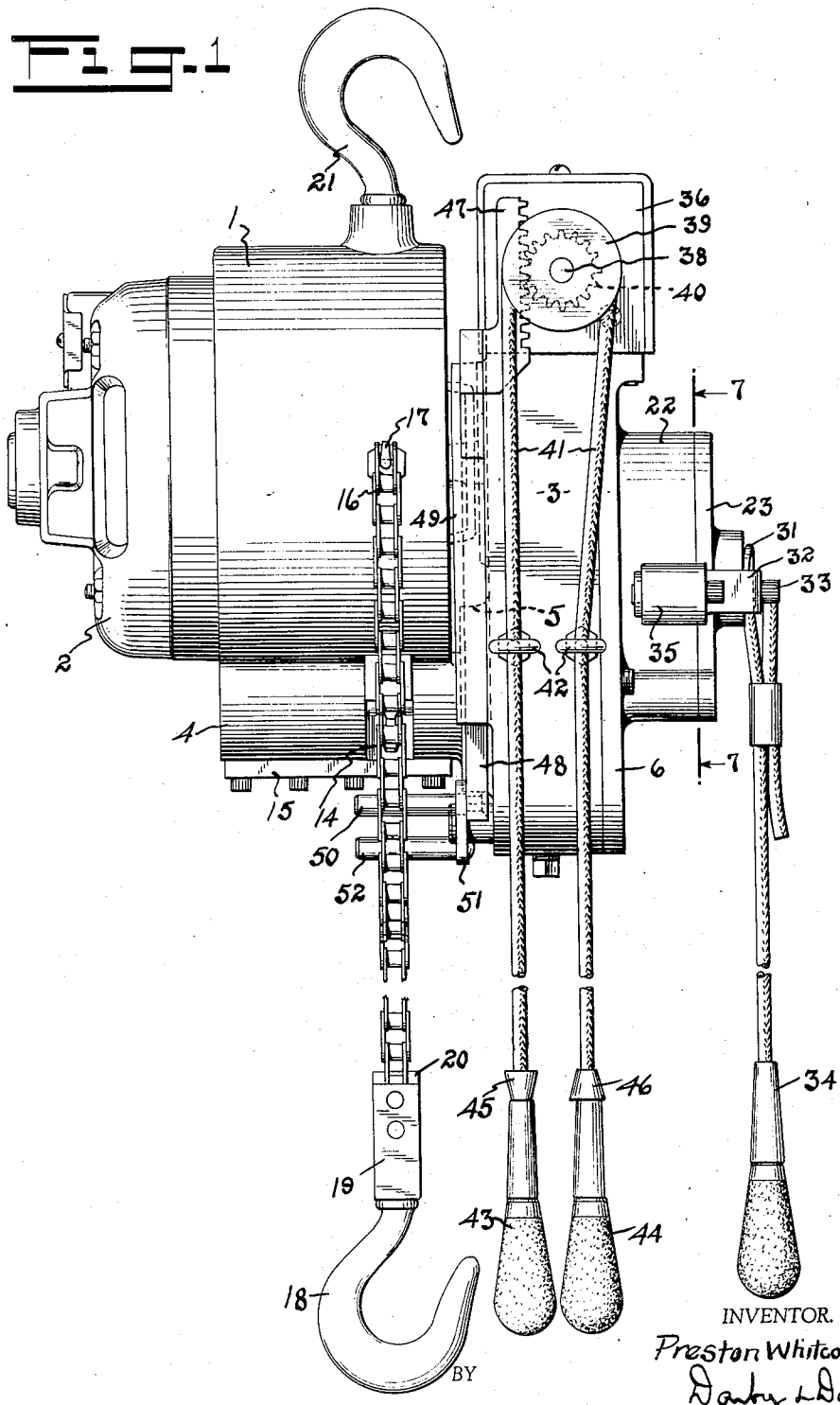
Aug. 20, 1940. P. WHITCOMB 2,211,873

ELECTRIC HOIST

Filed Oct. 6, 1937 4 Sheets-Sheet 1

Fig. 1



