J. D. HILLIARD, Jr. & C. E. PARSONS.

AIR OR WATER BLAST MAGNET.

APPLICATION FILED JAN. 29, 1906.

923,653. Patented June 1, 1909.

FIG. 1.

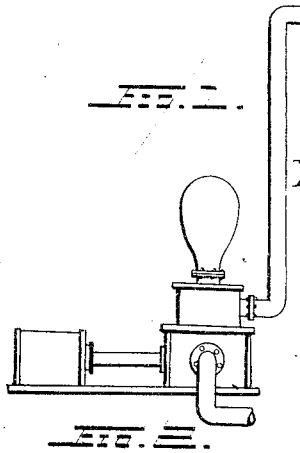


FIG. 2.

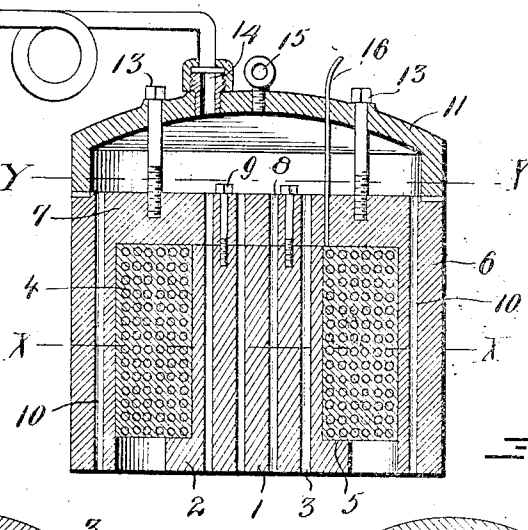


FIG. 3.

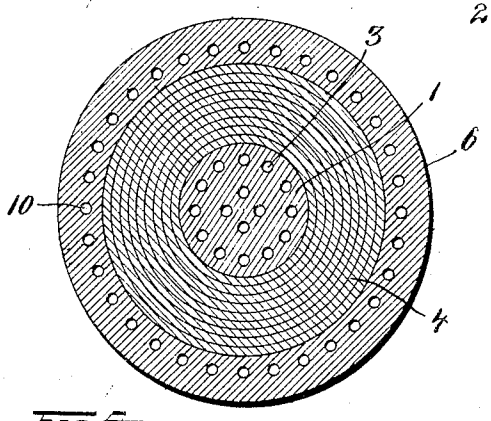


FIG. 4.

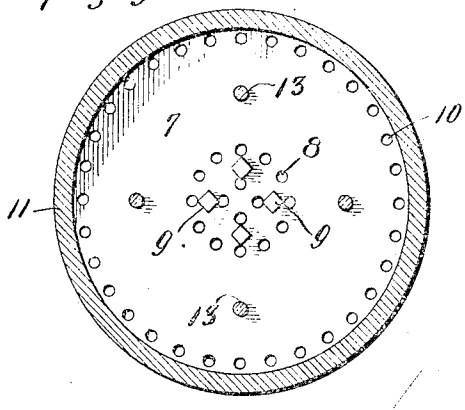
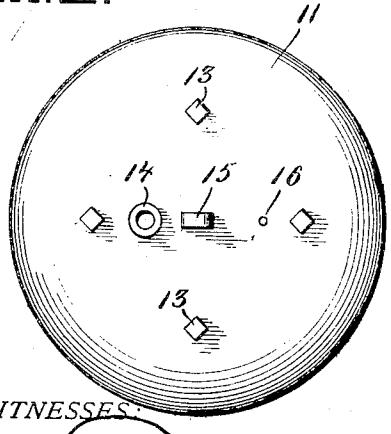
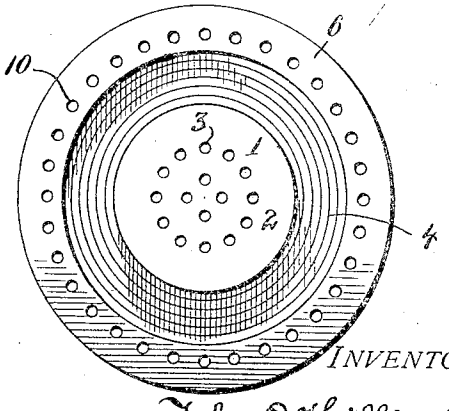


FIG. 5.





