Aug. 8, 1967 R. A. CORVINO 3,335,378

MAGNETIC APPARATUS FOR HANDLING BALE-LIKE OBJECTS, CONTAINERS AND THE LIKE

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Fig. 1.

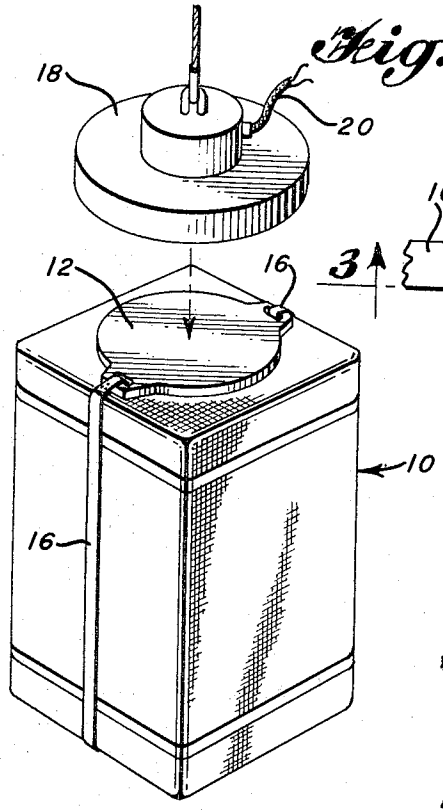


Fig. 2.

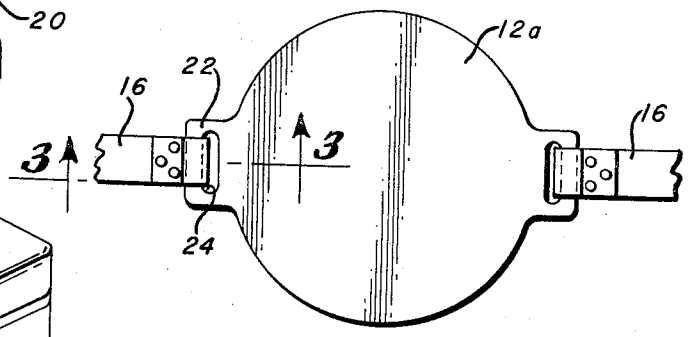


Fig. 3.

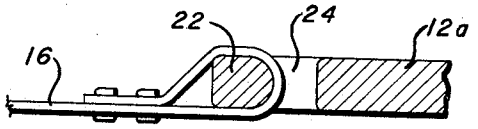


Fig. 4.

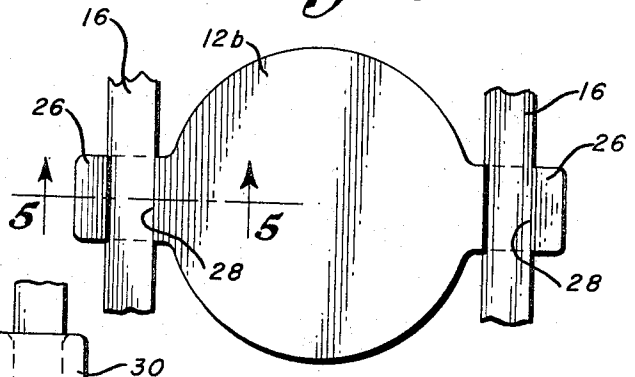


Fig. 6.

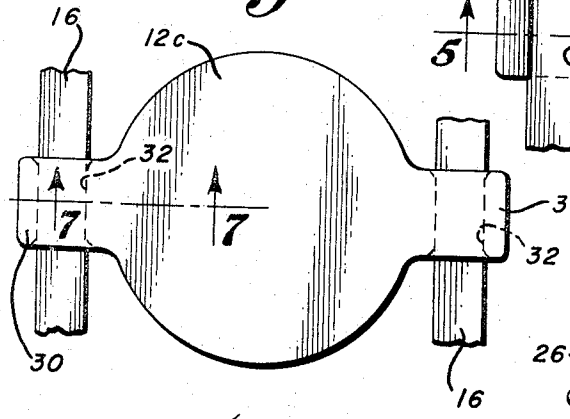


Fig. 5.

