June 3, 1941. F. J. MORAVECKY 2,244,371

ELECTROMAGNETIC CONTAINER

Filed Nov. 1, 1940 3 Sheets-Sheet 1

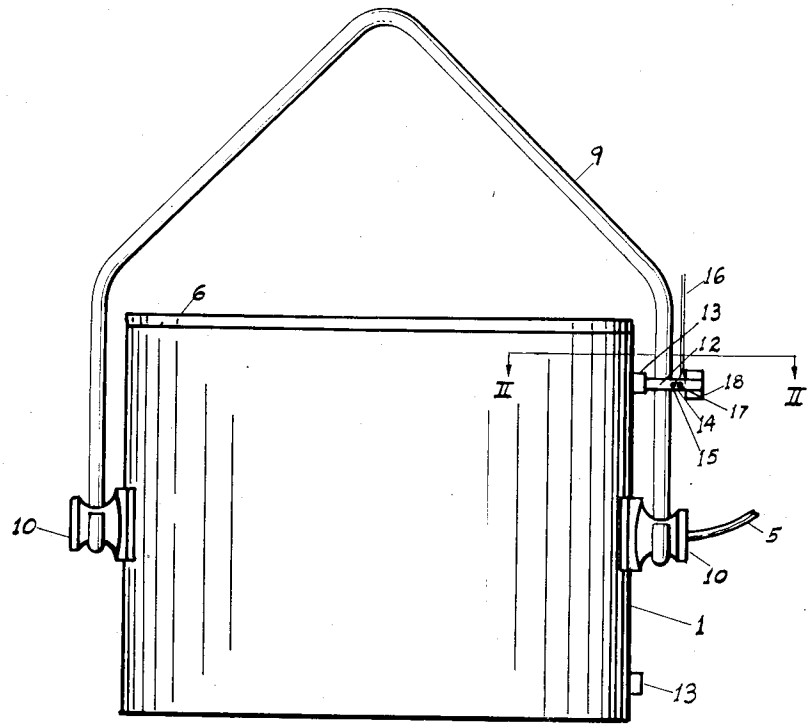


Fig 1

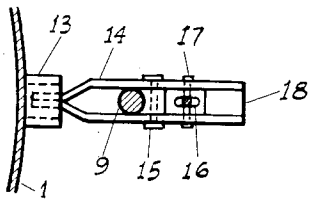


Fig 2

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Filed Nov. 1, 1940 3 Sheets-Sheet 2