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UNITED STATES PATENT OFFICE.

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AIR OR WATER BLAST MAGNET.

No. 923,653. Specification of Letters Patent. Patented June 1, 1909.

Application filed January 29, 1906. Serial No. 298,534.

To all whom it may concern:

Be it known that we, JOHN D. HILLIARD, Jr., and CHARLES E. PARSONS, citizens of the United States, residing at Glens Falls, in the county of Warren and State of New York, have invented a certain new and useful Improvement in Air or Water Blast Magnets, of which the following is a specification, reference being had therein to the accompanying drawing.

Our invention relates to electro-magnets, and has for its object the provision of a magnet for lifting purposes, in which self-contained means will serve to clean off the surface of the magnetic material to be removed.

It is now quite common to use electro-magnets of different sizes and designs, in connection with cranes and the like, but it has been found that frequently the use of the same is unsatisfactory, because the articles to be lifted are covered with dirt or mud. As the effective pull of a magnet is equal to the product of the area thereof into the square of the flux, divided by a constant, and as the flux depends upon the magnetizing force and reluctance, the latter being greatly increased by a dirt or mud gap, the extreme importance of a clean surface against which the magnet may be applied, is apparent.

In order to insure clean surfaces it has heretofore been necessary to rub or scrape the latter by hand, which, of course, is very undesirable. In order to avoid this we have developed a magnet from whose contact face a blast of air or water may be expelled, which will thoroughly cleanse the surface of the object just as the magnet comes against it. It is apparent that this device is very useful, not only in many situations on shore, but also in marine operations. In addition, the invention is of use in the extraction of ore and metals generally from non-metallic mixtures, the air or water blast serving to carry off waste and detritus, while the magnetic materials are retained. The extraction of magnetic material may take place under water or under sand. In the latter case a blast of water is used through the magnet, which burrows its way downward in the sand until the magnetic material is reached, and with the blast of water still being expelled the same may be easily raised out of the sand body.

Our invention, briefly stated, comprises perforations and a suitable hose connection thereto, whereby water or air under pressure may be supplied so as to be expelled from the perforations in the faces of the magnetic poles.

Figure 1 is a vertical sectional view. Fig. 2 is a transverse section on the line X—X of Fig. 1. Fig. 3 is a similar section on the line Y—Y, of Fig. 1. Fig. 4 is a top plan view, and Fig. 5 is a bottom plan view.

Referring now to the drawings, 1 represents a core of soft iron, which is provided with a flanged head 2, and longitudinal apertures 3. Around this core is wound a suitable winding 4, which rests upon a shoulder 5, formed by the flanged head 2, and which extends up to the upper end of the core 1. Surrounding the coil 4 and having its sides projecting down, so as to aline with the bottom of the core 1, is a heavy shell 6, whose head 7 is secured to the upper end of the core 1, and is provided with apertures 8, adapted to register with those of the core. Suitable screws 9 are tapped into the core through the head 7, and serve to hold the two parts in their proper relation. Extending down through the sides of the frame 6 are apertures 10, used for the same purposes as those through the head 7 and core 1. A hollow cap 11 is placed on top of the frame 6, in an air and water-tight manner, by interposing a rubber or other suitable gasket, and is held in place upon the frame 6, by screws 13, which pass through the hollow cap and are tapped into the head 7 of the frame 6. This cap forms a reservoir or feeding chamber 17 so that uniform distribution through the openings in the core and frame may be obtained. An apertured lug 14 projects above the top of the cap 11, and is provided with screw-threads on its exterior surface, so as to receive the end coupling of a water or air hose 18, which is adapted to convey either fluid to the hollow cap 11 from the pump 19, and from hence through the apertures 3, 8, and 10, to the object to be lifted.

A suitable ring or eye 15 is secured to the

center of the cap 11, in which a lifting hook may be secured. The cap is also provided with a suitable aperture which allows the wires 16 of the magnet to be led out. It is preferable that the line wires of the magnet be in a two-wire cable, so that only one aperture is needed. We have not shown herein any means for rendering this aperture air-tight, but any well known device for that purpose may be used.

