Dec. 23, 1952 O. W. EHLERS 2,622,750

MAGNETIC LIFTING DEVICE FOR FORK TRUCKS

Filed July 5, 1949 2 SHEETS—SHEET 1

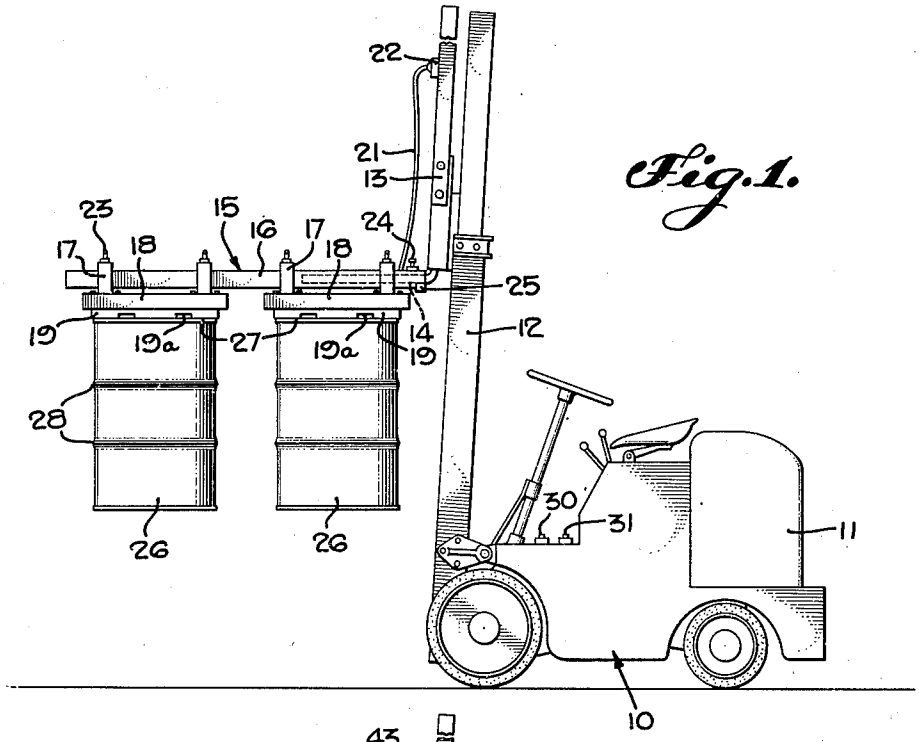


Fig. 1.

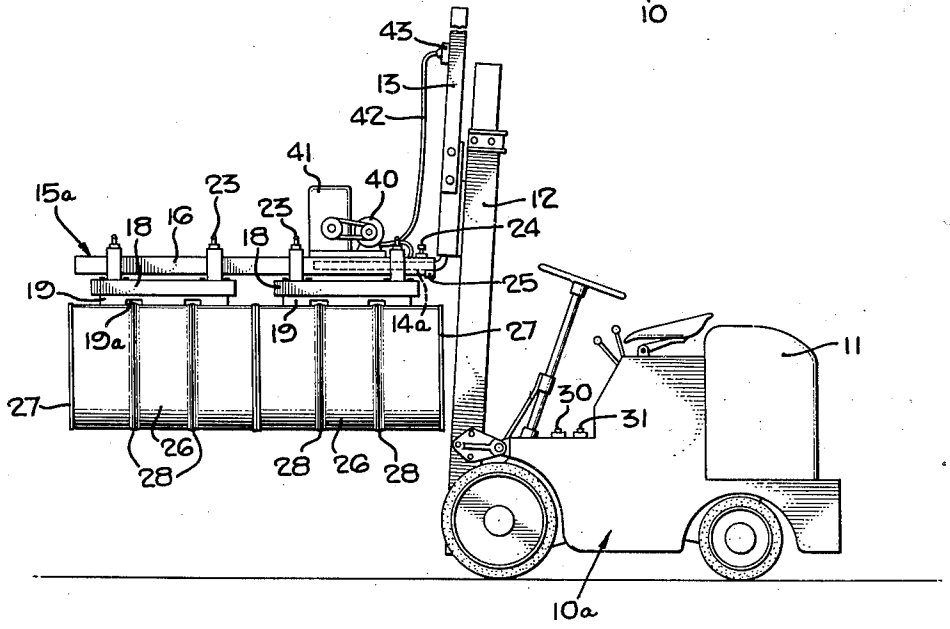


Fig. 2.

