July 1, 1930. H. H. MOYER 1,769,268

MAGNETIC SEPARATOR FOR SPOUTS

Filed Sept. 8, 1927

Fig. 1.

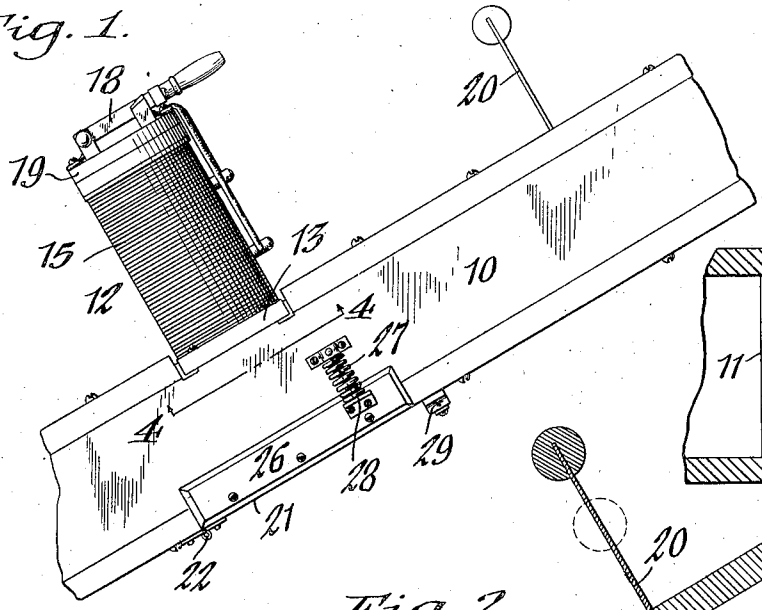


Fig. 4.

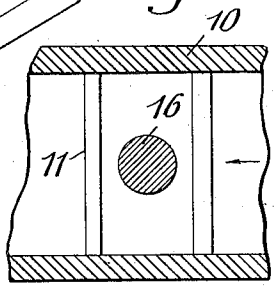


Fig. 2.