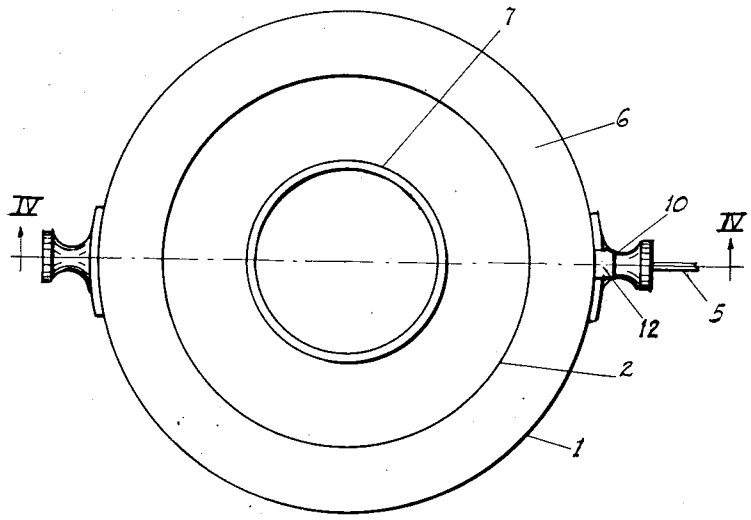


Fig. 3

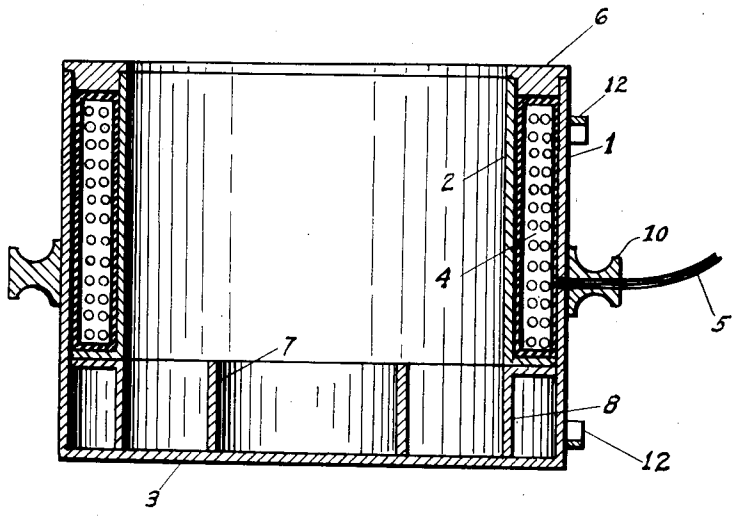


Fig. 4

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Filed Nov. 1, 1940 3 Sheets-Sheet 3

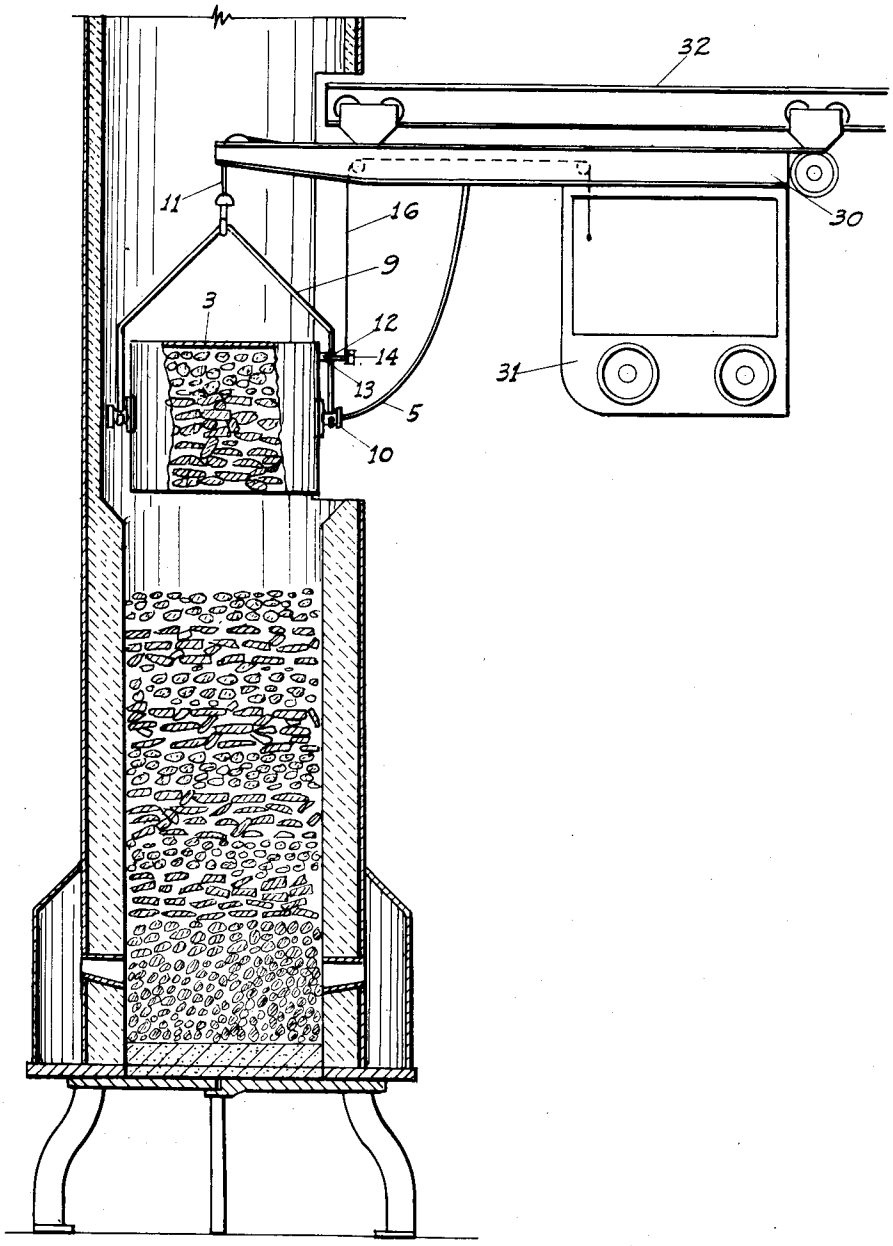


Fig. 5

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UNITED STATES PATENT OFFICE

2,244,371

ELECTROMAGNETIC CONTAINER

Frank J. Moravecky, Beaver Falls, Pa.