Other modifications might be resorted to without departing from the spirit and scope of our invention, and we consider all such changes or modifications well within the meaning and purview of the appended claims.

Having thus described our invention, what we claim and desire to secure by Letters Patent is,—

1. A grappling or lifting magnet comprising the following instrumentalities: a core constituting one element of a magnetic circuit, a winding encircling said core and leaving the end thereof exposed, an iron shell constituting an extension or return limb of the magnetic circuit attached to said core and surrounding said winding, a plurality of channels or openings formed in the core and in said return limb, a cap or cover secured upon the structure and forming a closed chamber communicating with said channels or openings, an inlet device attached to said cap for connecting a pressure tube thereto, and lifting means for the structure.

2. A lifting magnet having an apertured core, an apertured shell surrounding the core, and means for feeding a cleaning fluid through both against the article to be acted upon by the magnet.

3. A grappling or lifting magnet having a casing forming a fluid distributing chamber, a core having apertures in communication with said chamber, means for supplying fluid under pressure to the chamber, and means secured to the casing for lifting the entire structure.

4. A lifting magnet having an inclosing frame, apertures extending therethrough, and means for feeding a cleansing fluid through said apertures.

5. An electromagnet having an apertured core, apertured means surrounding the said core, the apertures of said means communicating with the core apertures, and means for feeding a cleaning fluid through said apertures.

6. An electromagnet having a core with apertures extending therethrough, a head on said core, said head provided with apertures registering with those in the core, a shell surrounding said core and connected to the head, apertures through said shell, and means for feeding a cleaning fluid through said apertures.

7. An electromagnet having an apertured core, a headed frame surrounding said core and provided with apertures registering with the apertures of said core, supplemental apertures in said headed frame, a hollow head secured to said frame and constituting a fluid chamber, a lifting device secured to said hollow head, and a suitable source of fluid supply connected thereto.

8. An electromagnet comprising a core and a winding therefor, a flange upon said core upon which the winding rests, a headed frame surrounding said winding, a hollow head secured to said headed frame, lifting means connected to said hollow head, a fluid supply connected thereto, and apertures through said headed frame and said core communicating with the hollow head and adapted to convey fluid pressure to the article to be lifted.

9. An electromagnet, apertured means surrounding said magnet, and a source of fluid supply connected to said apertured means.

10. An electromagnet comprising a core, a flanged end therefor, a winding surrounding said core and resting on said core and headed shell surrounding said core and winding, said shell and core being provided with apertures, and a hollow cap covering said apertures.

11. A portable lifting magnet having a heavy magnetic circuit normally completely broken in a portion thereof, with exposed faces adapted to be applied to an object to be lifted, a plurality of channels or openings formed in the respective members of said magnetic circuit and terminating at the exposed or contact faces thereof, a source of fluid pressure, a tubular connection therefrom to the channels in the magnet, and supporting means for the magnetic circuit.

12. Electromagnetic lifting apparatus comprising a magnet structure, means for supplying current thereto, means for lowering the same into juxtaposition with the surface of the object to be lifted, and means for directing a blast of fluid under pressure into the space between the magnet poles and the object, so as to clean the surface of the latter, said fluid pressure being cut off when contact is made.

13. Electromagnetic lifting apparatus comprising a lifting magnet, means for supplying current thereto, means for bringing the same into juxtaposition with a magnetic body, and means for directing fluid under pressure against the contact surface of the latter in a direction perpendicular thereto, so as to scatter and force outward foreign

matter on the surface, said pressure being cut off simultaneously with the completion of the contact, whereby the same is rendered direct and positive.

14. Lifting apparatus comprising an electromagnet, means to supply current thereto, and means associated therewith for directing a blast of fluid under pressure so as to blow out foreign matter from between the magnet pole and the contact surface of an object to be lifted during their mutual approach.

In testimony whereof we have affixed our signatures in presence of two witnesses.

JOHN D. HILLIARD, Jr.
CHARLES E. PARSONS.

Witnesses:
C. L. Snow,
Wm. B. Smith, Jr.