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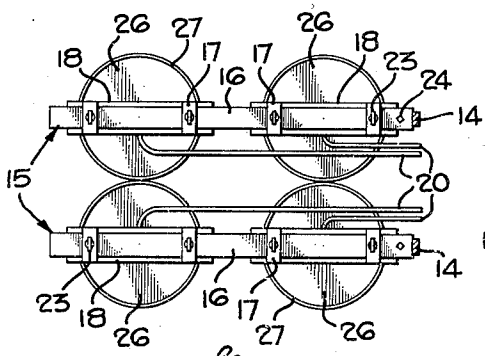


Fig. 3.

Fig. 4.

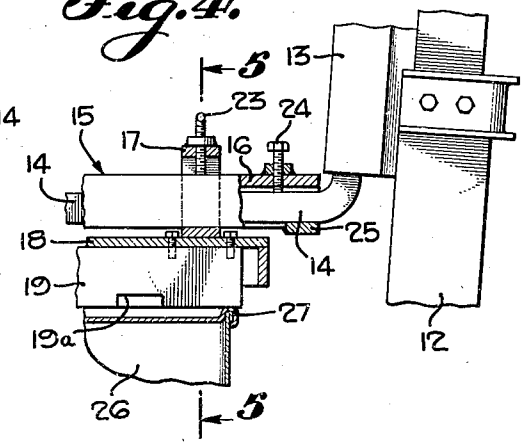
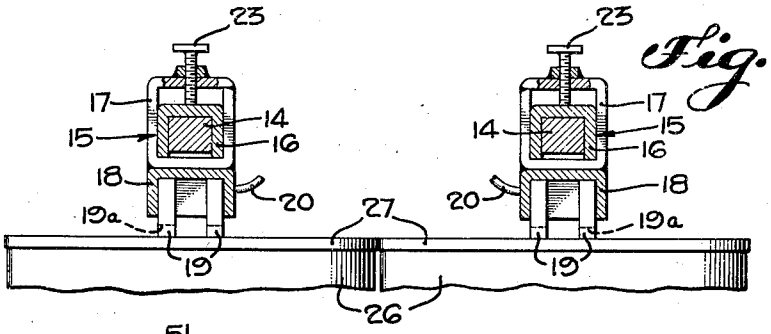


Fig. 5.



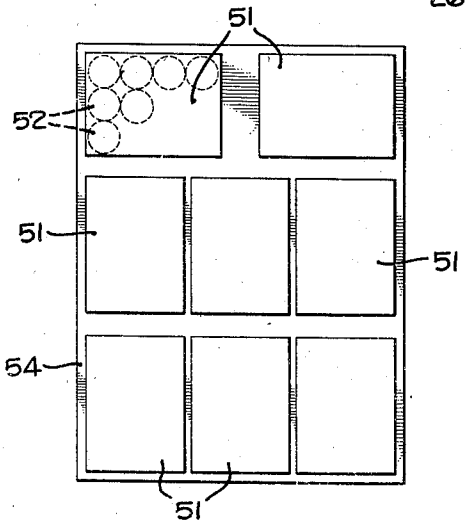


Fig. 6.

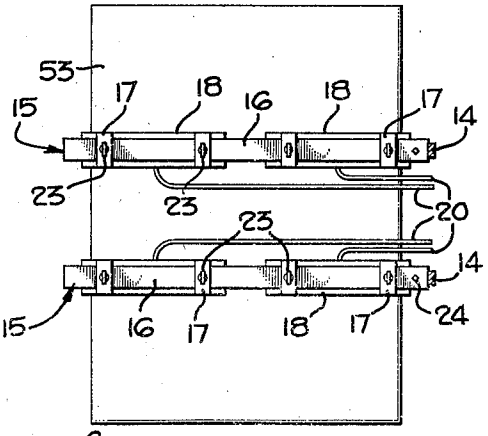


Fig. 7.

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MAGNETIC LIFTING DEVICE FOR FORK TRUCKS

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4 Claims. (Cl. 214—651)

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This invention relates to materials handling apparatus and is particularly directed to an improved form of magnetic lifting device for fork trucks.

The principal object of this invention is to provide magnetic means operable from a fork truck or the like for transporting empty metallic containers such as, for example, empty oil drums.

Another object is to provide a magnetic lifting device for handling packaged canned goods and the like.

Another object is to provide a magnetic lifting assembly which may be readily attached and detached from a conventional fork truck.

Another object is to provide such an assembly incorporating a prime mover and electric generator for supplying electrical energy to operate the magnets.

Other objects and advantages will appear more fully hereinafter.

