March 13, 1945. H. F. PARKER ET AL 2,371,352

HOIST

Filed April 8, 1942 3 Sheets-Sheet 1

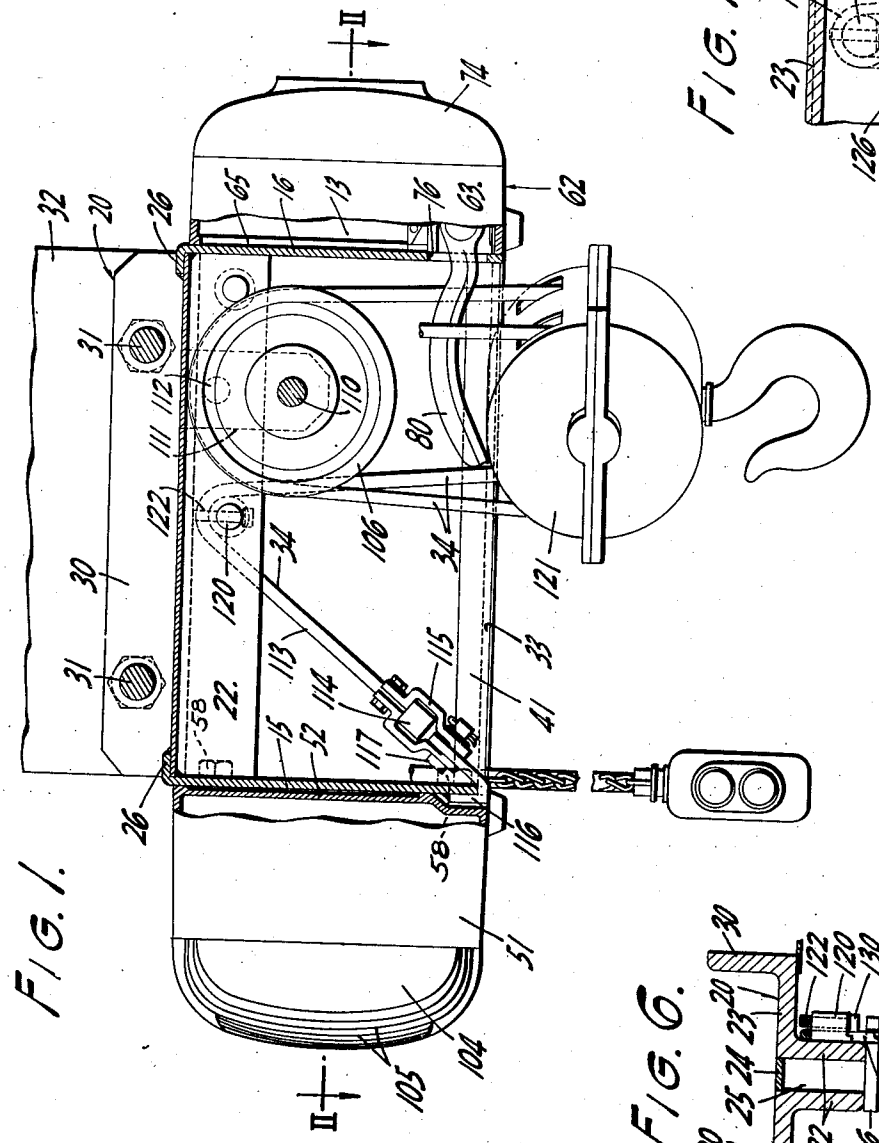


FIG. 1.

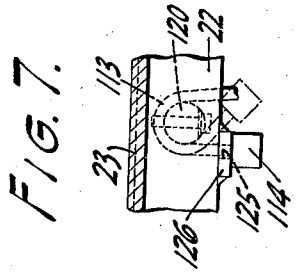


FIG. 7.

FIG. 6.

