

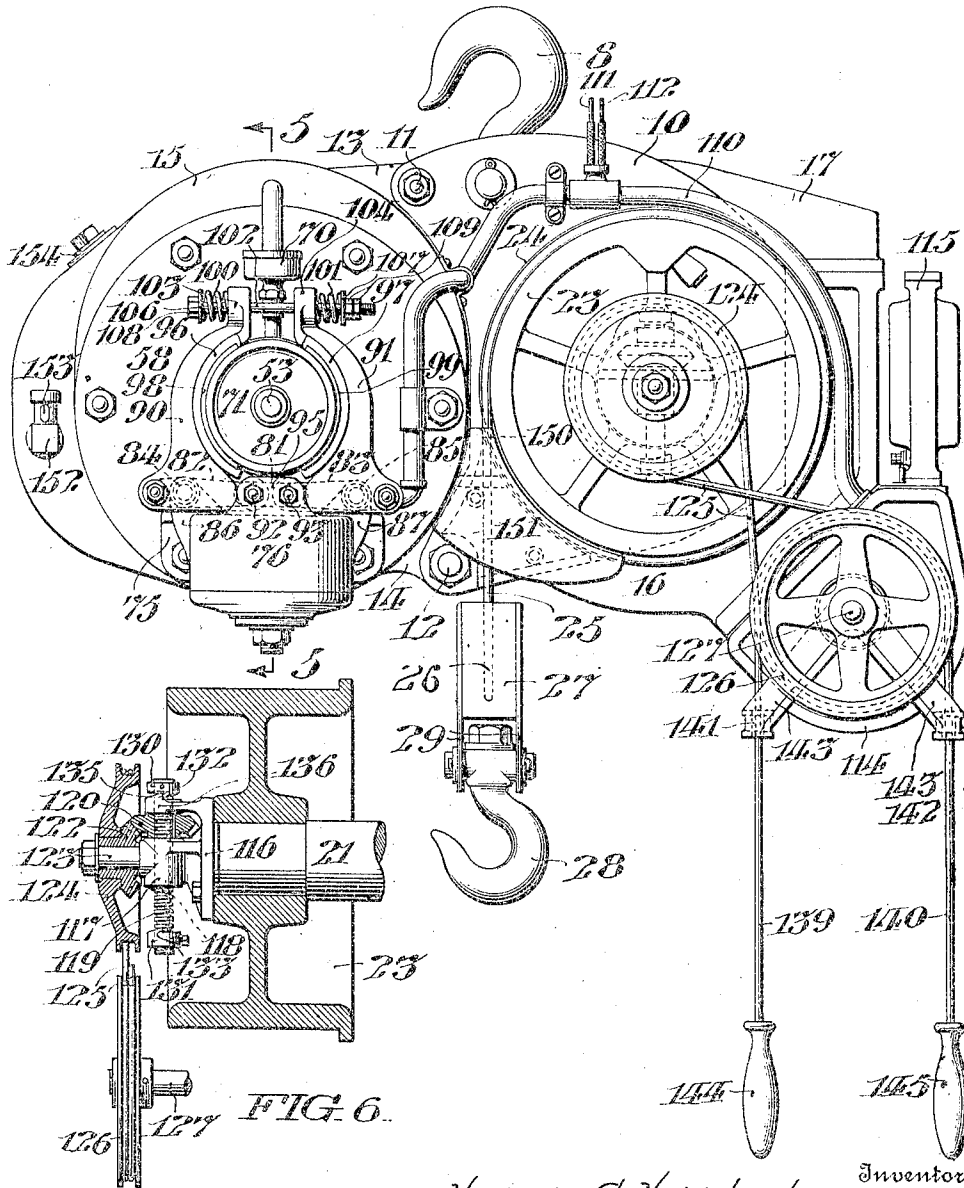
H. S. VALENTINE.
ELECTRIC HOIST.
APPLICATION FILED JULY 20, 1912.