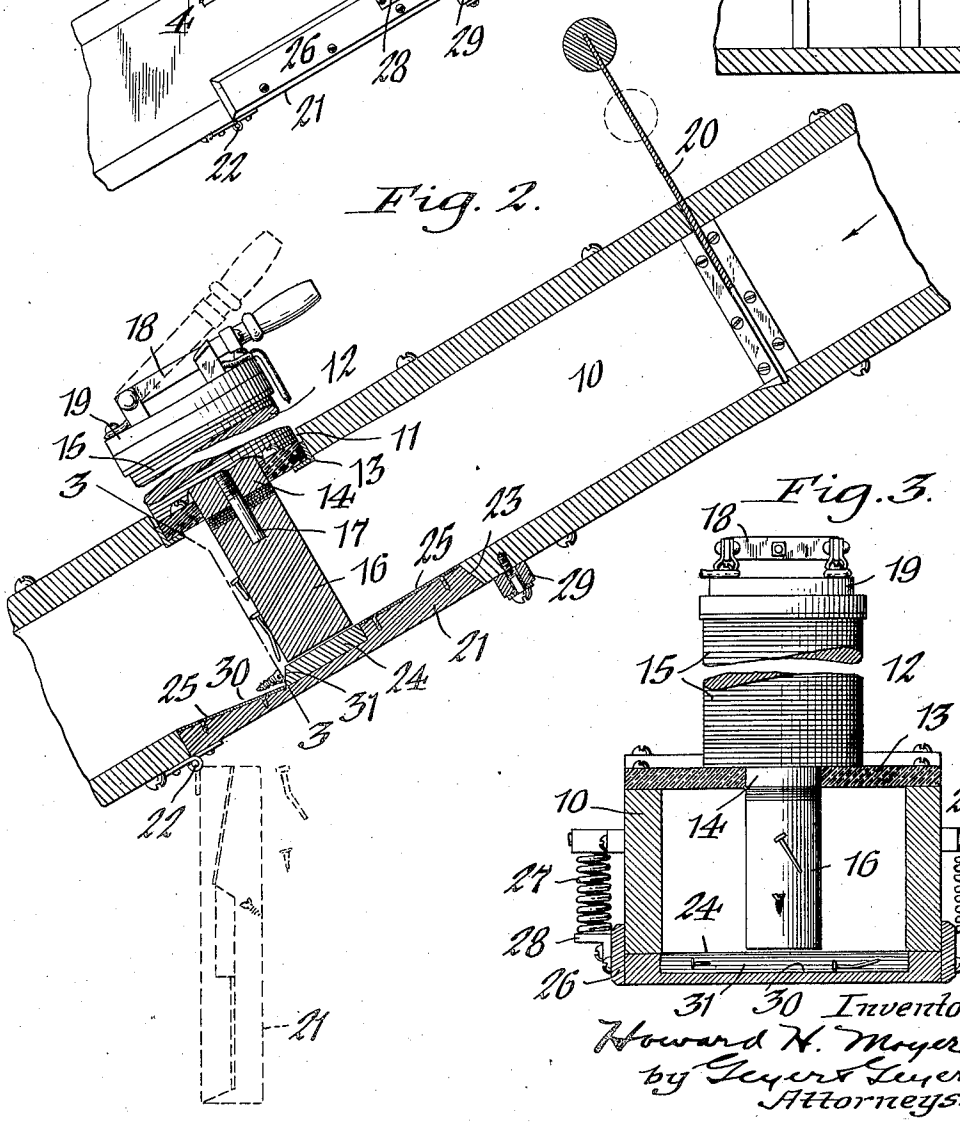


Fig. 3.

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Patented July 1, 1930 1,769,268

UNITED STATES PATENT OFFICE

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MAGNETIC SEPARATOR FOR SPOUTS

Application filed September 8, 1927. Serial No. 218,226.

This invention relates to a magnetic separating device which has been more particularly designed for application to the spouts used for conveying grain, feed and the like from one point to another.

One of its objects is to provide a simple inexpensive and efficient electro magnetic separating device of this character which is arranged to intercept any metallic particles present in the grain or feed flowing through the spout and which is so constructed as to hold the collected particles in a position where they are not liable to interfere with the free flow of material through the spout.

Another object of the invention is to provide the spout with means controlled by the separating device for governing the discharge of the separated metallic particles from the spout.

A further object is the provision of an electro magnetic separator which is so constructed and organized that it can be readily applied to spouts now in use without materially altering their construction.

In the accompanying drawings:—Figure 1 is a fragmentary side elevation of a spout showing my invention applied thereto. Figure 2 is an enlarged central longitudinal section thereof. Figure 3 is a cross section on line 3—3, Figure 2. Figure 4 is a fragmentary longitudinal section on line 4—4, Figure 1.

Similar characters of reference indicate corresponding parts throughout the several views.

The numeral 10 indicates a portion of a wooden delivery spout such as is commonly used for conveying feed, grain and similar materials from one point to another. My invention has been designed for application to such spouts, and is of such a nature that it can be applied to those now in use or it may be manufactured and sold as a unit spout section which can be readily fitted in present spouts.

Applied to the spout and extending through an opening 11 formed in the top wall thereof is an electromagnet 12 which is preferably mounted on a supporting plate 13 extending over said opening and attached to the side walls of the spout by screws or other appropriate fastenings. The pole piece of the electromagnet extends on either side of its supporting plate, the outer portion 14 thereof having a wire coil 15 wound thereon while the inner portion 16 is exposed and extends substantially centrally across the interior of the spout in spaced relation to the surrounding walls thereof to intercept and hold any of the metallic particles present in the material flowing through it. As shown in Figure 2, the inner portion 16 of the pole piece may be separably connected to the companion coil-bearing portion 14 so that changes can be readily effected in the size and strength of the magnets to suit different sized spouts. For this purpose the inner pole piece carries a threaded stem 17 which engages a corresponding opening in the outer pole piece. The pole piece is round so as not to interfere with the free passage of the material through the spout and also to allow the intercepted and attracted metallic particles to be carried around to the lower or discharge side of the magnet where they are out of the path of the flowing material. The coil 15 which supplies the magnetizing force to the pole piece is connected to a suitable source of direct current which is preferably controlled by a switch 18 mounted on a plate 19 secured directly to the top of the electromagnet. Arranged in the spout above or in rear of the electromagnet is a vertically movable slide-valve 20 for controlling the discharge of material through the spout.

Disposed in the bottom wall of the spout 10 and opposite the electromagnet 12 is a vertically-swinging door 21 hinged at its lower end, as indicated at 22, and normally closing an opening 23 through which the metallic particles collected on the pole piece 16 of the electromagnet may be discharged from time to time. The body of this door is made of wood or like material and on its inner face directly opposite the opposing lower end of the pole piece 16 is an iron plate 24 constituting an armature which is normally attracted to such pole piece for

holding the door closed. On either side of this plate the door is preferably faced with brass linings 25. The side edges of said door have sealing strips 26 applied thereto which partially extend over the side walls of the spout and prevent leakage of the grain or other material therefrom. It will be understood that as long as the electromagnet is energized the door 21 will remain closed and as the material flows from the spout the metallic particles will be caught and held by the pole piece 16. The moment the switch 18 is opened and the magnet deenergized, the door will automatically open and the collected particles drop by gravity through the opening 23 on to the floor or into a receptacle provided for receiving them. To insure a prompt opening of the door when the switch is opened, springs 27 are preferably applied to opposite sides of the spout and bear at their lower ends on abutments 28 secured to the door. A turn button 29 may be provided for keeping the door closed during the shipment of the spout.