INVENTOR
HUMPHREY F. PARKER
& KARL W. STINSON
BY
Beam, Brooks, Buckley & Beam
ATTORNEYS

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HOIST

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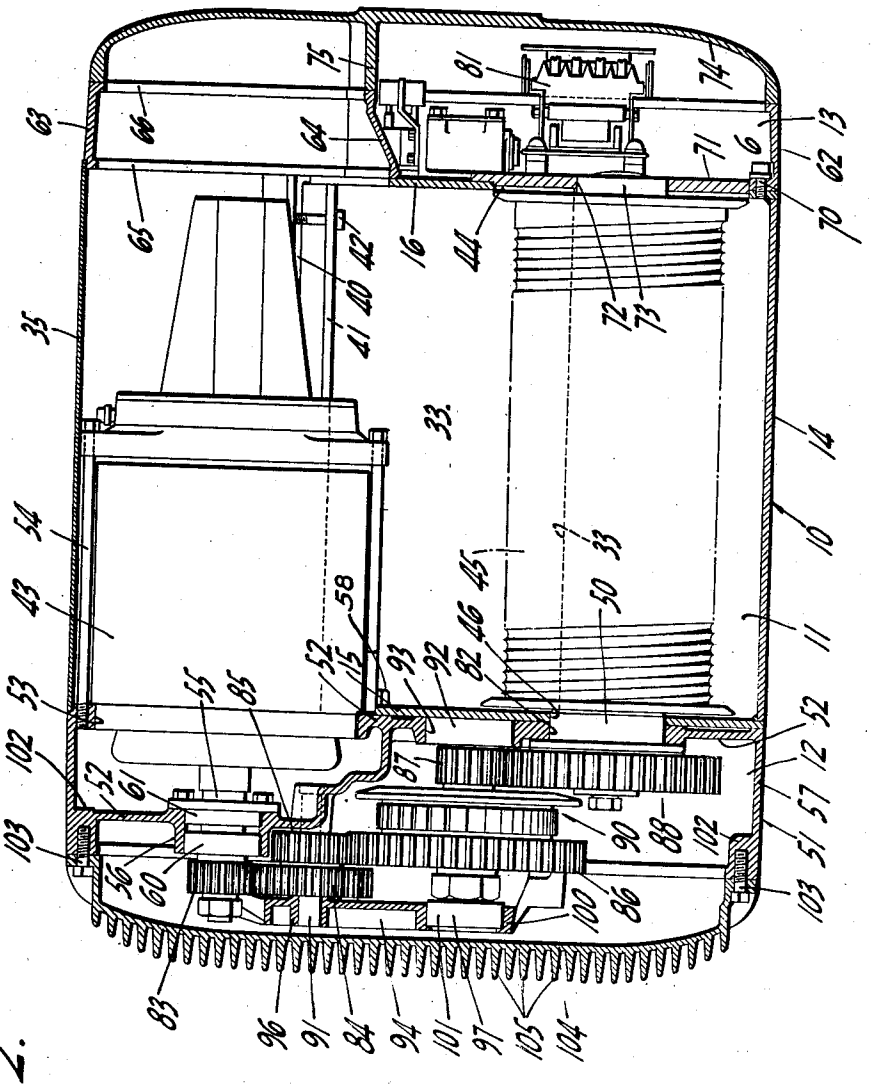


FIG. 2.

INVENTOR
HUMPHREY F. PARKER
& KARL W. STINSON
BY
Bean, Brooks, Buckley & Bean.
ATTORNEYS