1,058,497.

Patented Apr. 8, 1913.

4 SHEETS-SHEET 1.

FIG. 1.



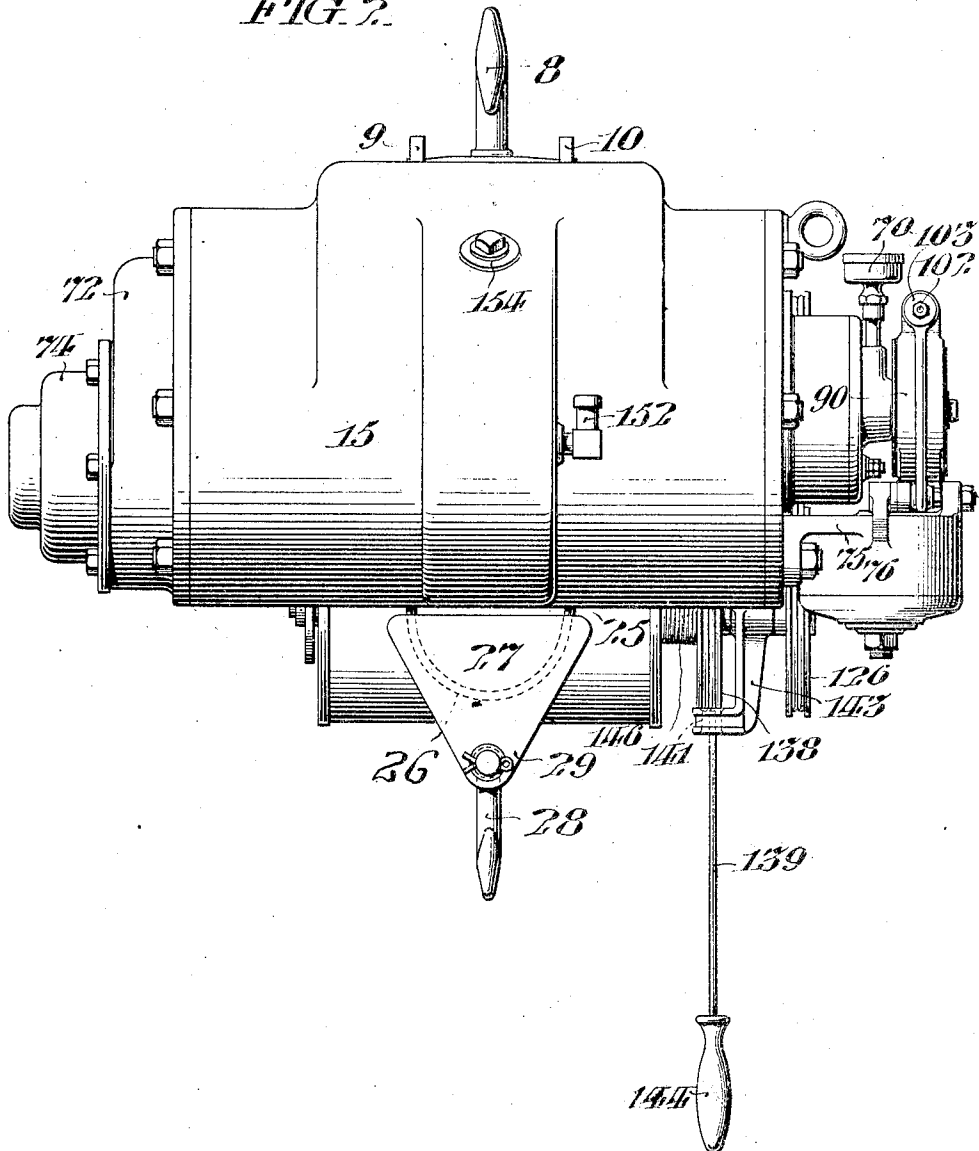
H. S. VALENTINE.
ELECTRIC HOIST.
APPLICATION FILED JULY 20, 1912.