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Fig. 3

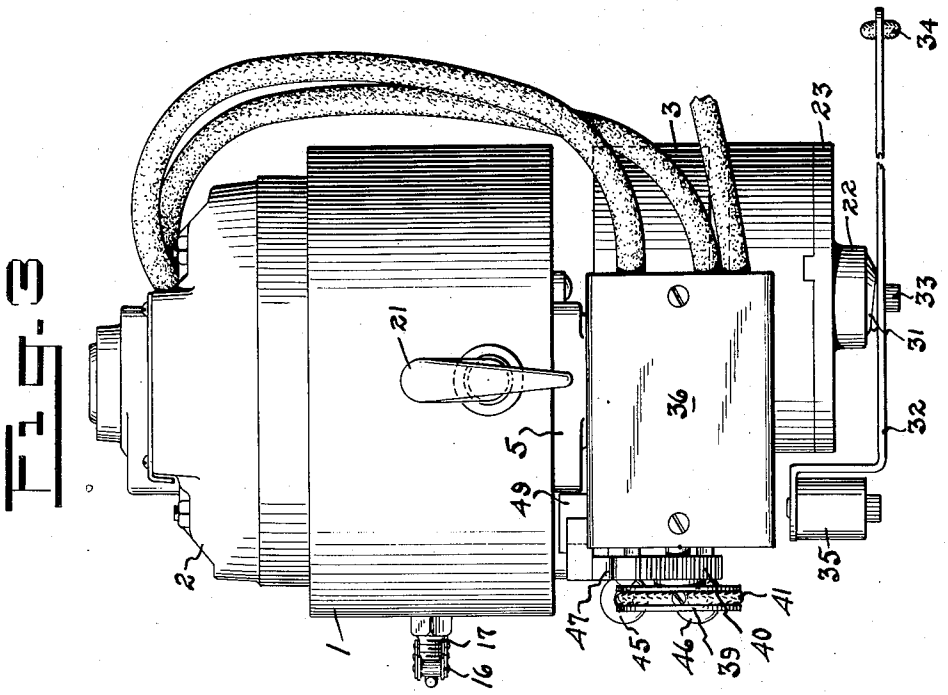
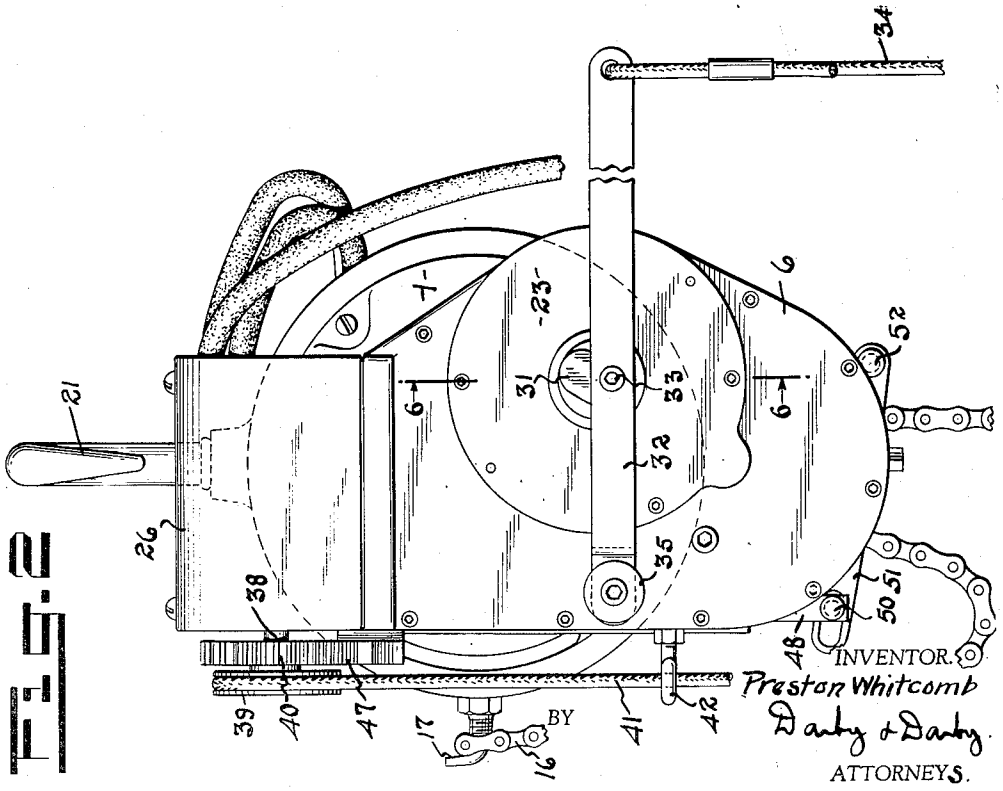