Application November 1, 1940, Serial No. 363,919

6 Claims. (Cl. 294—65.5)

This invention relates to containers for charging materials into metal melting furnaces such as cupolas and the like.

In the operation of a cupola charges are introduced by a charging container which, in some of its forms, is filled with layers or strata of fuel and the like, then positioned over the cupola and the charge released by opening a separable bottom. Containers of this type include elements, such as interior bars or cables to operate the separable bottom, which prevent a complete discharge of the material and further disarrange its desired stratification. Also, the complete charge is not simultaneously released, which further disrupts the stratification. Additionally undesirable is the special mechanism sometimes used to open the separable bottom, some containers requiring a special support on the cupola walls to hold the container when the bottom is being opened.

It is an object of my invention to provide a cupola or similar furnace charging container of simple construction which, without a separable bottom or other charge disrupting elements, releases its contents uniformly and in the proper sequence, and maintains the desired stratification of the charge of material after discharge.

The charging container provided according to my invention comprises a unitary wall and bottom adapted to receive a charge which may, and usually does, consist of non-magnetic material such as fuel, and magnetic material such as iron or steel, the latter forming the upper portion of the charge in the container. The container also includes an electromagnet adapted when energized to retain the magnetic material within the container when the latter is inverted, and as a consequence thereof to retain its content of non-magnetic material which is then uppermost. When the electromagnet is deenergized, the entire charge is released and falls into a cupola in its intended stratified form.

The container is preferably pivotally supported by a bail which engages trunnions that are so positioned that, when the container is empty, its center of gravity lies below, and that, when the container is supplied with a charge, its center of gravity lies above the trunnions. Thus, when the container is empty or only partly filled and is free to pivot on its trunnions, its open top lies uppermost, and when it is filled and free to pivot its open top lies lowermost. The container is provided with latch mechanism to retain a charged container with its open top uppermost until it is desired to invert it preliminary to deenergizing the electromagnet to permit the charge to fall into a cupola.

The invention is illustrated in the accompanying drawings, of which Fig. 1 is a side view of the container showing a latch used to hold the container in an upright position; Fig. 2 a horizontal sectional view taken along line II—II of Fig. 1; Fig. 3 a plan view of the container; Fig. 4 a vertical section on line IV—IV of Fig. 3; and Fig. 5 a vertical central sectional view of a cupola associated with a charging container embodying my invention.

Having reference to the illustrative embodiment of my invention shown best in Figs. 1 to 4, the container comprises an outer wall 1, an inner wall 2, a bottom 3, and an electromagnet 4 disposed between the outer and inner walls and connected to an electric circuit by a cable 5. To utilize the maximum efficiency of the electromagnet, the outer wall and the bottom are formed of magnetic material, while the inner wall is formed of non-magnetic material. Further, the container may be provided at its top with a ring 6 for closing the compartment containing a electromagnet, an inside ring 7 extending upwardly from bottom 3, and a ring 8 forming part of the inner wall of the container and extending to the same height as ring 7, all three of these rings being formed of magnetic material.

A container constructed in this manner is especially adapted to be filled with fuel, such as coke, or other non-magnetic material, substantially to the height of ring 7, and the remainder filled with iron, steel or other magnetic material. When the electromagnet is energized, there will then be a conductance of magnetic lines of force from the top ring 6 through outer wall 1, bottom 3, rings 8 and 7, and the magnetic portion of the charge. The inner wall 2 being formed of non-magnetic material, the magnetic lines of force diffused in the magnetic portion of the charge are not dissipated by conductance through wall 2, and thus the container utilizes substantially the full power of the electromagnet.

The container is pivotally suspended by a bail 9 which engages trunnions 10, and cable 11 which engages the bail. The positioning of the trunnions is an additional feature of the invention and provides an efficient and economical way of inverting the container. Accordingly, the trunnions are placed in a position on the container which is below the center of gravity of the container when filled with a charge but above the center of gravity when empty.