1,058,497.

Patented Apr. 8, 1913

4 SHEETS-SHEET 2.

FIG. 2.



HERBERT S. VALENTINE. Inventor

Witnesses

Clifton C. Halliwell
A. L. Meyer

By *Edw. J. Kelly* Attorney

H. S. VALENTINE.

ELECTRIC HOIST.

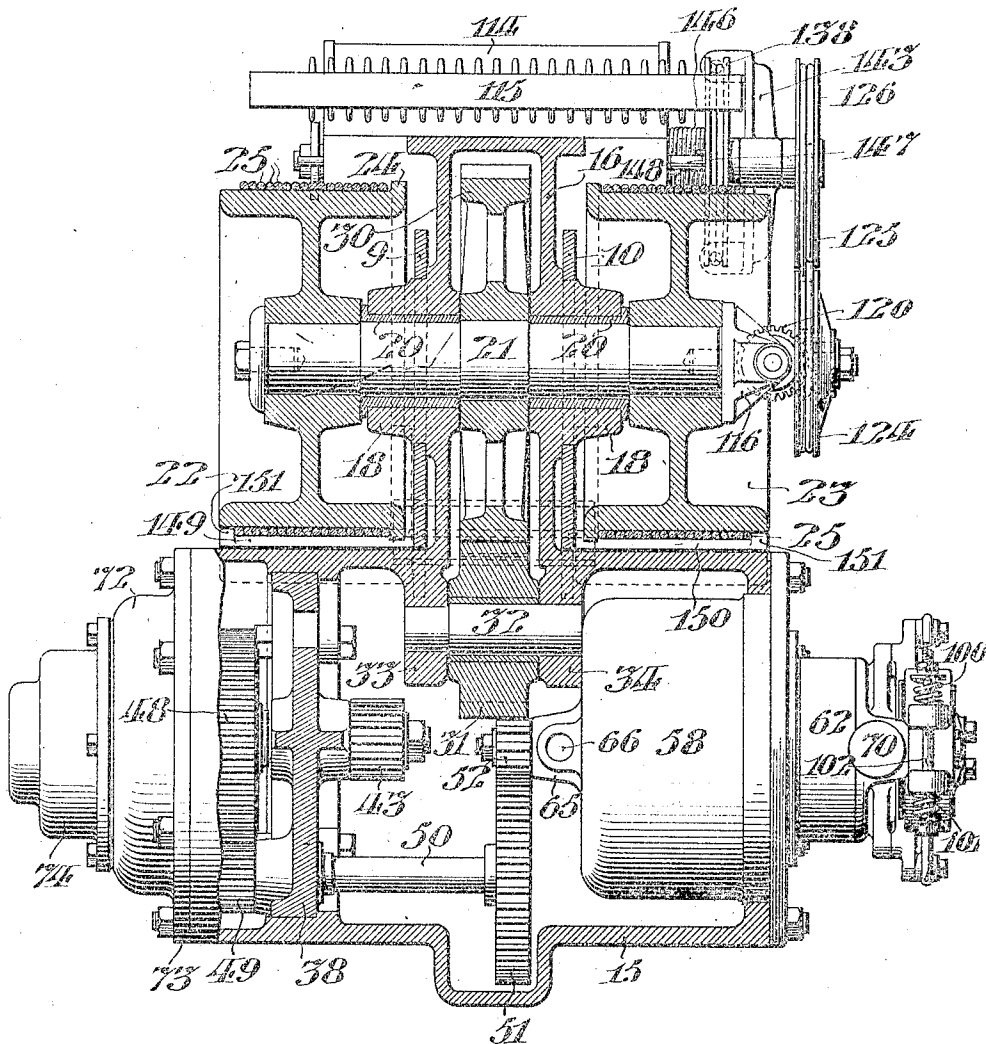
APPLICATION FILED JULY 20, 1912.

1,058,497.