Fig. 2



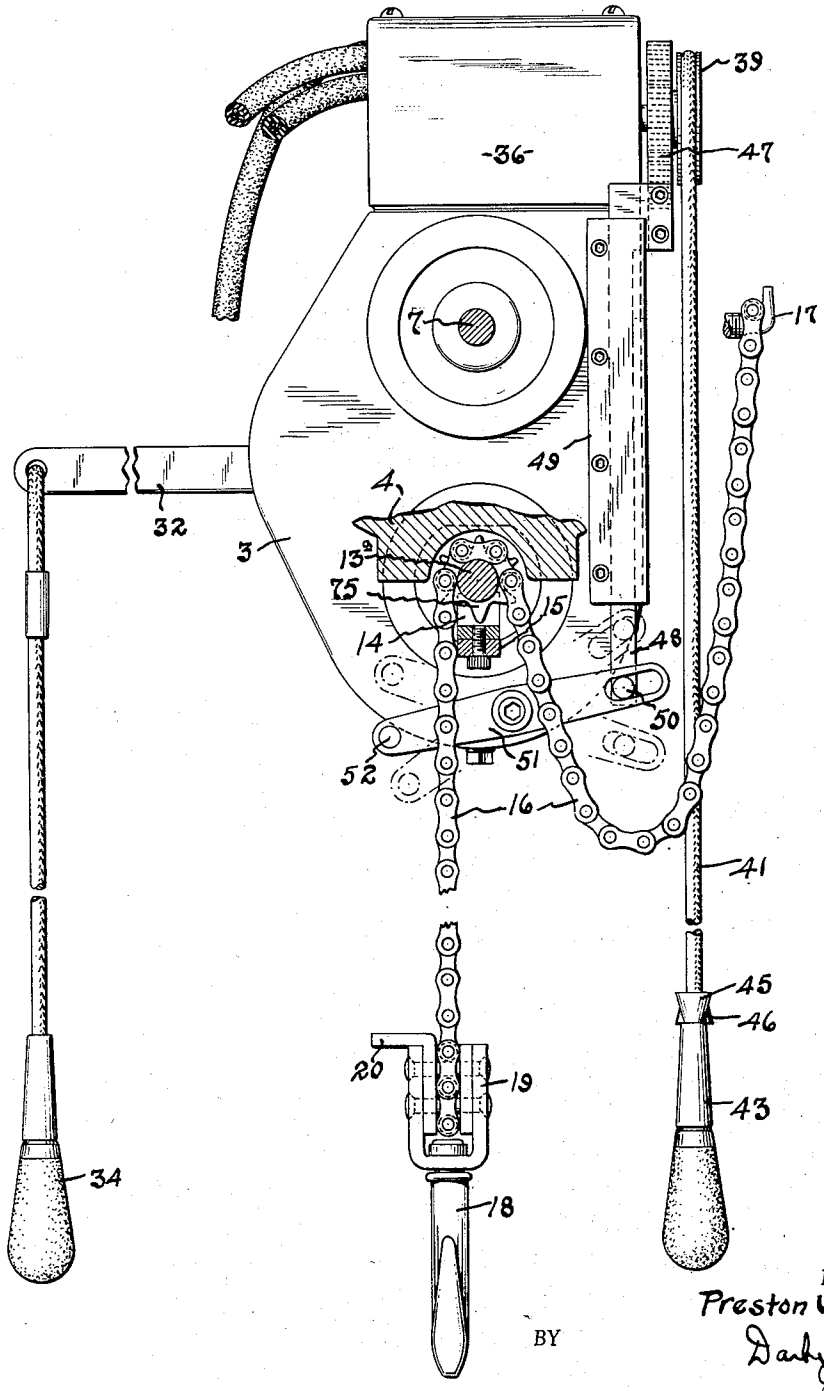
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Fig. 4



