

Oct. 10, 1933.

H. E. REEDER

1,930,108

SEPARATOR

Filed Jan. 8, 1930

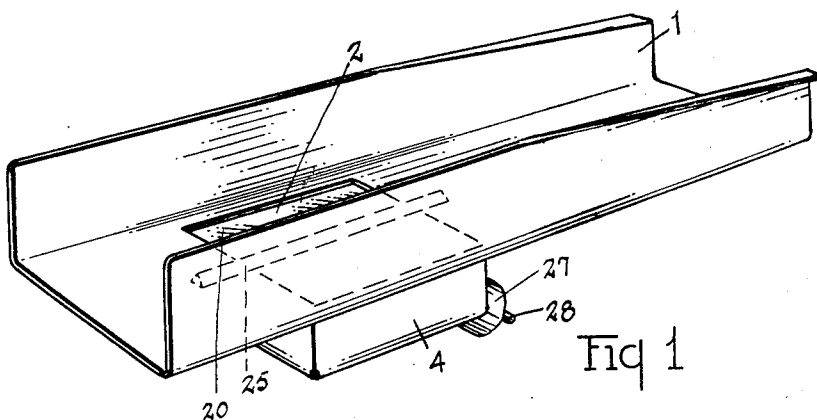


Fig 1

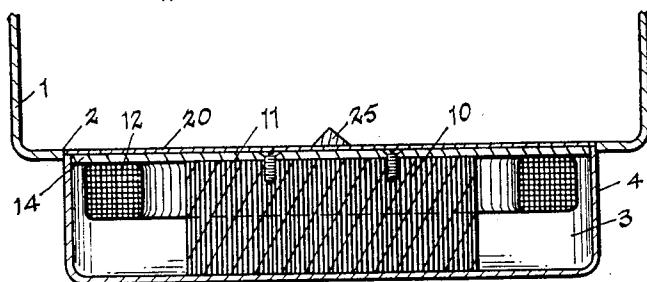


Fig 3

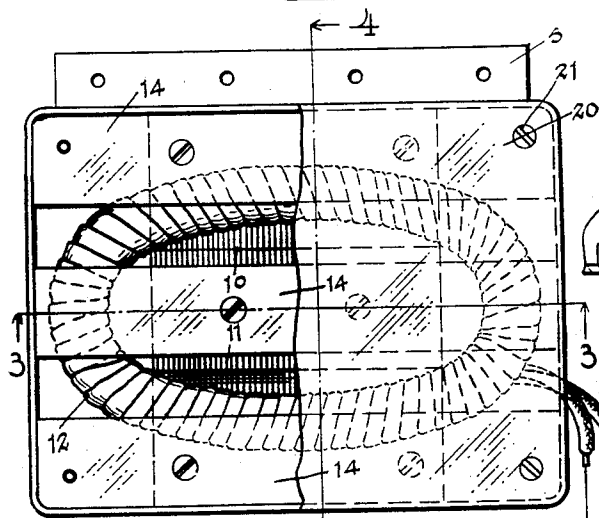


Fig 2

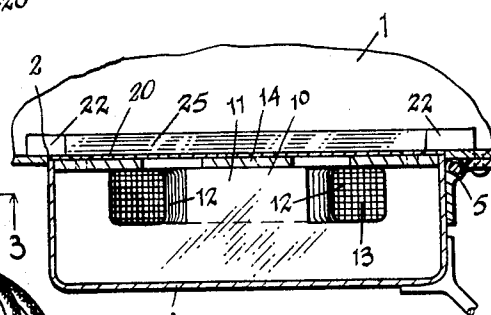


Fig 4

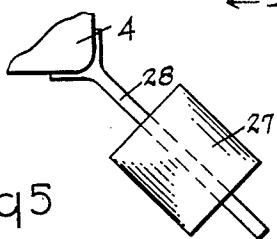


Fig 5

Inventor

Homer E. Reeder

By *Faust Y. Crampton*

Attorney

UNITED STATES PATENT OFFICE

1,930,108

SEPARATOR

Homer E. Reeder, Lima, Ohio

Application January 8, 1930. Serial No. 419,410

5 Claims. (Cl. 209—228)

My invention has for its object to provide a separator that may be used for separating magnetic substances from finely divided materials as they are passed through a chute or container of any form. Thus the invention may be used for the removal of magnetic material or articles from a mobile material. Particles of foreign material, such as nuts, small nails and tacks, which occasionally find their way into grain while being handled between the harvesting of the grain and taking to an elevator, invariably does damage to machinery used for grinding or pulverizing the grain, or to cattle if used for feed. Also, in pulverizing the grain a risk of fire exists if such articles are present by reason of the heat emitted by the breaking or striking of the iron particles in the atmosphere of dust created by the grinding or pulverizing operation.

The invention may be used in connection with apparatus of different kinds and may be embodied in structures that vary in their details. To illustrate a practical application of the invention, I have selected a structure containing the invention as an example of the various embodiments of the invention and shall describe the structure selected hereinafter. The particular structure referred to is shown in the accompanying drawing.

Fig. 1 is a perspective view of the separator selected for purposes of illustration. Fig. 2 is a top view of the separator. Fig. 3 is a view of a section taken on the plane of the line 3—3 indicated in Fig. 2. Fig. 4 is a view of a section taken on the plane of the line 4—4 indicated in Fig. 2. Fig. 5 illustrates a counterbalancing weight for counterbalancing the separator.

A chute 1 is located at the desired angle to enable finely divided material to move along the chute by its own weight. The bottom of the chute is provided with an opening 2 which may be closed by means of the separator 3. The separator is contained in the sheet metal box 4 that is hingedly connected by means of the hinge 5 to the upper edge of the opening 2. The hinge 5 is connected to one side of the box 4 and to the under side of the bottom of the chute 1.