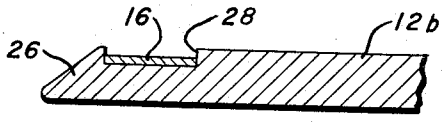
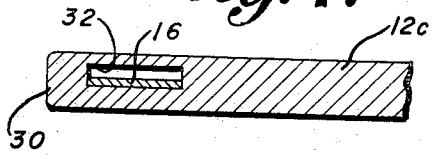


Fig. 7.



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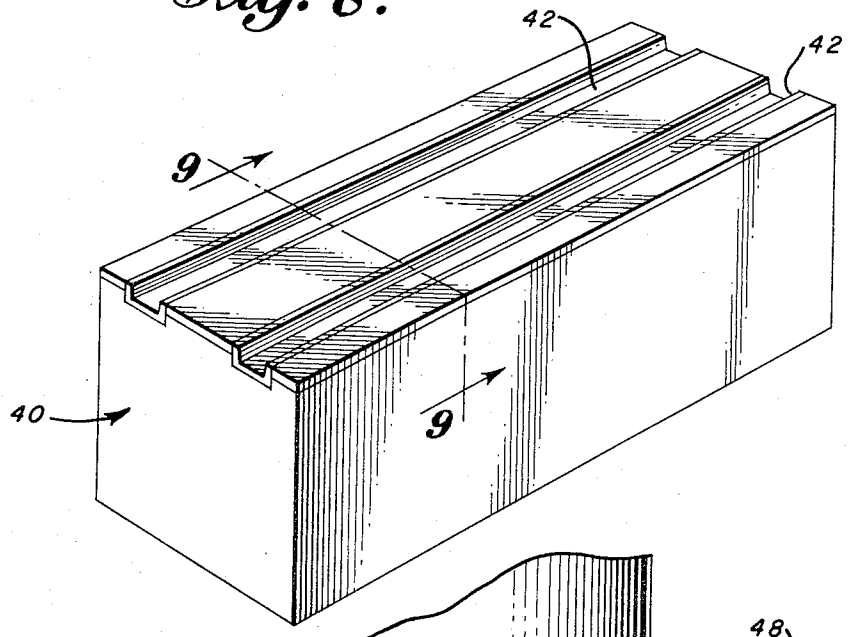
ATTORNEYS

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Fig. 8.



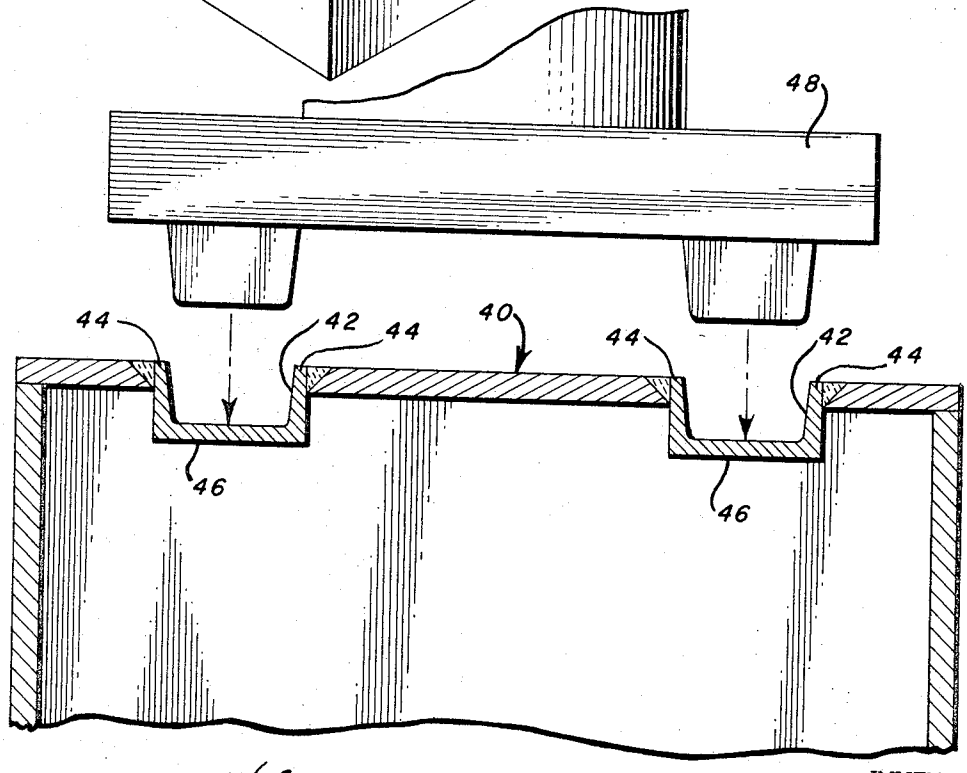


Fig. 9.