March 13, 1945. H. F. PARKER ET AL 2,371,352

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FIG. 3

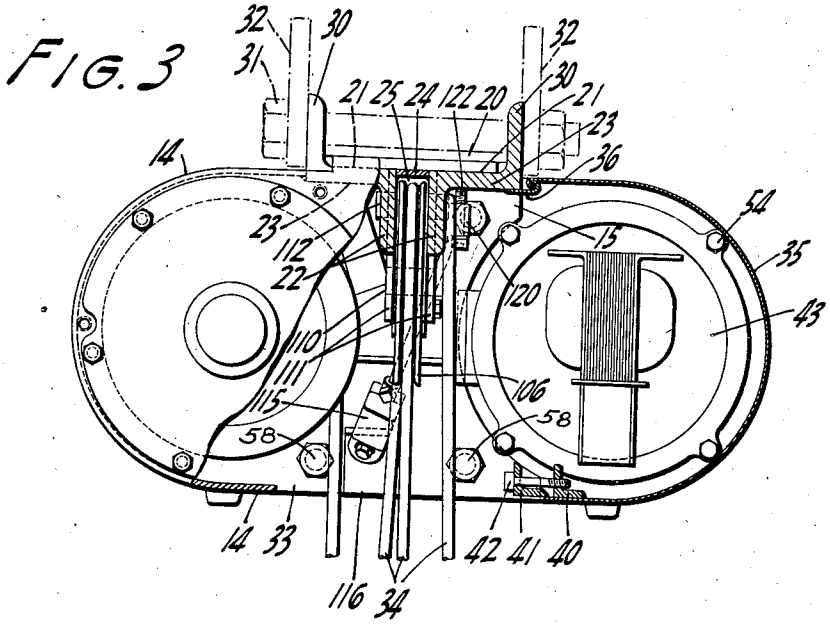


FIG. 4.

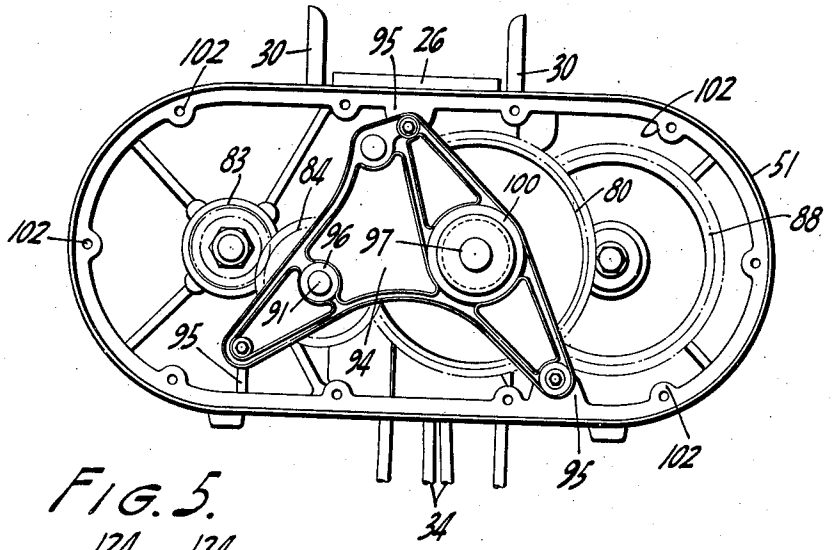
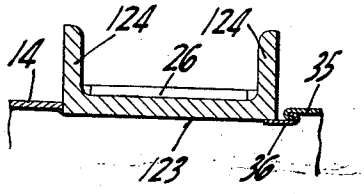


FIG. 5.



INVENTOR
HUMPHREY F. PARKER
& KARL W. STINSON
BY
Beam, Brooks, Buckley & Beam
ATTORNEYS

Patented Mar. 13, 1945 2,371,352

UNITED STATES PATENT OFFICE

2,371,352

HOIST

Humphrey F. Parker, Kenmore, N. Y., and Karl W. Stinson, Columbus, Ohio, assignors to Columbus McKinnon Chain Corporation, Tonawanda, N. Y., a corporation of New York

Application April 8, 1942, Serial No. 438,134

11 Claims. (Cl. 254—168)

Our invention relates in general to hoists of the cable type which are driven by an electric motor, although the invention is applicable to chain hoists.

The principal object of our invention has been to provide a hoist constructed largely of rolled sheet steel, whereby the weight of the hoist for a given capacity may be greatly reduced.

Another object has been to provide a hoist having rolled steel casing parts welded together to make one unitary structure, the casing parts being interlocked so that the stresses are taken by such parts and not by the welded joints uniting them.

