(No Model.)

F. E. FISHER.

MECHANISM FOR EXTRACTING STEEL AND IRON FRAGMENTS FROM GRAIN.

No. 336,402. Patented Feb. 16, 1886.

Fig. 1.

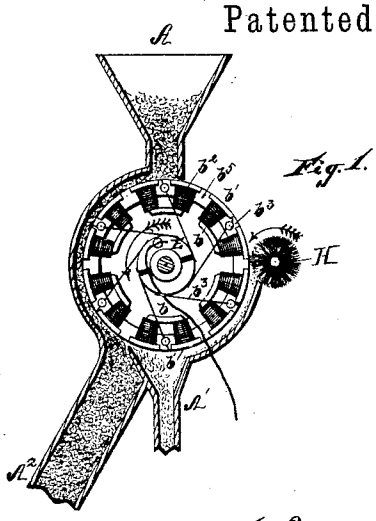


Fig. 2.

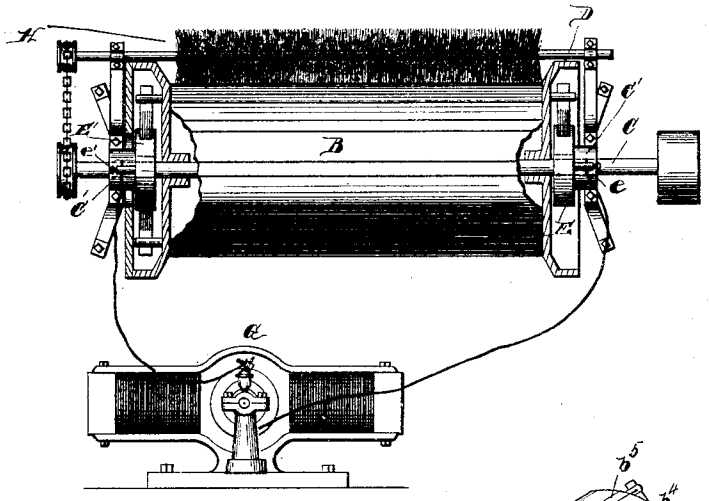
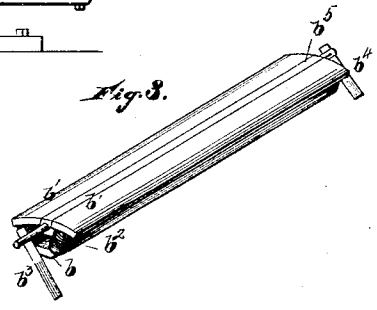


Fig. 3.



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FRANK E. FISHER, OF DETROIT, MICHIGAN.

MECHANISM FOR EXTRACTING STEEL AND IRON FRAGMENTS FROM GRAIN.

SPECIFICATION forming part of Letters Patent No. 336,402, dated February 16, 1886.

Application filed June 30, 1885. Serial No. 170,290. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. FISHER, of Detroit, county of Wayne, State of Michigan, have invented a new and useful Improvement in Mechanism for Extracting Steel and Iron Fragments from Grain, &c.; and I declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form a part of this specification.

My invention consists of the combinations of devices and appliances hereinafter specified, and more particularly pointed out in the claims.

In the drawings, Figure 1 is a vertical sectional view of the apparatus embodying my invention. Fig. 2 is a plan view of the electric apparatus shown in section in Fig. 1. Fig. 3 is a separate view of one of the magnets.

The object of my invention is to produce an apparatus for extracting particles of steel or iron from grain, or from cinders, or from any other mass which may carry them in suspension. Self-binders upon harvesting-machines where the binding material is iron or steel are quite common, and in bundles of this character it not infrequently happens, in passing through a thrashing-machine, that particles of the wire are severed and pass through with the grain into the seed-box, and are not separated from the grain, but are eventually fed forward in a mill to the millstone, and this results either in great injury to the millstone or in pulverizing the metal and incorporating it with the resulting flour. So, also, about machine-shops, foundries, &c., and in the cinder and ash piles common about such works, large quantities of iron or steel filings, borings, scrap, &c., are thus lost.

It is the purpose of this invention to gather these particles of the iron or steel, either for the purpose of cleansing the grain or other material of these foreign matters or for the purpose of recovering the same as a measure of economy.

We will suppose this apparatus (represented in the drawings) to be employed in connection with a grain-chute in a mill, and will now proceed to describe the same.

A represents a hopper, A^2 a grain-spout, and A′ a chute for receiving the iron or steel particles, as hereinafter explained.