In the drawings:

Figure 1 shows a magnetic lifting device embodying my invention as applied to a conventional electrically operated fork truck and utilized for lifting empty oil drums in an upright position.

Figure 2 is a similar view showing another form of the device and illustrating the use thereof in connection with lifting empty oil drums in horizontal position.

Figure 3 is a plan view of the magnetic device shown in Figure 1.

Figure 4 is an enlarged detail partly broken away showing the releasable connections between the fork truck and the magnetic lifting device.

Figure 5 is a sectional elevation partly broken away taken substantially on the lines 5—5 as shown in Figure 4.

Figure 6 is a top plan view of a pallet and a group of cases of packaged canned goods positioned on the pallet.

Figure 7 is a plan view of a modified form of lifting device embodying my invention for use in lifting the cases of packaged canned goods shown in Figure 6.

Referring to the drawings, the fork truck generally designated 10 may be of conventional style and may be operated from a source of electrical energy 11. The unit 11 may take the form of a storage battery or a motor generator set. In any event, the operator of the fork truck controls the operation of the truck by controlling the electrical energy delivered from the unit 11.

The fork truck 10 may include a pair of upright posts 12 carried on the forward end thereof, and a hoist unit 13 is mounted for vertical movement on the posts 12 in the conventional manner. Power means (not shown) driven from the electrical unit 11 serves to raise and lower the hoist unit 13 under the control of the operator of the fork truck. The hoist unit 13 includes a pair of forwardly directed forks 14. These forks serve as a support for the carrier units generally designated 15. Each of the carrier units 15 includes a channel member 16 which receives one of the forks 14. Each channel member 16 is encircled at intervals by support clips 17, and these clips in turn carry magnetic units 18. The magnetic units 18 are each provided with one or more magnet bars 19. A power supply cable 20 extends to each of the magnetic units 18 and each of the cables 20 is supplied with electrical energy from a common power cable 21. The cable 21 receives its power through a detachable connection 22 carried on the hoist unit 13. When electrical energy is supplied through the cable 21 each of the magnet bars 19 is energized. Means are provided for securing the magnetic units 18 with respect to the carriers 15, and this means includes the screw elements 23 which serve to prevent relative movement between the parts 18 and 15. The clips 17 can be adjustably positioned along the carriers 15 and anchored at the desired position by tightening the screw elements 23. The carriers 15 may each be secured to its respective fork 15 by means of set screw 24. A plate 25 extends across the sides of the channel member 16 in the region of the set screw 24 so that the forks are firmly secured by means of the set screws 24.

The magnet bars 19 are large enough in capacity so that two of them easily lift a standard oil drum 26 when it is empty. The drums may be lifted in vertical position as shown in Figure 1 or may be lifted in horizontal position as shown in Figure 2. The magnet bars 19 are sufficiently long so that they rest on the upper chain 27 of the drums 26 when the drums are vertical. Furthermore, the magnet bars 19 are notched as shown at 19a so that the bars engage the circumferential portion of the drums 26 while in horizontal position and the notches 19a provide clearance for the outwardly extending flanges or rolling ribs 28 conventionally provided on oil drums. As shown clearly in Figure 3, four drums 26 can be handled as a unit. Since the carriers 15 are mounted on the forks of the hoist unit 13, the drums can be lifted and carried from one location to another and can also be stacked as a second tier on the top of a lower tier of drums. When the drums are to be lifted the operator

energizes the cable 21 through suitable foot-operated switch means 30 and 31 and when it is desired to release the drums the circuit is broken.

Preferably the magnet bars 19 adjacent the hoist unit 13 are controlled by one of the switches 30 and the magnet bars 19 remote from the hoist unit 13 are controlled by the other switch 31. Separate control of the "near" and "far" magnet bars enables the operator to have the necessary selective control for loading the drums in pairs onto a moving conveyor (not shown) and for performing loading and unloading operations where it is desired to have selective control of the various magnet bars.

An important feature of my invention lies in the adjustability of the various magnet bars 19. The magnetic units 18 may be independently adjusted lengthwise along the carrier units 15, and the carrier units 15 may be spread laterally as desired by spreading the forks 14. The forks 14 are conventionally mounted on fork trucks in a manner so that the spacing between them may be adjusted as desired. This feature enables me to separate the parallel carrier units 15 to any desired extent within the limits of the fork truck mechanism for handling drums of various diameters. The electrical unit 11 which is normally used for operating the fork truck also serves as a supply source for the electrical energy required by the magnet bars 19.