Another object of our invention has been to provide a hoist having an enclosed gear chamber and an interspaced enclosed control chamber arranged one at each end of an intermediate drum and motor compartment, such chambers being coextensive with the compartment, whereby compactness and neatness of design is brought about.

Moreover, our invention contemplates the use of a finned cover for the gear compartment whereby the heat generated by the gears and the associated brake may be dissipated.

Furthermore, our invention provides for the support of the outboard gear bearings by the provision of a frame spider, thereby permitting all working parts of the hoist to be adjusted, tested and inspected before the end cover is put in place.

The above objects and advantages have been accomplished by the device shown in the accompanying drawings of which:

Fig. 1 is a side elevation, of our invention, partly in section;

Fig. 2 is a fragmentary, sectional plan view taken on line II—II of Fig. 1;

Fig. 3 is an end elevation, partly in section;

Fig. 4 is an end elevation showing the gear chamber with the cover removed;

Fig. 5 is a fragmentary, sectional elevation of a modified form of invention;

Fig. 6 is a fragmentary, sectional elevation of a modified form of anchoring means for the dead end of the cable; and

Fig. 7 is a side elevation of the modification shown in Fig. 6.

Our invention is provided with a frame 10 comprising an intermediate compartment 11, and a gear chamber 12 and a control chamber 13 arranged one at each end of said compartment.

The intermediate compartment comprises an exterior wall 14 which is semi-cylindrical in shape, having an integral end wall 15 at the gear chamber end and an end wall 16 at the control chamber end to which the wall is united preferably by welding.

The frame has a centrally arranged suspending rib 20 extending longitudinally of the intermediate compartment which preferably comprises two interspaced Z-bars 21, the downwardly extending leg 22 of each being suitably interspaced and, together with the webs 23 of each Z-bar, being secured to the end walls 15 and 16 of the frame by fastening means, such as welding. A filler plate 24 is arranged in the space 25 provided between the legs 22 and this plate is secured in position preferably by welding.

So as to relieve the welded joints, of the frame parts, of the load placed upon the hoist, we provide interlocking means for taking the load. Each of the end walls 15 and 16 is provided with an inwardly turned flange 26 which extends over the top of the webs 23 of the Z-bars. By this construction, the welded joints, which are in shear and not in tension, are depended upon solely to hold the parts together, the interlocking means serving to sustain the load. Each of the Z-bars is provided with an upwardly extending leg 30 which is formed with suitable apertures for the reception of bolts 31 whereby a conventional trolley hanger 32 or other suitable suspending means may be secured to the suspending rib.

As shown in Fig. 3, the exterior wall 14 of the intermediate compartment extends from the exterior surface of the upwardly extending leg 30 of the left-hand Z-bar in this figure in cylindrical manner down to the bottom of the chamber thereby providing an opening 33 for the passage of the cable 34 of the hoist. A portion of the bottom and the side remote from the exterior wall of the intermediate compartment is therefore open and exposed and the opposite side of the compartment is closed by means of a motor cover 35. This motor cover is detachably secured to the frame and has its upper and inner edge attached to the frame by means of hooked engagement with an attaching plate 36, secured preferably to the under side of the web 23 of the right-hand Z-bar shown in Fig. 1. This cover extends cylindrically around the compartment in such manner that it is preferably symmetric with the external wall 14 of the compartment. An attaching flange 40 is secured along the lower, inner edge of this cover and is secured to a frame angle 41 by means of bolts 42. The frame angle extends between the end plates 15 and 16 and is secured to these plates preferably by means of welding.

The upper edge of the end wall 15 terminates at the outer face of the leg 30 of the right-hand Z-bar of Fig. 3, and the lower edge of this wall terminates substantially at the frame angle 41. The edge surface connecting these two portions is cut out in arc-shaped form to permit the passage of the frame of the electric motor 43. The exterior contour of the end wall 16 is substantially identical to the wall 15. Furthermore, the end wall 16 is provided with an aperture 44 for the passage of the drum 45 of the hoist, the end wall 15 being provided with an aperture 46 for the passage of the drum bearing 50 at that end of the drum.

