D. C. JACKSON.

LIFTING MAGNET.

APPLICATION FILED JAN. 26, 1907.

1,147,682. Patented July 20, 1915.

Fig. 4.

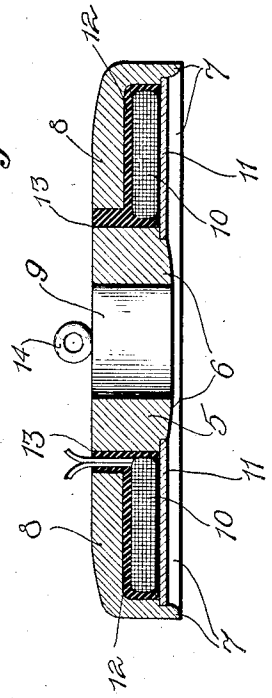


Fig. 3.

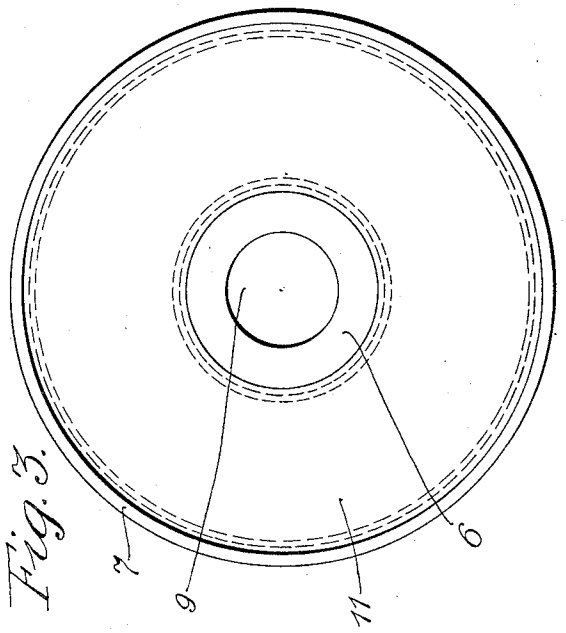


Fig. 2.

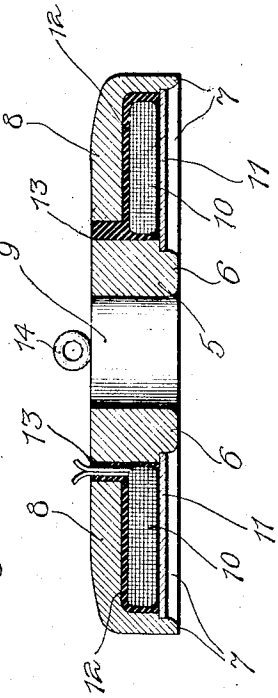
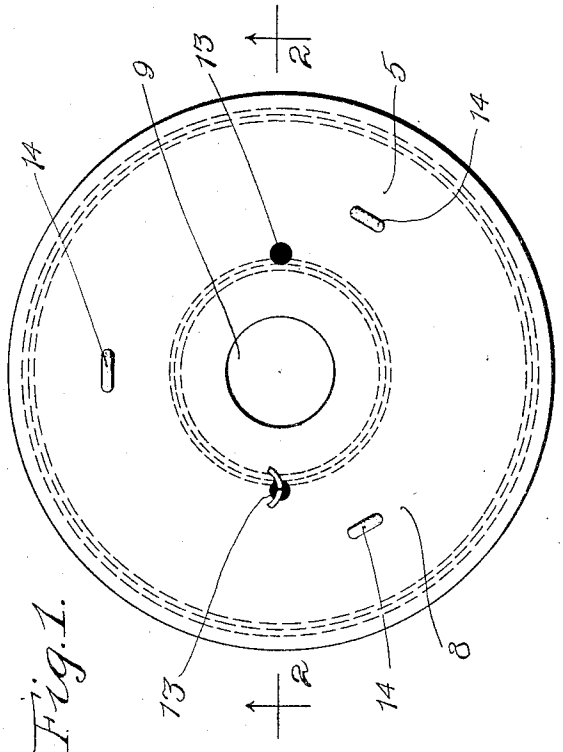


Fig. 1.



Witnesses:

Arthur H. Boettcher,

Fred W. Koehn.

Inventor

Dugald C. Jackson

By Charles A. Brown

Attorney

UNITED STATES PATENT OFFICE.

DUGALD C. JACKSON, OF MADISON, WISCONSIN, ASSIGNOR TO DUGALD C. JACKSON AND WILLIAM B. JACKSON, OF MADISON, WISCONSIN, COPARTNERS.

LIFTING-MAGNET.

1,147,682. Specification of Letters Patent. Patented July 20, 1915.

Application filed January 26, 1907. Serial No. 354,249.

To all whom it may concern:

Be it known that I, DUGALD C. JACKSON, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented a certain new and useful Improvement in Lifting-Magnets, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to lifting magnets and has for its object the provision of such a device of improved construction and of greater efficiency than lifting magnets of the prior art.

A lifting magnet to serve its duty most satisfactorily should be capable of setting up an enormous magnetic flux through the space about the poles, and a feature of importance is to have this magnetic flux increase in density at a rapid rate near the pole pieces whereby the portative force of the magnet is greatly increased. To this end the poles of the lifting magnet of my invention are formed to afford an extreme convergence of the lines of force toward the pole faces, the faces of the poles being adapted to this object.

It is desirable to have the pole pieces constructed so that they become fairly saturated so as to afford a high permeability for the metal of the magnet when lifting a load (as when handling pig iron or scrap iron or the like) but this saturation should not extend beyond the region of high permeability for the magnet, and they need not be saturated when the poles pieces are free from any iron material which may serve as a keeper.