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Fig. 5

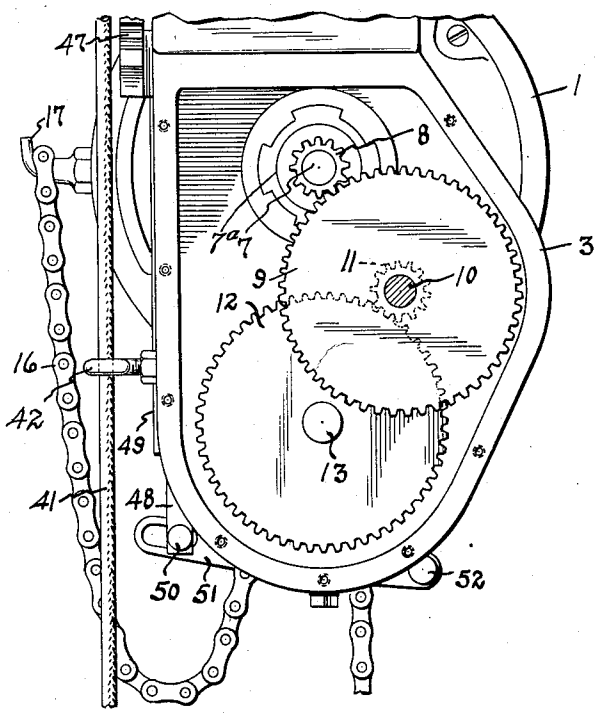


Fig. 6

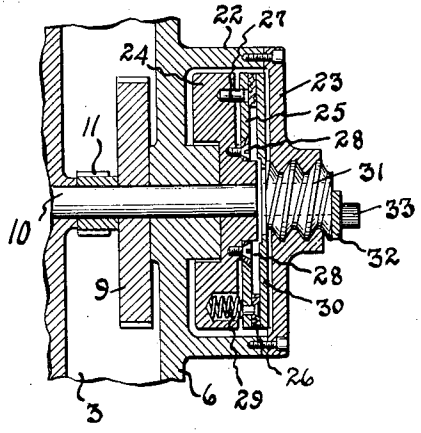
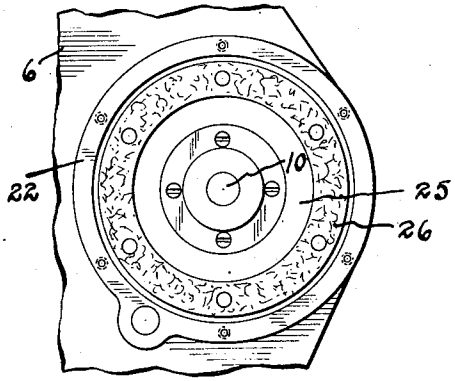


Fig. 7



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Patented Aug. 20, 1940 2,211,873

UNITED STATES PATENT OFFICE

2,211,873

ELECTRIC HOIST

Preston Whitcomb, Kenmore, N. Y., assignor to Manning, Maxwell & Moore, Inc., New York, N. Y., a corporation of New Jersey

Application October 6, 1937, Serial No. 167,484

1 Claim. (Cl. 254—168)

This invention relates to improvements in small electric hoists.

An object of the invention is to provide a compact, simple and rugged hoist structure which in proportion to the loads it is capable of lifting is remarkably light in weight and small in size.

A further object of the invention is to provide an electric motor hoist adapted for hook suspension, which is of such character as to provide maximum strength and good balance about a central vertical axis with low cost and simplicity of construction.

Further and more specific objects of the invention as will appear below are successfully secured thereby.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, all as will be described in greater detail in the following specification.

In the accompanying drawings,

Figure 1 is a front elevational view of the structure of this invention;

Figure 2 is a side elevational view thereof with some parts broken away;

Figure 3 is a top plan view thereof;

Figure 4 is an inside elevational view of the gear box and parts associated therewith showing the frame adjacent the chain pinion in cross-section;

Figure 5 is an elevational view looking into the gear box with its cover removed, with some parts broken away;

Figure 6 is a cross-sectional view taken on the line 6—6 of Figure 2; and

Figure 7 is a view looking into the brake housing on the plane 7—7 of Figure 1.

The full nature of the novelty and scope thereof as incorporated in this invention will be more quickly understood by first describing the structural details thereof. The main frame of the device consists of a ring-like casting 1 within which a standard fractional horsepower electric motor 2 is secured in the manner clearly illustrated. The housing casting 1 is provided with an integral journal member 4 at the bottom thereof provided with an integral bracket member 5 to which the gear housing 3 is secured in any suitable manner. The gear housing is provided with a removable cover plate 6 on which is formed a small cylindrical housing 22 which contains the brake mechanism and which in turn is closed by a removable cover plate 23.