The gear chamber 12 of our invention comprises a gear housing 51 preferably made of cast material whereby suitable bosses may be conveniently provided for the motor, drum and connecting gears. This housing is provided with an outer wall 57 and an end wall 52. This end wall of the gear housing is secured to the end wall 15 of the frame 10 in any suitable detachable manner and cap screws or bolts 58 may be used for this purpose. These screws pass through the end wall 15 and are screwthreaded into the end wall 52 of the gear housing. The outer wall has cylindrically formed ends symmetrically arranged about the center of the frame and co-extensive with the exterior contour of the intermediate compartment. The end wall 52 is provided with a flanged opening 53 through which the inner end of the motor 43 extends and to which the motor is secured by means of fastening bolts 54. The shaft 55 of the motor extends forwardly through an apertured hub 56 where an anti-friction bearing 60 is provided, an oil seal unit 61 being arranged at the inner end of the aperture of the hub 56 for sealing this joint against leakage of lubricant from the gear chamber.

The control chamber 13 which is arranged at the opposite end of the intermediate compartment comprises a control housing 62 which has substantially the same exterior contour as the gear housing 51 and is therefore co-extensive with the exterior of the intermediate compartment 11. This housing has an outer wall 63 extending around the chamber in unbroken manner, and a lateral dividing wall 64 which separates the control chamber from the flanged openings 65 and 66 at the edges of the housing opposite the motor 43. Suitable fastening bolts 70 pass through the inner flange of this housing and into the end wall 16 of the intermediate compartment. The inner flanges of the walls 63 and 64 contact the end wall 16 and thereby seal the control chamber. The opening 44 formed in the end wall 16 for the passage of the drum is closed by means of a cover plate 71 which is preferably provided with a pilot portion shown in Fig. 2 for engagement with the opening 44 whereby it will be centralized. This cover plate is provided with an opening 72 arranged concentrically with the pilot portion of the plate. This opening is for the reception of an anti-friction bearing 73 of the hoist drum 45.

A cover 74 is provided for closing the control housing 62, suitable bolts (not shown) being provided for securing it to the housing. This cover is provided with an intermediate lateral wall 75 which registers with the wall 64 of the housing, whereby the control chamber is completely enclosed, except for the provision of an opening 76 for the passage of a limit lever 80. This limit lever is connected, in well-known manner, to the electric controls of this hoist represented generally by the numeral 81.

The end wall 52 of the gear housing 51 is provided with an aperture 82 which registers with the aperture 46 of the end plate and serves with the last-mentioned aperture to support the anti-friction bearing 50 of the drum. The motor shaft 55 is connected to a spur gear 88 carried by the drum 45 by means of a spur gear 83 secured to the motor shaft, and two sets of intermediate gears 84 and 85, and 86 and 87. A brake 90 of the Weston type is arranged preferably between the group of gears 86 and 87. The gears 84 and 85 are mounted upon a shaft 91 supported at its inner end in the wall 52 of the gear housing 51, and the shaft 97 of the group of gears 86—87 is supported at its inner end within an anti-friction bearing 92 mounted within a flanged opening 93 formed in the inner wall 52 of the housing.

In order to support the outer ends of the shafts 97 and 91, we have provided a gear housing spider 94 which is arranged in interspaced relation with the inner wall 52 of this housing and which is suitably secured in registering position with the casing by means of lugs 95 arranged preferably in the same plane as the outer face of the gear housing. This spider is provided with an apertured boss 96 for supporting the outer end of the shaft 91 and with an apertured boss 100 for supporting an anti-friction bearing 101, mounted upon the outer end of the shaft 97. Suitable lugs 102 are arranged around the outer surface of the gear housing for the reception of bolts 103 which secure the cover 104 to the housing. This cover serves to enclose the gear chamber and it is provided with a plurality of vertically arranged fins 105 which increase the exposed radiating surface of the cover and thereby serves to dissipate the heat accumulated within the gear chamber by reason of the presence of the gears and the brake. By thus dissipating the heat from the gear chamber, it is conducted away from the intermediate compartment and the motor is thereby maintained at a more normal working temperature. Because of the provision of the spider 94, all of the parts in the gear housing may be finally adjusted and tested before the cover 104 is put in place.