B is an electrical machine, consisting of a cylinder so constructed that its exterior surface shall be composed of magnet-poles. These are composed, preferably, of soft iron, and are in the nature of electro-magnets, each made substantially as shown in Figs. 1 and 3, in which *b* is the loop, and *b′* the extremities or poles, the arms of the magnets being wound from end to end, as shown at b^2. One extremity of the winding wire is connected with a brush or equivalent, b^3, while the other end of the wire is connected at the other end of the magnet with the brush or equivalent b^4, the space between the poles *b′* being filled either with an insulator or with diamagnetic metal, b^5. The magnets are arranged in annular order about the shaft C, as shown in Fig. 1, and are secured rigidly to disks or heads D, so as to revolve freely with the shaft. The magnets have broad faces, and extend longitudinally the full length of the cylinder and parallel to the shaft C, thereby providing a large magnetic surface and rendering the apparatus much more effective in operation than where the magnets extend obliquely or around the cylinder.

C′ represents the boxing of the journal-bearings. To one of these journal-bearings is secured the stationary ring E. This ring is unbroken, and the binding-post *e* forms a means for connecting it with the dynamo G. Upon this ring E traverse the brushes b^4 as the cylinder B revolves, and so maintain a constant connection with the dynamo. At the other end of the machine is a similar ring, E′, except that this ring is divided, as shown in Fig. 1, one of the divisions only being connected by its binding-post *e′* with the other pole of the dynamo. The brushes b^3 traverse on the periphery of this divided ring.

The operation of this part of the device will now be understood. As the cylinder B revolves in the direction of the arrow shown in Fig. 1, the current from the dynamo passes through all those brushes b^3 which are in contact with the upper half of the divided ring E. Thence the current is conducted through the coils on the corresponding magnets, and off through the brushes b^4 and the ring E back

to the dynamo. This converts each of the corresponding magnets into electro-magnets, and in this condition they attract to the outer surface all particles of steel or iron contained in the grain or other materials that are passing through the hopper. These particles adhere to the magnets so long as they remain magnets. It will be observed, however, by examining Fig. 1, that as soon as any magnet has revolved into its lowest position, opposite the conduit A′, its brush will ride off from that portion of the divided ring which is the binding-post onto that portion of the ring which is disconnected from the dynamo. This breaks connection with the dynamo, the current through the corresponding coil ceases, and instantaneous demagnetization is the result, causing the magnet to release its hold, dropping the particles of iron or steel into the chute A′. It is possible, however, that the demagnetization may not be complete and some particles might still adhere to the poles. I therefore provide a brush, H, which serves to brush off any such adhering particles and cause them to pass back through the chute or off to any other suitable channel.

The dynamo may be run by any suitable power, and the same of the cylinder B.

I am aware that magnets have been employed for gathering and extracting particles of iron and steel from grain and other chutes. This contrivance, however, possesses the advantage that it is self-cleaning, and therefore is continuous in its operation, and does not require that the apparatus be removed or that its load of débris be taken away by hand. It is therefore specially well adapted for grinding-mills, and also for machine-shops, where carelessness in cleaning other forms of devices might result in overloading an ordinary permanent magnet, and so permit iron or steel particles to pass it.

By delivering the material to the magnetic cylinder from a hopper above the same, in contradistinction to delivering the material beneath the cylinder by an apron, the metal particles will gravitate within the action of the magnets, instead of away therefrom.

What I claim is—

1. The combination of a revolving magnetic cylinder composed of magnets extending longitudinally the full length of the cylinder, a dynamo for producing a current through the helices of the magnets, and means, substantially as described, for successively breaking the circuit of the magnets, with a hopper located above and extending partially around the magnetic cylinder, as and for the purposes set forth.

2. The combination of a revolving magnetic cylinder composed of magnets extending longitudinally the full length of the cylinder, and arranged parallel to and annularly around the shaft of the cylinder, a dynamo for producing a current through the helices of the magnets, and means, substantially as described, for successively breaking the circuit of the magnets, with a hopper located above and extending partially around the magnetic cylinder, as and for the purposes set forth.

3. The combination of the hopper A, the spout A^2, and the chute A′ with the magnetic cylinder located between the hopper and chute and partially surrounded by the hopper, and composed of magnets extending longitudinally the length of the cylinder, a dynamo for producing a current through the helices of the magnets, and means, substantially as described, for successively breaking the circuit of the magnets as they pass over the chute, as and for the purposes described.

4. The combination of a magnetic cylinder comprising electro-magnets composed of the loops *b*, poles *b′*, and insulators or diamagnetic metal b^5, with the arms wound from end to end, a dynamo for producing a current through the helices of the magnets, a hopper located above and partially surrounding the cylinder, a spout and a chute below the cylinder, and means, substantially as described, for successively breaking the circuit of the magnets as they pass over the chute, as and for the purposes described.

5. The combination of a magnetic cylinder comprising electro-magnets extending the full length of the cylinder, and composed of loops *b*, poles *b′*, and insulator or diamagnetic metal b^5, a dynamo for producing a current through the helices of the magnets, and means, substantially as described, for intermittently breaking the circuit of the magnets, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

FRANK E. FISHER.

Witnesses:

M. B. O'DOGHERTY,

SAMUEL E. THOMAS.