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MAGNETIC APPARATUS FOR HANDLING BALE-LIKE OBJECTS, CONTAINERS AND THE LIKE

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Filed Aug. 27, 1965, Ser. No. 483,177
8 Claims. (Cl. 335—286)

This invention relates to material handling apparatus and more particularly to an arrangement whereby metallic plates or channel members are attached to non-magnetic bale-like objects or containers so that said bales or containers can be lifted and handled by electromagnetic cranes or lifting units.

It is common practice to bind wood pulp, rags and other loose materials into bale-shaped objects by the use of steel or fabric bands wrapped tightly therearound. After the bales are formed, hauling straps or nets are placed around the bales which terminate in an upward extending hook. When the bale is to be transported, a hook-bearing crane or hoist is used. This requires a person at the loading station who manually engages the hooks. After the bale has been transported to the unloading zone, such as in the hull of a ship or on a freight car, another person is required to manually disengage the crane hook from the bale hook.

It can be appreciated that the requirements of the above-mentioned handling arrangement is expensive, time consuming and requires at least three crewmen: the crane operator and two men to manage the hooks. It is a primary object of the present invention to provide an arrangement for handling these bale-like objects or containers which enables rapid handling thereof by the crane operator alone.

One embodiment of the present invention comprises an enlarged plate which is placed on the bale-like object immediately prior to the banding thereof so that said plate is rigidly secured to the bale of non-magnetic material. The bale can then be quickly and easily handled by use of an electromagnetic lifting unit without the need of hooks or crewmen to operate the hooks.

Another embodiment of the present invention comprises a pair of channel beams rigidly embedded in and welded to the top of a shipping container which is handled by a rectangular parallel track type electromagnet.

Further objects of the present invention will become apparent from the following detailed description when taken in view of the appended drawings in which:

FIG. 1 is a perspective view of one embodiment of the present invention.

FIGS. 2, 4 and 6 are top plan views illustrating various plates comprising the present invention.

FIGS. 3, 5 and 7 are fragmentary side sectional views taken along lines 3—3, 5—5, 7—7 of FIGS. 2, 4 and 6, respectively.

FIG. 8 is a perspective view illustrating another embodiment of the present invention.

FIG. 9 is a fragmentary front sectional elevation taken along lines 9—9 of FIG. 8.

Referring to the drawings in detail, there is illustrated a bale **10** of pulp wood, cotton, rags or any other non-magnetic material which is to be loaded, unloaded and shipped. Immediately prior to the banding or strapping of bale **10** an enlarged metal plate **12** is placed on at least one side of bale **10**. Plate **12** is provided with securing slots through or in which conventional or steel bands or web straps **16** pass when bale **10** is being bound. With this arrangement, plate **12** is rigidly secured to bale **10** so that the lifting forces applied to plate **12** are transmitted throughout the bale by bands **16**.

In operation, when it is desired to move bale **10** to another location or load the same in the hull of the ship or on a freight car, a conventional electromagnet **18** is lowered by a boom or hoist operator and energized in the conventional manner through leads **20**. Plate **12** is immediately attracted to magnet **18** with sufficient force to secure and lift bale **10**. Bale **10** is then moved to the unloading zone and after being lowered to a surface, magnet **18** is deenergized and returned to the loading zone to pick up another bale.

It is apparent that the crewmen who normally engage the bale and hoist hooks are not needed with the present invention. When the bales arrive at their ultimate destination, plates **12** are removed and stacked and can be later used on returning cargo in the same manner described above.

Another feature in the operation of the present invention is that if a bale inadvertently tumbles to the side, a skilled hoist operator can use the electromagnet to righten the bale to a standing position. Again, no crewman is necessary to hook or unhook the bale to the hoist when righting the same to a standing position. The operation can be effected by a single hoist or crane operator and no additional crewman is necessary.

Referring now to FIGURES 2 to 7 there are illustrated various designs of plates that can be used pursuant to the present invention. Plate **12***a* is a circular disc provided with oppositely aligned projections or ears **22**. Each ear **22** defines an opening **24** through which the strap or band passes better seen in FIGURE 3. Strap **16** passes over and under ear **22** and is attached to itself by any suitable means.