In the form of device shown in Figs. 1 to 4 inclusive, we show a hoist designed for four-part reeving of the cable and an idler sheave 106 is therefore provided. This idler is mounted in the space 25 between the downwardly extending legs 22 of the Z-bars and is rotatably disposed upon a shaft 110. This shaft is suspended from hanger plates 111 secured in suitable recesses formed in the inner faces of the downwardly extending legs 22 and secured there preferably by welding. A pin 112 passes through each of the legs and each of the plates whereby the load carried by the shaft is sustained by the pin and does not depend upon the welded joint for its strength.

The dead end 113 of the cable 34 has an anchor 114 permanently secured thereto. This anchor is removably secured within an anchor block 115 which is fastened to an anchor bracket 116 by means of a bolt 117. The anchor bracket is provided with a hooked end as shown in Fig. 1 and this end is engaged with the under edge of the end wall 15 where it is welded in place. The cable is extended upwardly where it passes over a dead end spool 120 from whence it passes downwardly to a four-part block 121. The cable passes upwardly from the block over the idler 106, down again to

the block and then upwardly to the drum 45 where it is secured in any well-known manner. The cable is kept in place upon the spool 120 by means of a screw 122 passed upwardly through the spool and having its end extending close to the lower surface of the web 23 of the Z-bar thus retaining the cable in position against the vertical leg of the Z-bar.

Where a two-part block is to be used with my hoist, the modified form of suspending rib of Fig. 5 may be used. This rib comprises a channel iron 123, having legs 124 so positioned as to extend upwardly for engagement with the suspension means of the hoist.

In the modified form, shown in Figs. 6 and 7, the dead end 113 of the cable is extended around the dead end spool 120 and is engaged with a slot 125 formed in the edge of an anchor plate 126. The plate is arranged in such position with relation to the spool 120 that the cable will extend downwardly in a substantially vertical plane from the periphery of the spool as shown in Fig. 7. The anchor 114 at the end of the cable will engage the bottom surface of the wall and thus be anchored in place. The anchor plate 126 preferably extends across the downwardly extending legs 22 of the Z-bars where it is held in place preferably by welding. The natural tendency of the cable will be to straighten out so that this springing action will aid in holding the cable within the groove. However, the screw head 130 is so arranged in relation to the plate that should the cable get out of the slot 125, it will not be able to pass between the screw head and the adjacent edge of the plate.

From the foregoing, it will be obvious that all of the working parts of our hoist, requiring protection, are enclosed within housing chambers and thus sealed against dirt or moisture. All parts are readily accessible for adjustment or repair, and, as hereinbefore stated, when adjustment or inspection of the gearing is necessary, the bearings thereof do not have to be disassembled since the cover 104 may readily be removed without disturbing any of the working parts.

The inner edges of the gear housing 51 and the control housing 62 at the motor side of the intermediate compartment are recessed on their exterior to accommodate the motor cover 35 so that when drawn up to position by means of bolts 42, it will be properly aligned and thus seal the joints at these edges.

Obviously, some modifications of the details herein shown and described may be made without departing from the spirit of our invention or the scope of the appended claims, and we do not, therefore, wish to be limited to the exact embodiment herein shown and described, the form shown being merely a preferred embodiment thereof.

