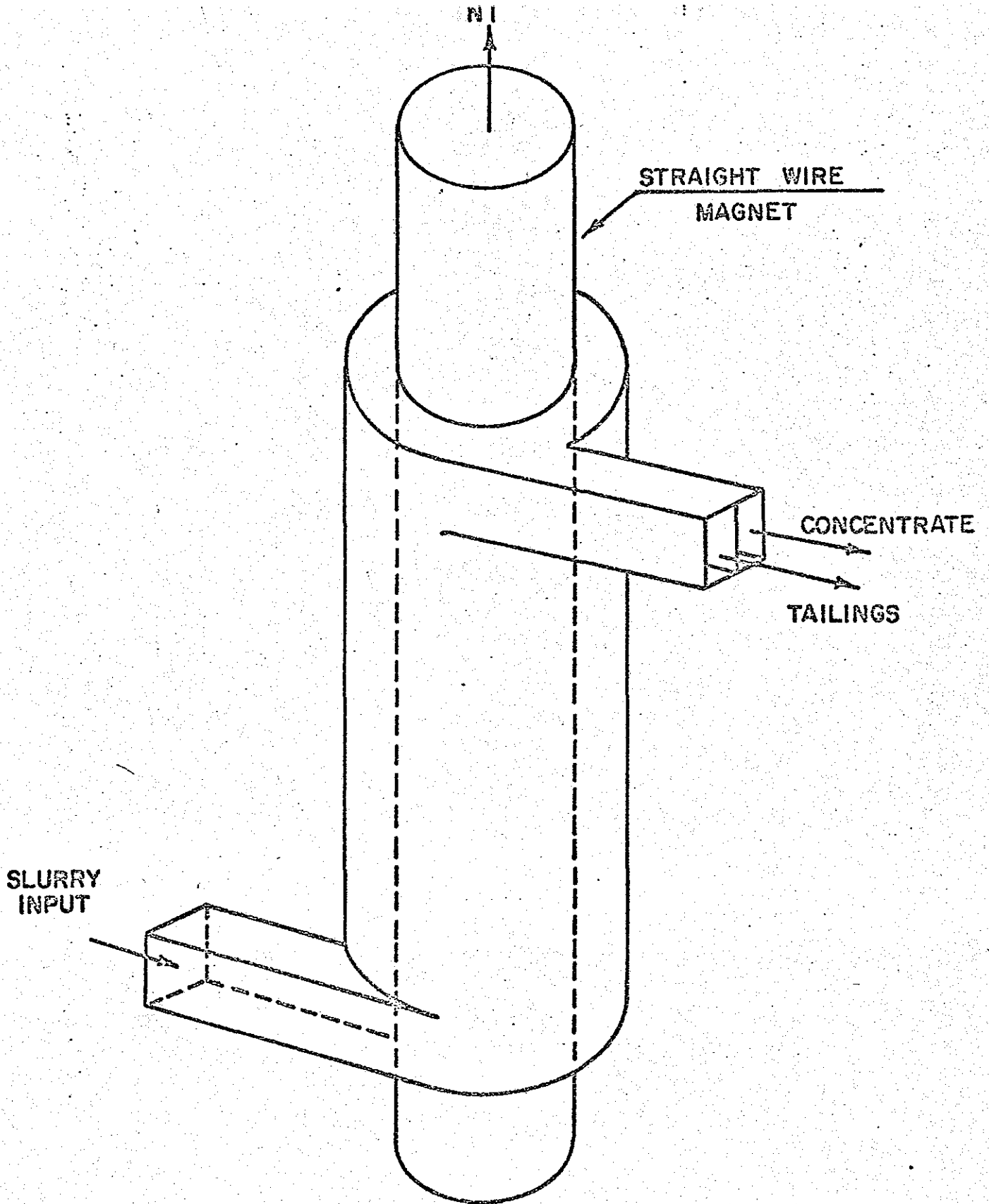


FIG. 13 THE CENTRIFUGAL MAGNETIC SEPARATOR