Aug. 28, 1956 G. W. FRAMPTON 2,761,094

MAGNETIC HOISTS

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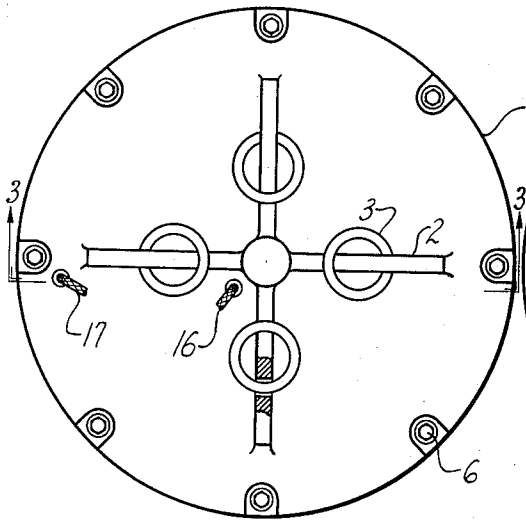


Fig. 1

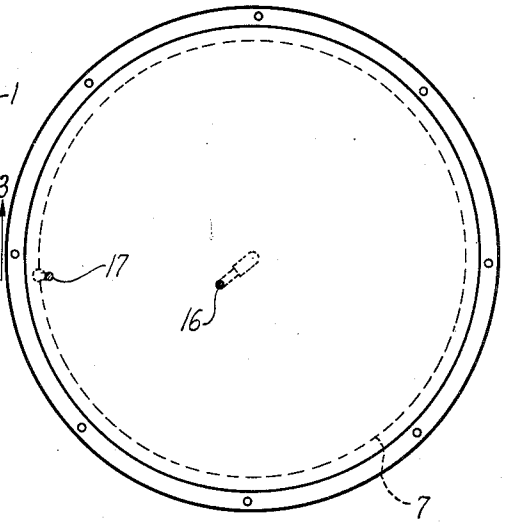


Fig. 2

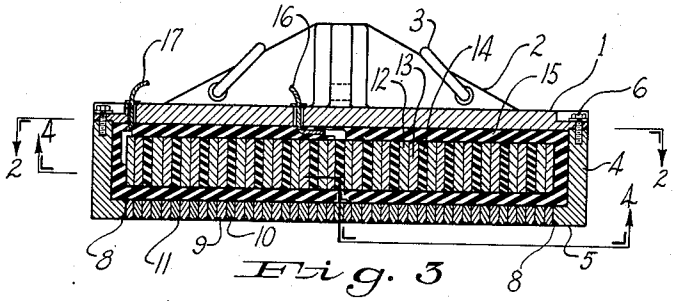


Fig. 3

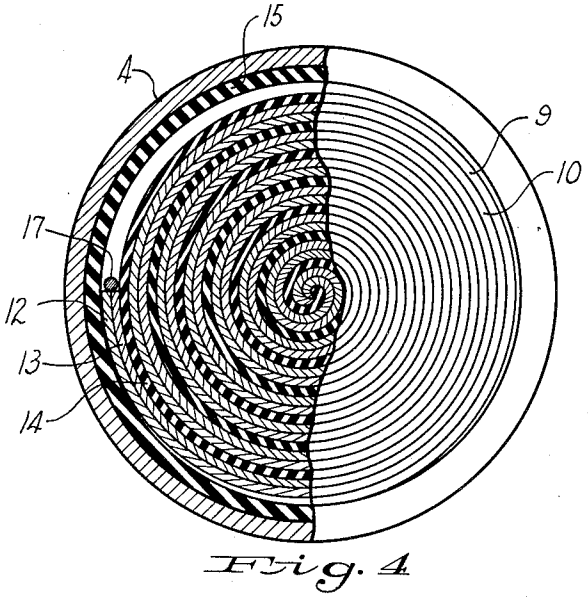


Fig. 4

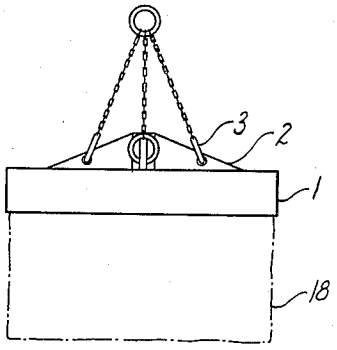


Fig. 5

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MAGNETIC HOISTS

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3 Claims. (Cl. 317—164)

This invention relates to new and useful improvements in electromagnetic lifting chucks such as are employed in the handling of scrap metals and the like, and it is among the objects thereof to provide a chuck in which the face plate and coil are constructed and aligned in a manner to obtain a uniform subdivision of the magnetic poles over the entire work-engaging surface to render it capable of lifting any size materials at any portion of the working surface.

It is a further object of the invention to construct both the surface plate and coil of spiral convolutions which are in substantial register with one another to thereby provide straight-line magnetic fields whereby the separating gaps between the separate pole fields are minute.

It is still a further object of this invention to construct the magnet bottom by spirally winding two metallic ribbons simultaneously, one having good magnetic qualities and the other being non-magnetic material, and subsequently fuse the working faces of the bimetallic convolutions to constitute the contract surface a solid mass.

The invention will become more apparent from a consideration of the accompanying drawing, constituting a part hereof, in which like reference characters designate like parts, and in which—

Figure 1 is a top plan view of a magnetic hoist chuck embodying the principles of this invention;

Figure 2 is a plan view with cover removed taken along the line 2—2, Fig. 3;

Figure 3 is a vertical cross-sectional view taken along the line 3—3 of Figure 1;

Figure 4 is a bottom plan view partially cut away taken along the line 4—4 of Figure 3; and

Figure 5 is a side elevational view of the chuck diagrammatically illustrating the loading thereof.