Patented Apr. 8, 1913.

4 SHEETS-SHEET 3.

FIG. 3.



HERBERT S. VALENTINE, Inventor

Witnesses

Clifton C. Halliwell
A. R. Meyer

By *Ed. A. Hall*,
Attorney

H. S. VALENTINE.
ELECTRIC HOIST.
APPLICATION FILED JULY 20, 1912.

1,058,497.

Patented Apr. 8, 1913.

4 SHEETS-SHEET 4.

FIG. 4.

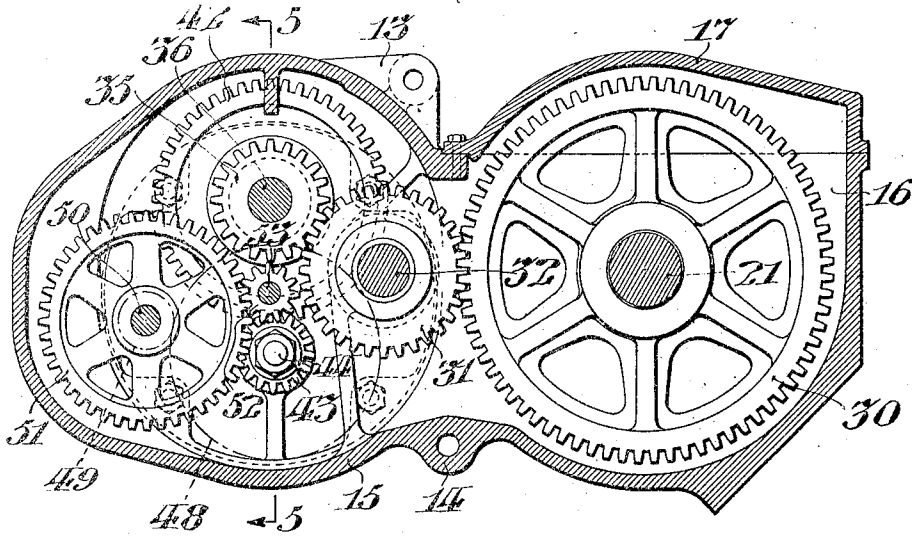
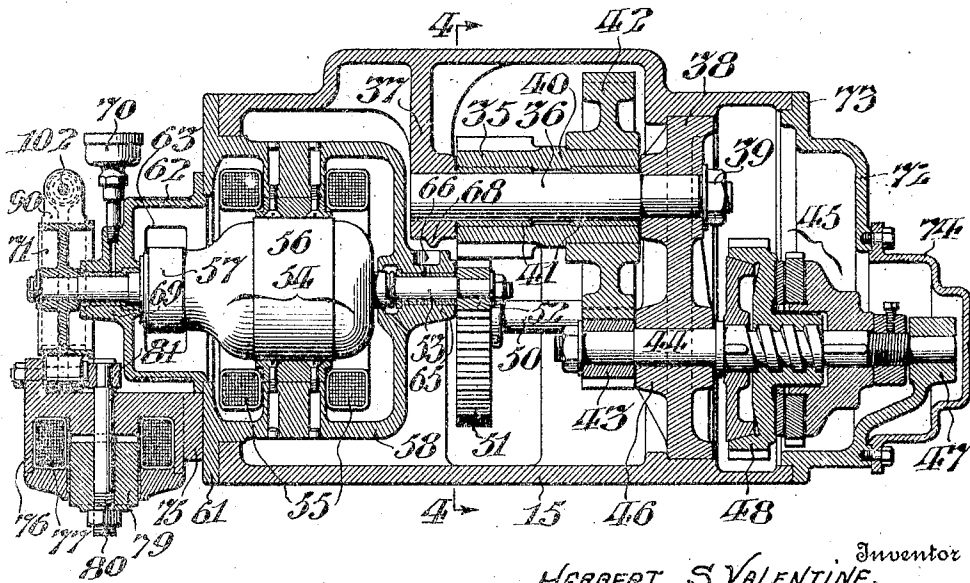


FIG. 5.



