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LIFTING MAGNET

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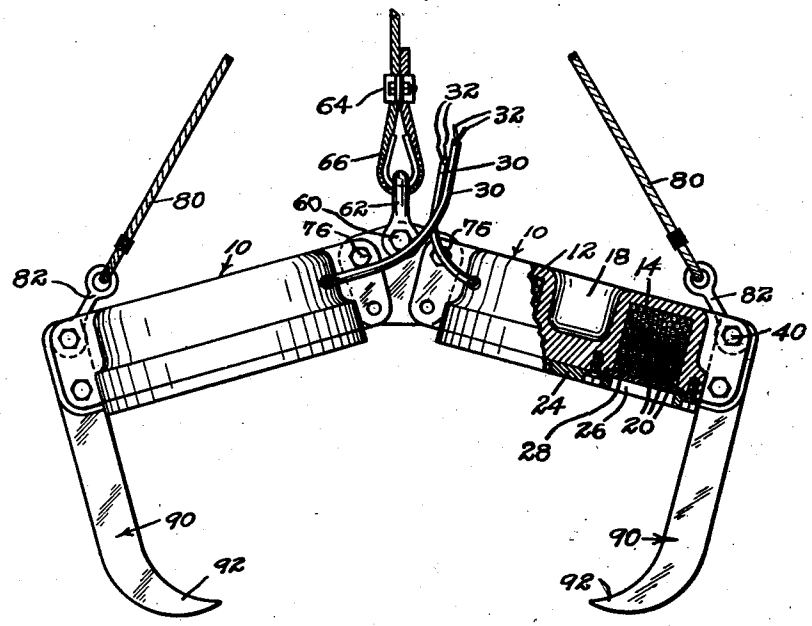


Fig. 1.

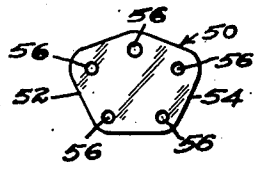


Fig. 2.

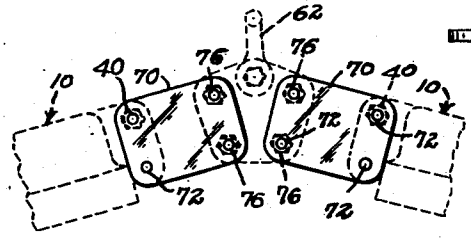


Fig. 3.

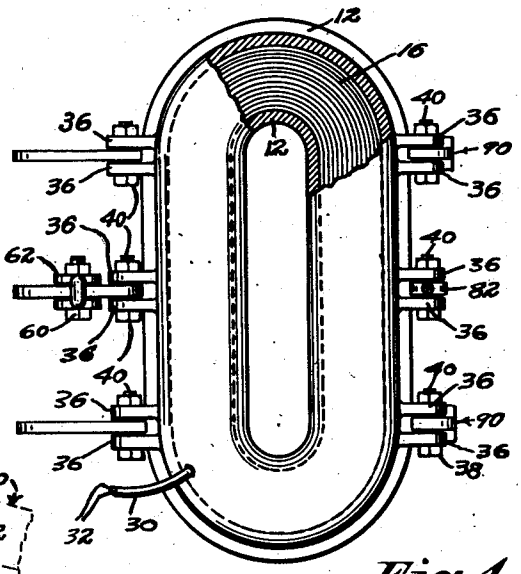


Fig. 4.

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LIFTING MAGNET

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1 Claim. (Cl. 294—65.5)

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This invention relates to lifting magnets of the type commonly used to pick up heavy ferrous materials.

It is an object of this invention to provide a lifting magnet having hooks for cooperation with the magnetic units thereof in the lifting of either ferrous, non-ferrous or mixed material.

Another object of the invention resides in the provision of a lifting magnet comprising a plurality of magnetic units disposed side-by-side, each of the units being particularly designed for attachment to and cooperation with others of the units to provide a lifting magnet of great power.

Another object of the invention resides in the provision of a lifting magnet including a plurality of magnetic units and which is particularly adapted to have other magnetic units added thereto to increase its power when desired.

Still another object of the invention resides in the provision of a lifting magnet comprising a plurality of magnetic units which are adapted to be pivotally secured together for pivotal movements in a single plane and with respect to each other and particularly adapted for defining such pivotal movements in cooperation with hooks employed on end sides of end ones of the units for facilitating the grabbing and lifting of material.

A further object of the invention is to provide a magnetic unit as described having outwardly protruding ears particularly arranged in cooperation with the ears of other similar units to provide the above described pivotal connections and to facilitate the attachment of hooks thereto.