To secure these and other desirable advantages, I provide a lifting magnet in which the pole faces are linear in character, their arrangement being such that the magnetic flux set up by the magnet will converge rapidly in the region of the pole pieces and that they will come to great magnetic density when supplied with a keeper.

My invention will be understood by referring to the accompanying drawing and the following description thereof:

Figure 1 is a plan view of a lifting magnet comprising my invention; Fig. 2 is a sectional view taken on line 2—2 of Fig. 1; Fig. 3 is a view of the underside of the magnet, and Fig. 4 is a view similar to that of Fig. 2, but showing a slightly modified construction.

The frame of the magnet indicated at 5 is of magnetic material and includes the pole pieces 6 and 7 which are joined by a hood 8 as indicated in the drawings, thereby leaving a central aperture 9. The pole piece 7 is an external circular ring, and the other pole piece 6 a concentric circular ring. The purpose and advantages of this particular construction will be hereinafter pointed out. An energizing coil 10 is suitably disposed within the space between the two annular pole pieces and is conveniently protected by means of a protecting plate 11 of non-magnetic material which may be secured in any suitable manner to the main casting. The energizing coil 10 is thoroughly insulated as a unit in any well known manner, and the extra space in the coil chamber may be filled by means of insulating material 12 which may be introduced into the annular chamber in which the coil is disposed through ducts 13, 13. This insulating material 12 should be of character which will aid in carrying away the heat produced in the coil, and the exterior surface of the magnet may be ribbed to assist in the dissipating of the heat from the surface of the magnet. It is desirable for the terminals of the exciting winding to pass out through the top of the frame of the magnet in order that they may be out of danger from injury when the magnet is in use, and I, therefore, conveniently lead these terminals through one of the ducts 13.

The entire device is expected to be carried by a crane and is, therefore, provided with suitable suspending means which may be three eyes 14, 14 secured in the framework, to which a three legged crane chain may be hooked in a well known manner. Any other convenient suspending means may be employed; for instance, the hood may be extended over the central aperture and appropriate means secured therein.

The faces of the poles are linear in character. As illustrated in the drawing they are curvilinear, but it is evident that this is not essential to the practice of the invention, and they may be rectilinear, if desired.

When the pole pieces are constructed as hereinbefore shown and described, the proper energization of the exciting coil will afford great strength to the pole pieces when

lifting a load. The pole faces being linear in character, the lines of force toward the faces have an extreme convergence, and the magnetic flux is, therefore, increased at a very rapid rate near the pole pieces. This greatly increases the portative force of the magnet and raises the efficiency thereof. The linear pole piece bites into the material it engages, providing a uniformity of contact and increased portative effect and the fact that the linear pole piece is co-extensive with the periphery of the pole piece increases the capacity of the magnet.

The pole faces may be arranged so as to best approach the particular loads which they are expected to carry. Thus, when a magnet is expected to handle sheet iron or boiler plates, it is desirable for the faces of both the linear poles to be in one plane, as indicated in Fig. 2, while it is preferable for the central linear pole piece of an annular magnet to stand at a slightly higher plane than the outer linear pole pieces when the magnet is intended to be used for handling pig iron, scrap iron or the like from a pile, such construction being shown in Fig. 4. This form enables the pole pieces to come into more intimate contact with the bulging face of a pile of material. For some circumstances of use, it may be preferable to extend the inner pole piece to a greater length than the exterior pole pieces. I find it advantageous to have the exposed faces of the poles slightly bulging or convex.

A magnet constructed in accordance with my invention, and which is of about four feet, outside diameter and of about eight inches in height, may advantageously be wound with a winding which will afford from 60,000 to 70,000 ampere turns. Such a magnet would have enormous lifting strength.

I have herein shown and described but one embodiment of my invention, and changes and modifications can be made by those skilled in the art without departing from the spirit and scope thereof.

I do not wish to be limited to the precise construction herein shown, but desire that my invention be construed as providing the means set forth in the appended claims whereby the rate of convergence of the magnetic lines of force toward the poles is very rapid and is greatly increased over that in lifting magnets of the prior art, thus materially increasing the portative force of the magnet. To secure these desirable results I employ pole pieces of linear character which it is evident may be either rectilinear or curved and need not be disposed precisely as shown in the drawings in order to secure the operation or effect thereof. I also provide a magnet which is constructed so as to afford great strength to the pole pieces by properly saturating the parts.

I claim as new and desire to secure by Letters Patent:

1. In a lifting magnet, a circular pole having a central opening and provided with an inner annular pole piece and an outer annular pole piece, said pole pieces lying in substantially the same plane, said outer pole piece being comparatively wide at its upper portion and being rounded on its inside to form a more or less sharpened lower edge substantially co-extensive with its outer circumference, said edge engaging and biting into the material to be lifted, an exciting soil carried by said frame entirely above said plane, and a cover-plate for said winding, said pole pieces projecting beyond the surface of said cover-plate.

2. In combination, a framework, a pair of pole pieces disposed in substantially the same plane, one of said pole pieces having a relatively wide upper portion and rounded on the inside thereof to form a more or less sharpened lower edge portion substantially coextensive with the periphery of said pole piece, said sharpened lower portion causing a convergence of the magnetic lines of force toward the lower portion of the pole piece, said sharpened portion engaging and biting into the mass of material to be lifted.

In witness whereof, I hereunto subscribe my name this fifth day of January A. D. 1907.

DUGALD C. JACKSON.

Witnesses:
WM. B. JACKSON,
DORA E. CASEY.