Plate **12***b* is also a circular disc and has provided thereon squared projections **26** having a channel **28** defined therein and extending perpendicular to the direction of the projection **26**. Straps **16** lie in said channel **28** and relative lateral movement thereof is prevented by the upstanding sides of channel **28** and the tension in straps **16**.

Plate **12***c* also has oppositely aligned projections **30** with openings **32** extending through the center thereof in a direction perpendicular to the aligned direction of projections **30**. Straps **16** pass through elongated openings **32** to secure plate **12***c* to the bale.

The plates can be of any suitable metal which can be attracted by an electromagnetic field and they are preferably made of cast steel. The corners of plates **12** intended to contact the strap should be rounded, for example, with a radius of ¼ of an inch. If desired, the plan profile of plates **12** can be square, rectangular or any other desired shape without departing from the present invention. The size, shape and weight of plates **12** are normally determined by the cargo being handled.

Referring now to FIGURES 8 and 9, there is illustrated another embodiment of the present invention. A conventional elongated crate or container generally indicated as **40** having wooden or steel sides is provided with two elongated parallel channels **42**. Channels **42** of magnetic material are embedded in the top of container **40** so that channel tops are flush with the top of the container. Channels **42** run the entire length of the container and are welded, bolted or otherwise secured thereto, such connection being sufficient to transmit the entire lifting forces (load, container weight, acceleration and safety) through channels **42** to the entire container **40**.

Each channel **42** has two upstanding sides **44** and an interconnecting lower web section **46** which has a sufficient transverse dimension to receive the bottom of a rectangular parallel track type of electromagnet. See FIGURE 9. The parallel track type magnet is conventional and forms, per se, no part of the present invention.

The operation of the embodiment of the invention

shown in FIGURES 8 and 9 is the same as mentioned above and again it is pointed out that the hoisting of container 40 by electromagnet 48 is accomplished by the hoist or crane operator without the need of additional crewmen.

It should be understood that other and further modifications can be made to the herein disclosed apparatus without departing from the spirit and scope of the present invention. For example, plates 12 could be secured to more than one side of bale 10 and channel members 42 can be embedded and mounted to more than one side of container 40. It should also be understood that the electromagnets described herein are conventional and readily available in the commercial market and, apart from the combination herein disclosed, do not, per se, comprise the present invention.

What is claimed is:

1. In combination, a bale or box-like object of non-magnetic material having rectangular ends and sides and when on end, a height greater than either of the lateral dimensions, a generally flat plate of magnetic material positioned flat on one end of the object, and covering a substantial area thereof, said plate having on opposite sides two band-receiving parts to cooperatively receive a part of a band-like member and prevent relative movement thereof in a direction transverse to the length of that part of the band-like member, a band-like member tightly binding said object and having parts engaging said two band receiving parts to secure said plate to the end of the object, and a movable electromagnet to selectively electromagnetically engage and disengage said plate whereby the object can be handled and moved by operation of the electromagnet.

2. The combination of claim 1 wherein each band receiving part includes an aperture and the band-like member passes through each aperture and doubles back on itself.

3. An arrangement for handling bale or box-like objects which are non-responsive to an electromagnet comprising at least one magnetic member having a flat surface, said member being disposed on one face of the object, securing means rigidly maintaining said member on the object and a movable electromagnet adapted to be selectively energized and deenergized being magnetically connected to said member when energized and disengaging said member when deenergized whereby the object is handled and moved by the operation of said electromagnet, and wherein said at least one member comprises a pair of elongated spaced but parallel channels each channel being U-shaped and having two upstanding sides and an interconnecting web at the bottom thereof, the tops of said sides being flush with the face of the object.

4. The arrangement as set forth in claim 1 wherein each band-receiving part defines on its top side a channel with upstanding sides extending generally parallel with those of the other band-receiving part and said band-like member lying in said channel.

5. The arrangement as set forth in claim 1 wherein said band-receiving parts comprise generally parallel openings extending parallel with and between the top and bottom surfaces of the plate, said band-like member passing through each said opening.

6. The arrangement as set forth in claim 3 wherein said securing means comprises welds between the object and each channel.

7. The arrangement as set forth in claim 3 wherein said electromagnet comprises parallel track type magnets which are dimensioned to engage said interconnecting web.

8. The arrangement as set forth in claim 6 wherein said channels have substantially the same length as the object side in which they are secured.

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