Yet a further object of the invention resides in the provision of a lifting magnet having separate magnetic units and further having a connecting member of advantageous design disposed between central adjacent ones of said units for connecting the same together.

A further object of the invention is to provide a lifting magnet as described including means so designed as to cause the units comprising the magnet to together define a concave underside for extending around material to be lifted.

Another object of the invention is to provide a device for the purpose described which is sturdy and durable in construction, reliable and efficient in operation and relatively simple and inexpensive to manufacture, assemble and utilize.

Other and still further objects and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof:

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In the drawings:

Figure 1 is a side elevation of the lifting magnet of the invention shown having controlling cables secured thereto, upper portions of the controlling cables and of the electrical power supply cables being broken away, an end portion of the housing of the magnetic coil of one of the magnetic units being broken away and other portions being shown in cross-section, the units of the magnet shown in Figure 1 being disposed in a relaxed position having the underside of the units of the magnet defining a concave curve.

Figure 2 is a side elevation of a connecting member employed.

Figure 3 is a side elevation of two spacing members of the invention shown in position securing together two adjacent magnetic units of the invention and secured to the connecting member or plate of Figure 2, the said units and connecting member being shown in dotted lines.

Figure 4 is a top plan view of one of the magnetic units of the invention, shown with the connecting member of Figure 2 attached, also having other attachment plates shown in position, two hooks of the invention being shown attached to their respective ears, and the lower portion of an eyelet member being shown as secured to centrally disposed ears of the magnetic unit.

The lifting magnet of this invention includes a plurality of magnetic units, generally indicated at 10 in the drawing. Each magnetic unit 10 is preferably of an oval shape as best shown in Figure 4, and includes an outer casing 12 which is preferably of oval shape.

The casings 12 are each provided with an oval recess 14 therein entering from the lower side thereof. The recess 14 is for the purpose of receiving a magnetic coil 16 as later described.

The upper side of each casing 12 is provided with a coil 18 therein which is disposed between those housing portions which form the inner sides of the recesses 14.

The coil 16 may be composed of any suitable quality of wire and may be disposed in several sections, each section being separated by insulating partitions 20 from an adjacent lower and upper section. The lower side of the casings 12 is covered by a suitable fire-resistant material 24 which latter forms a plate covering the outer side of each housing 12.

The plate 24 is provided with an oval shaped opening 26 thereto through which magnetic force may act upon material to be lifted. The lower plate 24 is held to the housing 12 by means of suitable bolts. Above the opening 26 a suitable,

rough, preferably wear-resistant, insulating material 28 is provided for protecting the coil from the material to be lifted.

Each of the units 10 is provided with a power intake cable which latter each has two wires 32 therein which are in use connected to a suitable source of electric current.

The housings 12 are provided on their two parallel outer sides with a plurality of spaced apart ears 36 which latter are arranged so as to provide three pairs of ears to a side. Those ears 36 which comprise a pair are closely spaced apart and are rigidly secured to the housing 12.

The ears 36 are all provided with apertures for receiving bolts 40. The bolt apertures in those ears 36 which are disposed on one side of the housing 12 are all disposed in alignment with those other bolt apertures which are disposed on the same side as the housing 12.

The ears 36 are each provided with two spaced apart apertures for the purpose of receiving bolts 40. The apertures in each ear 36 are disposed in a line preferably at a right angle with respect to the underside of the units 10 and extending upwardly therefrom.

A connecting member 50 is provided in the invention as best shown in Figure 2. The connecting member 50 is preferably provided with five sides, at least two spaced apart ones 52 and 54 of the sides are disposed at an inclination to each other for a purpose later described.

The connecting member 50 is provided preferably with five apertures 56 therethrough, each disposed closely spaced inwardly from the five corners of the connecting member 50. The sides 52 and 54 each have two of the apertures 56 disposed in a line in parallelism therewith.

The purpose of the connecting plate 50 is to secure two adjacent ones of the magnetic units 10 together. For such purpose the connecting plate 50 is disposed between those ears 36 of the center pairs of ears on adjacent sides of two magnetic units 10 which are disposed alongside each other. Bolts 40 are disposed through those apertures 56 which are on the upper or more spaced apart ends of the sides 52 and 54. The same bolts 40 are at the same time disposed through the uppermost aperture in the said center pair of ears. When coupled together in this fashion the magnetic units 10 will be free to pivot upwardly toward either side of the connecting member 50; however, they will be prevented from pivoting excessively in downward direction toward each other. In other words, they will be maintained in rest position, as is shown in Figure 1, with the undersides of the two magnetic units disposed at an acute angle with respect to each other.