The box 4 is formed, preferably, of sheet iron and an electro magnet 10 is located within the box 4. The core 11 of the magnet 10 is formed of a plurality of sheet iron strips which form laminations when placed together to form the core 11. The core fits between the sides of the sheet iron box 4. The laminations or sheets that form the core are provided with slots so that when they are placed together they form

the channels 12 in which the electric coil 13 is inserted. Bars 14 are secured to the protruding parts of the core 11, each bar extending over a portion of the coil and lengthwise of the box. The bars 14 are formed, preferably, of soft iron and form the poles of the separator. When the separator is connected to the chute 1, the bars 14 extend across the bottom of the chute to produce two fields extending across the bottom of the chute and between the poles, whereby all of the material that passes through the chute will pass through the fields produced by the coil and the poles. The coil 13 is connected to the source of supply of electric current, such as to the mains 17—17, through a switch 16, whereby the circuit of the coil may be opened and quickly closed. This operates to open and close the door and to discharge the iron particles when opened and reclose the chute to allow the grain to pass over the door.

In order that there may be a free flow of the non-magnetic material over the separator, a plate 20 of diamagnetic, such as copper or brass, is secured to the box by means of the screws 21 which pass through the ends of the outer bars 14. The plate 20 fits the opening 2 and when the separator is located in position to close the opening 2, the plate 20 is located flush with the inner surfaces of the bottom of the chute in order to permit free movement of the non-magnetic material over the separator.

An iron bar 25 extends lengthwise the chute and across the opening 2. The bar 25 is, preferably, triangular in cross section and terminates intermediate the upper and lower edges of the opening 2. It is brazed or secured to brass blocks 22 that overhang the edges of the sheet metal chute 1, and which are brazed to the bottom of the sheet metal chute to locate the inner ends of the bar 25 well within the edges of the opening 2.

The weight of the box is counterbalanced by means of the weight of the metal block 27 which is located on the arm 28 that protrudes from the corner of the box located below the hinge 5. When, therefore, a current is passed through the coil 13, the attraction created by the poles of the magnet for the bar 25 will lift the box to close the opening 2. The grain, or pulverent material, is then allowed to pass along the chute over the plate 20 and the magnetic material, passing through the chute, will be magnetically held on the plate 20 by the field of force of the electromagnet. When the movement of the finely divided material discontinues through the

chute, the circuit through the coil 13 is opened and, owing to de-magnetization of the poles of the magnet and the weight of the box, the box immediately swings on the hinge 5 and opens the bottom of the chute. The magnetic material that has been caught on the surface of the plate 20, immediately slides down the surface of the field but does not have opportunity to continue down the chute on account of the opening of the chute by the movement of the box. The plate 20 being formed of diamagnetic material, the magnetic particles caught by the electromagnetic field will be immediately released and fall outside of the chute where they may be collected, if desired, and removed.

I claim:

1. In a separator for separating magnetic material from mobile material, a sheet metal guide for the materials, the bottom of the guide having an opening, a sheet metal box hingedly connected to the upper edge of the opening, a coil having a core of magnetic material, the core having a pair of channels for receiving the coils, bars of magnetic material secured to the core and extending over the coil and parallel to the upper edge of the opening, a plate of diamagnetic material covering the top of the box and the said bars, the outer surface of the plate located substantially flush with the bottom of the chute when the opening is closed by the plate, and means for closing the opening by movement of the box on its hinged connection with the chute.

2. In a separator for separating magnetic material from mobile material, a sheet metal guide for the materials, the bottom of the guide having an opening, a sheet metal box hingedly connected to the upper edge of the opening, a coil having a core of magnetic material, the core having a pair of slots for receiving the coils, bars of magnetic material secured to the core and extending over the coil and parallel to the upper edge of the opening, a plate of diamagnetic material covering the top of the box and the said bars, the outer surface of the plate located substantially flush with the bottom of the chute when the opening is closed by the

plate, and a bar of magnetic material extending in a direction parallel to the movement of the grain through the chute and connected to the bottom of the chute for closing the opening when the coil and core are energized.

3. In a separator for separating magnetic material from mobile material, a sheet metal guide for the materials, the bottom of the guide having an opening, a sheet metal box hingedly connected to the upper edge of the opening, a coil having a core of magnetic material, the core having a pair of slots for receiving the coils, bars of magnetic material secured to the core and extending over the coil and parallel to the upper edge of the opening, a plate of diamagnetic material covering the top of the box and the said bars, the outer surface of the plate located substantially flush with the bottom of the chute when the opening is closed by the plate, a bar of magnetic material extending in a direction parallel to the movement of the grain through the chute, blocks of diamagnetic material connected to the ends of the bar and secured to the bottom of the chute at points above and below the upper and lower edges of the opening respectively.

4. A feed spout having a door opening in its inclined bottom, a door plate hinged near its upper edge below said bottom, an electromagnet operatively supported by and below said plate and lessening the gravitating swing of said plate away from said bottom, cable connection from said magnet to a source of electricity, and a switch in said connection allowing breaking and quick closing of current to effect opening of door, discharge of collected particles, and automatic return of plate to operative position, substantially as described.

5. In an electro-magnet feed spout, the herein described inclined door plate hinged at its upper edge, and an electro-magnet operatively supported by said plate so that its weight when swinging tends to lessen the gap between the plate and the bottom of the spout, substantially as described.

HOMER E. REEDER.

50

125

55

130

60

135

65

140

70

145

75

150