Referring to Figure 5 it will be seen that the shaft 7 of the motor projects into the gear housing 3 and has mounted thereon a small drive pinion 8 which meshes with the driven gear 9, the projecting inner end of the motor shaft being journaled in a bearing 7a keyed in the gear housing end wall. This gear is secured, together with the pinion 11, to a jack shaft 10 which is journaled in the gear housing. The pinion 11 meshes with a driven gear 12 which is secured to the shaft 13. Shaft 13 extends through the back of the gear housing and into the journal housing 4.

As is clear from Figures 1 and 4, the journal housing is divided longitudinally into two parts to provide an opening into which the chain pinion 75 fits. The pinion is mounted on a short shaft 13a. The pinion 75 lies in a bearing block 14 which is U-shaped in form so that the pinion lies between the legs thereof, as is clear from Figure 4. The block 14 closes the lower half of the space in the bearing member 4 and is secured to and held in place by means of a bar 15 which is attached to the casting, as is clear from Figures 1 and 4, by screws or bolts. By this arrangement the chain is guided in its movement over the pinion 75.

The hoist chain is shown at 16, the upper free end of which is attached to the casting 1 by means of a hook 17 mounted on the casting. As is clear from Figure 4, the chain hangs in a loop between the pinion 75 and the hook 17. The other end of the chain is provided with the loading hook 18 which is attached thereto by means of a U-shaped yoke 19 and rivets, as is clear from Figure 4. Secured by these same rivets is an L-shaped bracket 20 which performs a function which will be described later. The suspension hook, by means of which the device is supported from overhead, is shown at 21 secured in any suitable manner to the casting 1. It is noted that the hook 21 is mounted directly over the pinion 75 and the weight of the various parts on either side of the axis which includes them is so distributed that the device is nicely balanced. This is of practical advantage since the loads on the chain are directly transmitted through the casting 1 to the overhead support without danger of causing the device to tip or swing.

As shown in Figures 6 and 7 the shaft 10 extends into the brake housing 22 and has secured on the end of it a disc-like member 24 which in turn loosely supports the inner brake disc 25. The disc 25 is held properly positioned and is caused to rotate with the disc 24 by reason of the pins 27 mounted in the latter disc and engaging apertures in the former. Screws 28 are also provided which are firmly secured to the disc 24 and extend through enlarged conical open-

ings in the disc 25 so that it is free to move axially of shaft 10 but prevented from coming off the disc 24. Secured on the outer face of disc 25 adjacent its periphery is a ring 26 of any suitable braking material, as for example leather or the like. This ring is attached by rivets, as is clear from the drawings. Rotatably mounted in the cover plate 23 is a threaded member 31 which has secured at its inner end the other clutch plate, which is shown in the form of the disc 30, positioned to engage the ring 26. When the member 31 is revolved in either direction the disc 30 is caused to have an axial movement either towards or away from the friction ring 26. Secured to the outer face of the member 30 by means of a screw 33 is the lever 32. At one end of the lever 32 is a handle 34 secured thereto by a suspending cord while there is mounted on the other end of the lever a weight 35. The threads of the member 31 are pitched in such a direction that when lever 32 is free the weight 35 tends to move the member 31 and the disc 30 inwardly to cause the disc 30 to engage the ring 26.

As will be apparent by tracing the motions through, a weight suspended on the hook 16 will tend to rotate the disc 25 in a direction so as to tend to cause the member 31 to move inwardly. Thus all of the forces involved, including the weight 35, are in a direction to tend to cause the brake to grip and hold the chain against movement. The various lever arms involved are so proportioned in relation to the strength of the springs 29, of which there are several distributed circumferentially around the disc 24, that all loads on the hook 18 up to the capacity of the device are insufficient to cause any movement of the mechanism unaided by the motor. However, when the motor is energized to move the hook 18 downwardly the resistance of the brake mechanism is overcome so that the hook may readily descend. In this connection it may be noted that even with the hook unloaded the motor may lower the chain against the resistance of the brake or clutch mechanism. When it is desired to lower the hook bearing a load without employing the motor this is done by releasing the brake, which is accomplished by pulling down on the handle 34. This rotates the member 31 in a direction so that the disc 30 moves away from the ring 26 to release the brake. By making the arm 32 of the proper length this control may be very sensitive and the loaded hook may be caused to descend very slowly or in small increments so as to be always under control. As soon as the handle 31 is released the weight 35 plus the tendency of the rotation of the disc 24 under the load of the hook are such as to cause the brake to firmly grip and stop all movement.