What we claim is:

1. A hoist having a frame formed with an intermediate compartment for housing the load-lift means of the hoist, comprising a longitudinally extending suspending rib, an end wall for each end of the compartment permanently secured to each of the ends of said rib, and an outer casing permanently secured to said rib and to said end walls, whereby to form a unitary hoist frame, an independent inclosed gear housing at one end of said compartment, a motor for said hoist carried by said gear housing, gear means mounted in said gear housing for connecting said motor to said load-lift means, shafts for said gear means, said gear housing having an inner wall secured to the adjacent end wall of the frame, bearings carried by said inner wall for supporting the inner ends of said shafts, and a housing spider carried by said gear housing for supporting the outer ends of said shafts.

2. A hoist having a frame formed with an intermediate compartment for housing the load-lift means of the hoist, comprising a longitudinally extending suspending rib, an end wall for each end of the compartment permanently secured to each of the ends of said rib, and an outer casing secured to said rib and permanently welded to said end walls, whereby to form a unitary hoist frame, an independent inclosed gear housing at one end of said compartment, a motor for said hoist carried by said gear housing, gear means mounted in said gear housing for connecting said motor to said load-lift means, shafts for said gear means, said gear housing having an inner wall secured to the adjacent end wall of the frame, bearings carried by said inner wall for supporting the inner ends of said shafts, a housing spider carried by said gear housing for supporting the outer ends of said shafts, and a cover for said gear housing detachably secured thereto independently of said shafts, said cover being formed with a plurality of vertically arranged cooling fins.

3. A hoist comprising a pair of Z-shaped bars having upstanding and substantially parallel flanges and downwardly extending and substantially parallel flanges offset inwardly from the upstanding flanges by intermediate portions, means provided on the upstanding flanges by which the hoist may be suspended, load-suspending means carried by and between the depending flanges, end walls of rolled sheet steel secured to and depending from the intermediate portions in interlocking relation therewith, a drum interposed between and journaled in the end walls, a cast metal housing on the exterior side of one end wall, and drive means in the housing operatively connected to the drum.

4. A hoist comprising a pair of Z-shaped bars having upstanding and substantially parallel flanges and downwardly extending and substantially parallel flanges offset inwardly from the upstanding flanges by intermediate portions, means provided on the upstanding flanges by which the hoist may be suspended, load-suspending means carried by and between the depending flanges, end walls of rolled sheet steel secured to and depending from the intermediate portions in interlocking relation therewith, a drum interposed between and journaled in the end walls, a housing on the exterior side of one end wall, and drive means in the housing operatively connected to the drum.

5. A hoist comprising a pair of Z-shaped bars having upstanding and substantially parallel flanges and downwardly extending and substantially parallel flanges offset inwardly from the upstanding flanges by intermediate portions, means provided on the upstanding flanges by which the hoist may be suspended, load-suspending means carried by the depending flanges, end walls of rolled sheet steel secured to and depending from the intermediate portions in interlocking relation therewith, a drum interposed between and journaled in the end walls, a housing on the exterior side of one end wall, and drive means in the housing operatively connected to the drum.

6. A suspended hoist comprising a centrally arranged longitudinally extending supporting

structure, a cylindrical plate secured to said supporting structure at one side thereof, an end plate at each end of said supporting structure for supporting the load-lift means of the hoist, said cylindrical plate and said end plates forming a unitary structure with said supporting structure for supporting and enclosing said load-lift means, said end plates being welded to said cylindrical plate and said supporting structure, an inturned flange formed only along the upper edge of each of said end plates and extending over the adjacent ends of said supporting structure, thereby being capable of sustaining the load independently of the welded joints between said end plates and said supporting structure, and means whereby the load-lift means may be assembled after said cylindrical plate and said end plates have been welded.

7. A suspended hoist comprising a centrally arranged longitudinally extending supporting structure, a cylindrical plate secured to said supporting structure at one side thereof, an end plate at each end of said supporting structure for supporting the load-lift means of the hoist, said cylindrical plate and said end plates forming a unitary structure with said supporting structure for supporting and enclosing said load-lift means, said end plates being welded to said cylindrical plate and said supporting structure, an independent speed-reduction housing removably secured to the exterior face of one of said end plates, an electric motor carried by said housing, speed-reduction gearing carried by said housing and operatively connecting said motor to said load-lift means, whereby the load carried by the hoist will be suspended directly through said unitary structure to the exclusion of the speed-reduction housing, and means whereby the load-lift means may be assembled after said cylindrical plate and said end plates have been welded.