Latches 12 are provided for holding the con-

tainer in an upright or inverted position as desired. Referring to Figs. 1 and 2, the latches comprise hasps 13, one of which is attached near the open top and the other near the bottom of the container. These hasps are grooved to receive the forward end of a bolt 14, which is bifurcated near its front end to form two prongs which pass on opposite sides of bail 9 on which it is pivotally mounted by a pin 15. A cable 16 loops about a cross bar 17 and passes over pulleys to a control cab 31 of a charging carrier 30 (Fig. 5), to be described later. To cause the container to invert, cable 16 is pulled upwardly to swing the bolt from engagement with the hasp disposed near the open top of the container. After the container is inverted, it being desired to hold it in such position, cable 16 is released and a counterweight 18 raises the forward end of bolt 14 into engagement with the other hasp. This latch is merely a practical example of mechanism to hold the container in a desired position and is not intended to limit the invention in any way.

The operation of a container embodying my invention may be more fully understood by reference to Fig. 5 which shows the container after it has been carried to and aligned with the cupola, and inverted. The mechanism for lifting and moving the container from place to place forms no part of this invention, and since its construction is well known to those skilled in this art, it need not be described in detail. Generally, such mechanism consists of a carrier 30 which carries a cab 31 and moves on a track 32. The controls for the carrier as well as the controls for positioning the container and operating the latch mechanism are arranged in the cab for convenient manipulation by an operator. The container is suspended from the carrier by cable 11 which passes over a system of pulleys and into the control cab and is thus borne by the carrier to a convenient charging floor. Before the container is charged, the bail of the container is engaged by the latch so as to retain the charged container with its open top uppermost. The container is loaded with a charge of magnetic and non-magnetic material in the manner described, and, when loaded, returned by the carrier 30 to the cupola, horizontally aligned with the cupola bed, and vertically positioned by lengthening or shortening the cable 11. The electromagnet is then energized by current flowing through cable 5, and the latch disengaged to allow the container to invert. The electromagnet then maintains the charge of material in a suspended state in the container. After the bolt of the latch is brought into engagement with the bottom hasp the electromagnet is deenergized, and the charge of material uniformly, in proper sequence, and without obstruction by any interior bars or cables of the container, drops into the cupola.

According to the provisions of the patent statutes, I have explained the principle and mode of operation of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A container for charging material into metal melting furnaces and the like, the container comprising a side wall, a bottom, and an electromagnet surrounding the side wall adapted when energized to maintain a magnetic charge in the container when inverted, and to release said charge when deenergized.

2. A container for charging material into metal melting furnaces and the like, the container comprising a side wall, a bottom, means to suspend said container including trunnions positioned below the center of gravity of the container when filled with a charge, a bail engaging said trunnions, releasable means to hold said container in an upright position, and an electromagnet adapted when energized to maintain a charge of magnetic material in the container when inverted, and to release said charge when deenergized.

3. A container for charging material into metal melting furnaces and the like, the container comprising a side wall, a bottom, means to suspend said container including trunnions positioned below the center of gravity of the container when filled with a charge, a bail engaging said trunnions, releasable latches on said container to engage said bail and to hold the container in an upright position, and an electromagnet adapted when energized to maintain a charge of magnetic material in the container when inverted, and to release said charge when deenergized.

4. A container for charging material into metal melting furnaces and the like, the container comprising outer and inner walls, said outer wall being composed of magnetic and said inner wall of non-magnetic material, an electromagnet disposed between said outer and inner walls, and a ring of magnetic material spanning the width between the tops of said outer and inner walls, the container having a bottom formed of magnetic material.

5. A container for charging material into metal melting furnaces and the like, the container comprising outer and inner walls, said outer wall being composed of magnetic and said inner wall of non-magnetic material, an electromagnet disposed between said outer and inner walls, a ring of magnetic material spanning the width between the tops of said outer and inner walls, the container having a bottom formed of magnetic material, and a ring of magnetic material extending upwardly from the central portion of said bottom to form a magnetic conductance path through the central portion of the charge.

6. A container for charging material into metal melting furnaces and the like, the container comprising outer and inner walls, said outer wall being composed of magnetic and said inner wall of non-magnetic material, an electromagnet disposed between said outer and inner walls, a ring of magnetic material spanning the width between the tops of said outer and inner walls, the container having a bottom formed of magnetic material, a ring of magnetic material extending upwardly from the central portion of said bottom to form a magnetic conductance path through the central portion of the charge, means to suspend said container including trunnions positioned below the center of gravity of said container when filled with a charge, a bail engaging said trunnions, and latches to engage said bail and to hold said container in an upright position.

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