In the modified form of my invention shown in Figure 2 the carriers 15*a* serve as a support for a power driven electrical generator 40. The generator 40 may be driven from any suitable prime mover such as, for example, the internal combustion engine 41. A control cable 42 extends to the disconnectable outlet box 43 mounted on the hoist unit 13. Suitable switch means (not shown) are provided on the fork truck 10*a* so that the operator may control the operation of the magnet bars 19 from the electrical energy supplied by the generator 40. This form of my invention which includes the power driven generator 40 on the carriers 14*a* is used when the fork truck 10*a* is driven mechanically from an internal combustion engine rather than from a source of electrical energy.

It will be understood that either of the magnetic lifting units shown in Figures 1 and 2 may be employed for operation on vertical or horizontal drums.

In the event that it is desired to use the fork truck for conventional lifting and carrying operations not requiring magnets, the set screws 24 may be released and the power supply or control cable detached from the hoist unit 13. The magnetic lifting unit may then readily be disconnected from the fork truck simply by backing the truck away from the unit as it rests on the ground. In this disconnecting operation the forks 14 move axially out of the encounter provided by the channel member 16. Similarly, the magnetic lifting units may be readily and conveniently connected for operation with a fork truck simply by running the forks 14 into the channel member 16, securing the set screws 24 and connecting the supply cable 21 or control cable 42, as the case may be.

In the modified form of my invention shown in Figures 6 and 7, a magnetic lifting device is employed for handling canned packaged goods. Canned fruits, vegetables or other commodities are conventionally packaged in non-magnetic packing cases 51. Each of these cases may contain a relatively large number of metallic containers 52. I have found that the magnetic lifting device may be employed for convenient handling of a plurality of cases 51 since the magnetic effect of the magnet bars 19 acts on the metallic containers within the non-magnetic containers. I prefer to provide a metal plate 53 and to secure it by any convenient means directly under the carriers 15 in contact with the individual magnet bars 19. When the magnet bars are energized the metal plate 53 becomes magnetic, and when this plate is positioned over a case of canned goods the latter is supported by the plate 53 by reason of the magnetic attraction between the plate 53 and the individual metallic containers 52.

The cases 51 of canned goods may be arranged in any suitable or desirable pattern on a conventional pallet 54 which is about the same size as the plate 53. The fork truck is then driven to a position adjacent the pallet so that the plate 53 is directly above the cases 51. The magnet bars are then energized through the cables 20, and the cases 51 then become supported by the plate 53 and may be carried from one location to another. Since the plate 53 is supported on the hoist unit 13, the cases may be raised to any suitable elevation for stacking.

The same type of magnetic apparatus can be used when initially filling the non-magnetic cases 51 with the metallic containers 52. The magnetizable plate 53 can be energized to pick up a group of containers in a pre-arranged pattern and then deposit them within the cases as a unit. In a similar manner, empty metallic containers can be magnetically withdrawn from a shipping case, filled with foodstuffs, beverages or any other commodity, and then handled magnetically in a group by the magnetic device for reloading into the cases.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. Lifting apparatus for use on the parallel forks of a materials-handling fork truck, comprising in combination a pair of substantially horizontal channel members each adapted to receive one of said forks in telescopic relation, releasable means for securing each channel member to its respective fork, a plurality of magnetic units spaced along said channel member and being provided with magnet elements for contacting a drum, a magnetizable plate carried on the channel members and engaged by said magnetic units.

2. Drum lifting apparatus for use on the parallel forks of a materials-handling fork truck, comprising in combination a pair of substantially horizontal carrier members each adapted to receive one of said forks in telescopic relation, releasable means for securing each carrier member to its respective fork, and a plurality of magnetic units spaced along each carrier member underneath the forks and being provided with magnet elements for contacting a drum, the magnet elements being so positioned that they may engage the upper end of an upright drum within the outer chine thereof and spaced so that they span across the rolling rings of a horizontal drum.

3. Drum lifting apparatus for use on the parallel forks of a materials-handling fork truck, comprising in combination a pair of substantially horizontal channel members each adapted to receive one of said forks in telescopic relation, re-

leasable means for securing each channel member to its respective fork, a plurality of magnetic units spaced along said channel member underneath the forks and being provided with magnet elements for contacting a drum, and a power driven generator supported on the channel members for supplying electrical energy to said magnet elements.

4. Apparatus for lifting non-magnetic cases filled with metallic containers, comprising in combination a pair of substantially horizontal parallel carriers each adapted to receive one of the parallel forks of a materials-handling fork truck in telescopic relation, releasable means for securing each of the carriers to one of said forks, magnetic units mounted on each carrier under said forks and provided with downwardly facing magnet elements, and means for simultaneously energizing the magnet elements.

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