Mounted on top of the gear casing 3 is a switch 36, the details of construction of which are unnecessary to a full understanding of the invention except to note generally that when the switch is turned from its neutral position in one direction the motor, which is reversible, is energized for rotation in one direction, and when the switch is moved from neutral to its other position the motor is energized in the reverse direction. In this connection, depending upon the nature and field of use of the device, the switch may be of a type which requires continuous conscious effort to maintain it in either actuated position or may be of a type which remains in actuated position until returned to neutral position. The actuating shaft for the switch is shown at 38 and has secured thereto a pulley 39 and a pinion 40. Mounted on the pulley and preferably attached thereto are a pair of depending cords 41 which pass through guide eyelets 42 mounted on the gear housing and terminate in handle grips 43 and 44. At 45 and 46, respectively, are indicators which indicate, for example in the case of indicator 45, that when handle 43 is pulled downwardly the hook will move down and when handle 44 is pulled downwardly the indicator 46 indicates that the hook will move up.

At 47 is a rack member meshing with the pinion 40 and secured to a vertical slidable bar 48 mounted in a suitable guide member 49 on the rear face of the gear housing 3. The lower end of the bar 48 is provided with a pin 50 which extends through the slot in the end of a lever 51 pivotally mounted intermediate its ends on the rear face of the gear housing, as is clear from Figure 4. The other end of the lever 51 is provided with a pin 52 which is positioned to be in the path of travel of the arm 20 on the hook yoke. Pin 50 is positioned so as to be over the loop in the chain 16 between the chain pinion 75 and the hook 17.

To operate the device, handle 43 is pulled downwardly which rotates the pulley 39 and closes the switch to set up connections so that the motor 2 will rotate pinion 75 through the gear train in a direction to move the chain downwardly. At the same time pinion 40 moves the rack 47, bar 48, and right hand end of lever 51, Figure 4, downwardly so that the lever is in the dotted position shown. Thus the hook is lowered whether loaded or not, and if by oversight switch 36 is not shut off in time the shortening loop in the chain 16 will ultimately engage the pin 50 to move bar 48 and rack 47 upwardly, which will move the switch back to normal position and deenergize the motor. Thus the mechanism is stopped before the chain is drawn tight, eliminating any tendency to break the chain or the hook 17. Lever 51 is at the same time moved to neutral or full line position. The nature of this automatic stopping mechanism is such that even if the operator should hold on to the handle 43, which he would do particularly in the case of a switch that had to be held in operated position, the switch will be returned to neutral position. To raise the hook, handle 44 is pulled downwardly which rotates the switch in the reverse direction and moves lever 51 to the other dotted position (Figure 4) through the rack 47 and the bar 48. In this case the pin 52 is downward and in the event that the operator overlooks shutting off the device in time the arm 20 will engage the pin 52 moving lever 51 back to full line position and at the same time returning the switch to neutral position to deenergize the motor.

The device of this invention is amazingly small, compact and rugged. The device, as illustrated, has an over-all width of not much more than a foot and weighs in its present form but fifty pounds. Nevertheless, the device is capable of lifting a load of five hundred pounds or in the ratio of ten to one with respect to its weight. It is anticipated that upon further design the weight may be reduced to about thirty pounds which will render the device easily portable and of great utility. Because of the simplicity of the structure involved the cost of manufacture is relatively low and the device is already demonstrating commercially these remarkable characteristics.

It will be apparent to those skilled in the art

that the details of construction employed for illustrating the principles of the invention may be varied without departure from the true nature and scope of the invention. It is desired, therefore, not to be limited to the disclosure but rather to the appended claim.

What I seek to secure by Letters Patent is:

A portable electric hoist having, in combination, a supporting structure comprising a ring adapted to be supported with its axis horizontally disposed, an electric motor having a drive shaft, a cylindrical motor casing carried by and projecting from one end of said ring, and an end shield on said casing providing a bearing for said shaft and closing the projecting end of the casing, the other end of said motor shaft projecting from said ring, said supporting structure further comprising a journal member formed integrally with said ring and positioned at the bottom of said ring, a gear case rigid with said journal member at the end opposite said motor and providing a bearing for said projecting end of the motor shaft, and a hoisting mechanism comprising a driven shaft journaled in said journal member in spaced parallel relation to and below the motor shaft, and speed reduction gearing mounted in said casing and connecting said shafts.

PRESTON WHITCOMB.