With reference to the several figures of the drawing, numeral 1 designates a top steel casting having radial ribs 2 provided with hoist rings 3. Numeral 4 designates an annular steel housing having a bottom flange 5 which is secured to the top plate 1 by bolts 6 as shown in Figures 1 and 3.

A surface plate, generally designated by the numeral 7, is secured to the housing 4 as by welding shown at 8 to constitute the contact surface for engaging the material to be handled, such as steel and iron scrap of various shapes and sizes. The surface plate 7 is constructed by winding two metallic ribbons 9 and 10 of material in the form of a spiral, one of these ribbons being magnetic iron or steel of high magnetic qualities, and the other having non-magnetic characteristics, such as aluminum, brass or other non-ferrous metal, the bimetallic ribbons being fused or integrally joined at their exposed edges in the manner shown at 11, Figure 3, or along their entire contacting faces in any suitable manner, to form a solid surface for withstanding impact and normal wear. An energizing coil is formed by spirally winding a ribbon 12 of ferrous metal and a ribbon 13 of non-ferrous metal with a strip 14 of insulating material therebetween. The coil is suitably insulated by insulating material 15 as shown in Figure 3,

and is provided with electrical connections 16 and 17 as shown in Figure 3 which constitute the electrical terminals of both the ferrous and non-ferrous strips. The insulating material 15 must be of a quality to protect the coil from induction voltage damage which is at a maximum when the energizing current is interrupted. It is to be noted that the convolutions 12, 13 and 14 of the magnetic and insulating material of the energizing coil are in substantial alignment with the convolutions 9 and 10 of the magnetic and non-magnetic material of surface plate 7 to decrease the length of the effective magnetic path, thereby obtaining the desired magnetic gap whereby the magnet will have attraction in varying degrees between any two points having a different length of radius with the greatest attraction towards the center of the plate.

When the magnet is energized the center area of the surface plate 7 becomes one pole of the magnet and the outer edge or rim area, which is the annular housing 4 and flange 5, acts as the opposite pole. The magnetic path is from the center of surface plate 7 upward through the ferrous part of the spiral convolutions of plate 7, through the insulation material 15, thence through the ferrous convolutions 12 of the energizing coil, through the top insulation 15, and thence to the cover member 1 and to the annular housing 4.

As illustrated in Figure 5, the particles of metal to be lifted by the magnet are diagrammatically shown by the line 18 as evenly distributed over the face of the lifting magnet.

By the use of the aluminum strip with the ferrous magnetic strip 9 and 10 in the surface plate 7, the magnet will be of minimum weight. By fusing the adjoining edges of the surface plate 7 as shown at 11 in Figure 3, moisture cannot seep through the surface plate to the insulation and coil in the center of the housing. By the arrangement of the convolutions of the magnetic strip of the coil in alignment with the magnetic strip of the surface plate, the entire surface area of plate 7 is magnetized, so that small articles of scrap can be handled as efficiently as larger articles.

In conventional practice the gap between the housing 4 and the center of the surface plate is substantial, so that a large article must bridge this gap before smaller particles can attach themselves thereto. This is not required in the present structure where each convolution of the ferrous strip constitutes a different pole.

Although one embodiment of the invention has been herein illustrated and described, it will be evident to those skilled in the art that various modifications may be made in the details of construction without departing from the principles herein set forth.

I claim:

1. A lifting magnet comprising an annular steel housing, a disc shaped surface plate extending across the bottom of the housing comprising a spirally wound bimetallic element having one metal of highly magnetic properties and the other of non-magnetic properties, integrally joined to the housing, and an energizing coil within said housing insulated from said surface plate and housing, said energizing coil consisting of spirally wound alternate layers of ferrous and non-ferrous metal strips in contiguous side contact with each other throughout their entire length in the coil and being provided with a strip of insulating material between each of the alternate contiguous layers of ferrous and non-ferrous metal strip throughout the coil.

2. A lifting magnet comprising an annular steel housing, a disc shaped surface plate extending across the bottom of the housing comprising a spiral winding of a bimetallic element having one metal of highly magnetic properties and the other of non-magnetic properties integrally joined to the housing, the spiral winding of said element extending from the center to the outer edge there-

of, and an energizing coil within said housing insulated from said surface plate and the housing, said energizing coil comprising a spiral winding of alternate layers of ferrous and non-ferrous metal strip in contiguous side contact with each other through their entire length in the coil and being wound with a strip of insulating material between each of the alternate contiguous layers of ferrous and non-ferrous metal strip throughout the spiral coil, the centers of said bi-metallic elements of the surface plate and energizing coil being in co-axial alignment.

3. A lifting magnet comprising an annular steel housing having a common central axis, a disc shaped surface plate extending across the bottom of the housing comprising a spirally wound flat bimetallic strip having one metal of highly magnetic properties and the other of non-magnetic properties integrally joined to the housing and having the flat sides of the strip spirally wound about the central axis of the housing, an energizing coil of flat composite strip material axially spaced and insulated from said surface plate and spirally wound about the axis of the housing consisting of alternate layers of ferrous and non-ferrous metal strip in contiguous side contact with each other throughout their entire length in the spiral coil and being provided with a strip of insulating material between each of the alternate layers of suitable thickness so that the flat sides of the energizing coil and the flat sides of the strips in the surface plate lie in a vertical plane to produce straight line magnetic fields through the energizing coil and surface plate.

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