The uppermost aperture 56 of the member 50 is employed for the purpose of retaining a bolt 60 for securing the connecting member 50 to a U-coupling 62. The latter may be secured by a cable clamp 64 to a cable 66.

If it should be desired to space the magnetic units further apart than they are shown in Figure 1, suitable spacing members 70 are provided by the invention, as best shown in Figure 3. The spacing members 70 are each preferably of a rectangular shape having apertures 72 in the four corners thereof, the said apertures themselves being disposed in the form of a rectangle.

Two of the spacing members 70 can be disposed interconnecting the central pairs of ears on the opposing sides of two side-by-side magnetic units 10. The spacing members 70 are placed between the connecting member 50 and the oppositely

disposed magnetic units 10. The connecting members 70 are rigidly secured by means of four bolts 76 to the walls of those apertures 56 of the connecting member 50 which are on the sides 52 and 54 respectively thereof.

The outer ends of the spacing members 70 are each connected at their uppermost outer apertures 72 to the uppermost respective apertures of the center pair of ears on the oppositely disposed sides of the two side-by-side magnetic units 10, as best shown in Figure 3.

The outer lower apertures 72 of the spacing members 70 are preferably not bolted, so that the units 10 are free to swing upwardly, but not downwardly, with respect to a spacing member 70.

When two of the magnetic units 10 are hooked together as shown in Figure 1, they are caused to swing or pivot with respect to each other by means of any suitable power lifting arrangement, not shown. The latter can be attached to two cables 80 as shown in Figure 1, the latter each extending downwardly to suitable double-eye members 82.

The members 82 are themselves secured by means of bolts 40 to those center pairs of ears 36 which are disposed upon the outer sides of the two magnetic units 10.

A pair of hooks 90 are provided on each end of the outer side of each of the two units 10 as shown in Figure 1. The hooks 90 are elongated members having their upper ends secured by suitable bolts 40 to those end pairs of ears 36 which are on the outermost sides of the units 10.

The hook members 90 extend downwardly and terminate preferably in pointed sections 92 which latter point inwardly toward each other when the magnetic units 10 are in operating position as shown in Figure 1.

In operation, the lifting magnet of the invention is as shown in the position of Figure 1 at a time when it is descending upon material to be lifted. The operator will then permit the device to spread out around the material, the two magnetic units 10 moving upwardly about the connecting member 50.

At such time the material to be lifted, if it is ferrous, will be drawn to and upheld by the magnetic coil 14. If the material is not ferrous it will be upheld by the hooks 90. If the material is a mixture of partly ferrous and partly non-ferrous pieces, the ferrous pieces will tend to pinch between them certain of the non-ferrous pieces as the ferrous pieces are drawn toward the magnetic coils 14.

It will be seen that as many of the magnetic units 10 as are desired can be coupled together by connecting pieces or spacing members 70 and disposed side-by-side to give a magnet of more pulling power. With such an arrangement the hooks 90 will be disposed on the outerside of the outermost of the magnetic units 10.

This invention has provided a lifting magnet having hooks for cooperation with the magnetic units thereof for more efficient operation, a lifting magnet the power of which may be easily varied and a lifting magnet which includes a connecting member of particular design for controlling the position of the magnet preparatory to grabbing objects to be lifted, and an article of manufacture comprising a magnetic unit of superior construction.

From the foregoing description, it is thought to be obvious that a lifting magnet constructed in accordance with my invention is particularly adapted for use by reason of the convenience

and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification including variations in the shape and size of the parts without departing from the principles and spirit thereof, and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice, except as claimed.

I claim:

A lifting magnet comprising: a plurality of magnetic units disposed side-by-side, said magnetic units each having a substantially flat work-engaging surface; two pairs of ears one pair secured to and protruding outwardly from adjacent sides of each of said units, the ears of a pair being spaced apart with respect to each other, said ears having apertures therethrough extending in parallelism with said surface; a connecting member disposed between the ears of both of said adjacent units, said connecting member having two opposite side surfaces inclinedly disposed with respect to each other, said connecting member having an aperture therethrough adjacent each end of each inclined side surfaces; removable bolt means for securing said connecting member to said ears through selected ones of said connecting member apertures; and cable-like lifting members attached one each to said connecting piece and to the outer extremities of the outermost sides of said units.

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