8. A suspended hoist comprising a centrally arranged longitudinally extending supporting structure, a cylindrical plate secured to said supporting structure at one side thereof, an end plate at each end of said supporting structure for supporting the load-lift means of the hoist, said cylindrical plate and said end plates forming a unitary structure with said supporting structure for supporting and enclosing said load-lift means, said end plates being welded to said cylindrical plate and said supporting structure, an independent speed-reduction housing removably secured to the exterior face of one of said end plates, an electric motor carried by said housing, speed-reduction gearing carried by said housing and operatively connecting said motor to said load-lift means, whereby the load carried by the hoist will be suspended directly through said unitary structure to the exclusion of the speed-reduction housing, an independent control housing carried by and secured to the exterior face of the opposite end plate and free of the gear housing, and means whereby the load-lift means may be assembled after said cylindrical plate and said end plates have been welded.

9. A suspended hoist comprising a centrally arranged longitudinally extending supporting structure, a cylindrical plate secured to said supporting structure at one side thereof, an end plate at each end of said supporting structure for supporting the load-lift means of the hoist, said cylindrical plate and said end plates forming a unitary structure with said supporting structure for supporting and enclosing said load-lift means, said end plates being welded to said cylindrical plate and said supporting structure, an inturned flange formed only along the upper edge of each of said end plates and extending over the adjacent ends of said supporting structure, thereby being capable of sustaining the load independently of the welded joints between said end plates and said supporting structure, said load-lift means having bearing support at one end in one of said end plates, the other end plate being formed with an aperture to permit the passage of said load-lift means, and a cover plate secured to the last mentioned end plate for closing the aperture therein and for providing a bearing for the adjacent end of said load-lift means.

10. A suspended hoist comprising a centrally arranged longitudinally extending supporting structure, a cylindrical plate secured to said supporting structure at one side thereof, an end plate at each end of said supporting structure for supporting the load-lift means of the hoist, said cylindrical plate and said end plates forming a unitary structure with said supporting structure for supporting and enclosing said load-lift means, said end plates being welded to said cylindrical plate and said supporting structure, said supporting structure having at least one upstanding flange, means provided on said flange by which said hoist may be suspended, said end plates depending from said supporting structure in interlocking load-carrying relation therewith, an independent housing adjacent the exterior side of one of said end plates, said housing being separate from said unitary structure and detachable therefrom, drive means in said housing operatively connected to said load-lift means, and means carried by one of said end plates, whereby the load-lift means may be assembled after said cylindrical plate and said end plates have been welded.

11. A suspended hoist comprising a centrally arranged longitudinally extending supporting structure, a cylindrical plate secured to said supporting structure at one side thereof, an end plate at each end of said supporting structure for supporting the load-lift means of the hoist, said cylindrical plate and said end plates forming a unitary structure with said supporting structure for supporting and enclosing said load-lift means, said end plates being welded to said cylindrical plate and said supporting structure, said load-lift means having bearing support at one end in one of said end plates, the other end plate being formed with an aperture to permit the passage of said load-lift means, a cover plate secured to the last mentioned end plate for closing the aperture therein and for providing a bearing for the adjacent end of said load-lift means, an independent speed-reduction housing removably secured to the exterior face of one of said end plates, an electric motor carried by said housing, speed-reduction gearing carried by said housing and operatively connecting said motor with said load-lift means, whereby the load carried by the hoist will be suspended directly through said unitary structure to the exclusion of said speed-reduction housing, and means whereby the load-lift means may be assembled after said cylindrical plate and said end plates have been welded.

HUMPHREY F. PARKER.
KARL W. STINSON.