If desired, the inner face of the door 22 forwardly of the pole piece 16 may be recessed or undercut to provide a pocket 30 for receiving those metallic particles which are caught by the plate 24. By this construction, such particles are held below and out of the path of the material, the lower edge 31 of the plate 24 being inclined so that the particles will drop out of the pocket 30 and not be held therein in the open, pendant position of the door, shown by dotted lines in Figure 2.

The operation of the device is as follows:—

In the normal operative position of the parts shown by full lines in the drawings, the slide-valve 20 is opened, the switch 18 is closed so as to energize the electromagnet, and the door 22 is closed. As the material flows through the spout, the metallic particles therein are collected and held on the pole piece 16 or plate 24. At suitable intervals the slide-valve is closed to check the flow of material through the spout, and the switch is opened, thereby automatically opening the door and immediately releasing the collected particles which thereupon are discharged by gravity through the opening 23. As soon as the foreign particles have thus been discharged, the switch is closed, the door is swung upwardly and held closed by the magnet after which the slide-valve is opened and the flow of material through the spout is again continued.

Aside from its simple and inexpensive construction, this improved magnetic spout separator is efficient and easy to operate, and is not liable to get out of order. Furthermore, its parts are exposed and can be readily cleaned when desired.

I claim as my invention:—

1. A device of the character described, comprising a spout having a discharge opening in its bottom side, a magnetic separating element arranged transversely within the spout opposite said opening for intercepting and collecting any metallic particles present in the material flowing therethrough, and a closure for said opening controlled by said separating element for governing the discharge of the metallic particles from the spout.

2. A device of the character described, comprising a spout having an opening therein, an electromagnet applied to said spout and having its pole piece extending across the interior of the same in the path of travel of the material flowing therethrough and in line with said opening, and a door for said opening normally held closed by said electromagnet.

3. A device of the character described, comprising a spout having an opening in its bottom side, an electromagnet applied to the opposite side of said spout and having its pole piece extending across the interior of the same in the path of travel of the material flowing therethrough and opposite said opening, and a door for the spout-opening having a part attractable by the electromagnet for normally holding it closed.

4. A device of the character described, comprising a spout having an opening in its bottom side, an electromagnet applied to the top side of said spout with its pole piece extending across the interior of the same and in line with its opening to intercept and hold any metallic particles flowing with the material through the spout, and a vertically-swinging door hinged to the bottom of said spout for normally closing said opening and having an iron plate applied to its inner face and in opposing relation to the end of the pole piece of said electromagnet, the door being automatically opened by gravity when said electromagnet is deenergized.

5. A device of the character described, comprising a spout for conveying material having an opening in its bottom side for the discharge of magnetizable particles, a cut off valve in the spout above its discharge opening, a magnet applied to the spout over said opening and having its pole piece arranged substantially centrally across the interior of the spout, to intercept and hold the magnetizable particles, and a magnetically closed door applied to said opening.

6. A device of the character described, comprising a spout for the passage of material having an opening in its bottom side for the discharge of magnetizable particles present in such material, a closure for said opening, and an electromagnet applied to said spout and having its pole piece extending through its interior from the top to the

bottom side thereof and in line with said opening, said pole piece being substantially round for carrying the intercepted, attracted particles out of the path of the flowing material.

7. A device of the character described, comprising a spout having an opening in its bottom side, an electromagnet applied to the top side of said spout with its pole piece extending across the interior of the same and in line with its opening to intercept and hold any metallic particles flowing with the material through the spout, and a vertically-swinging door hinged to the bottom of said spout for normally closing said opening and having an iron plate applied to its inner face and in opposing relation to the end of the pole piece of said electromagnet, the inner face of the door having a recess therein extending forwardly from the front edge of said iron plate and forming a pocket for receiving any of the metallic particles which may be intercepted by the plate.

8. A device of the character described, comprising a spout having an opening in its bottom side, an electromagnet applied to the top side of said spout with its pole piece extending across the interior of the same and in line with its opening to intercept and hold any metallic particles flowing with the material through the spout, a vertically-swinging door hinged to the bottom of said spout for normally closing said opening and having an iron plate applied to its inner face and in opposing relation to the end of the pole piece of said electro-magnet, and springs applied to the door for effecting its prompt opening upon the deenergizing of the electromagnet.

9. A device of the character described, comprising a spout for the passage of material and a discharge passage therein, a downwardly-opening closure for said passage, and a magnet applied to the spout adjacent to said opening for catching metallic particles present in the material flowing through the spout, said closure being disposed in operative relation to the magnet and normally held thereby in closed position and being free to open by gravity when the magnet is deenergized.

HOWARD H. MOYER.