Inventor
HERBERT S. VALENTINE,

Witnesses

Clifton C. Halliwell
A. L. Moyer

By *Ed. A. Hall*
Attorney

UNITED STATES PATENT OFFICE.

HERBERT S. VALENTINE, OF READING, PENNSYLVANIA, ASSIGNOR TO READING CRANE & HOIST WORKS, OF READING, PENNSYLVANIA.

ELECTRIC HOIST.

1,058,497.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed July 20, 1912. Serial No. 710,548.

To all whom it may concern:

Be it known that I, HERBERT S. VALENTINE, citizen of the United States, residing at Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Electric Hoists, of which the following is a specification.

My invention particularly relates to hoisting mechanism for cranes or the like, and is especially directed to electrically propelled hoists.

The principal object of my invention is to provide an electric hoist composed of separate, independently removable units respectively, comprising the driving mechanism or motor, the controlling mechanism and its resistance, the reducing gear mechanism, the holding brake mechanism, the lowering brake mechanism, and the stop mechanism, all assembled to form a compact, composite, unitary structure.

Other objects of my invention are to provide an electric hoist having the parts so correlated as to afford a minimum head space or approaching distance between the supporting hook and load carrying hook, and to dispose said hooks in alinement with the center of gravity of the assembled composite structure, whereby it is maintained in absolute equipoise, irrespective of the load carried thereby.

Further objects of my invention are to provide separated synchronously actuated winding drums to which the opposite ends of the lifting cable are coiled, whereby any twisting tendency of said cable is prevented, and to provide winding drums of such diameter that their cylindrical cable supporting surfaces are substantially in the cylindrical plane of the pitch line of the drum driving gear, whereby the cable may depend in a plane tangent to the pitch lines of the intermeshed teeth of said drum driving gear and the gear connecting it with the driving mechanism, thereby substantially reducing the friction in the bearings.

This invention also comprehends novel means for suspending the hoist casing from the supporting hook; and includes a guide for preventing the cable from climbing.

This invention further includes all of the various novel features of construction and arrangement of the parts as hereinafter more specifically set forth.

In the accompanying drawings, Figure 1 is an end elevation of an electric hoist constructed in accordance with my invention; Fig. 2 is a rear elevation of the structure shown in Fig. 1, as viewed from the left of said figure; Fig. 3 is a sectional plan view of said electric hoist, taken in the plane of the axis of the winding drums, certain parts being shown in elevation for convenience of illustration; Fig. 4 is a transverse, vertical, sectional view of the gear casing and the included mechanism, taken on the line 4—4 in Fig. 5; Fig. 5 is a longitudinal sectional view of the hoist, taken on the line 5—5 in Figs. 1 and 4; and Fig. 6 is a fragmentary sectional view, showing the automatic stopping mechanism.

In said figures the supporting hook 8 is conveniently connected to support the hoist by the suspension plates 9 and 10 which are connected by bolts 11 and 12 with the lugs 13 and 14 on the gear casing 15, which has the narrow extension 16, provided with the removable cover 17 and the bearing bosses 18, which extend through, and are snugly fitted in suitable apertures in said suspension plates 9 and 10.

The bearing bosses 18 are provided with bearing sleeves 20, in which the drum shaft 21 is journaled, and rotatably carries the winding drums 22 and 23 at its respectively opposite ends. Said drums have flanges 24 at their opposed edges, extending circumferentially from their cylindrical faces, and providing means to prevent accidental displacement of the rope or cable 25, whose opposite ends are helically wound around the respective drums as best shown in Fig. 3, and whose intermediate portion forms the bight 26 extending loosely through a suitable channel in the block 27 of the lifting hook 28, which is pivotally connected to the lugs 29 depending from said block.

The drum shaft 21 is provided with the drum gear 30 disposed within the extension 16 of the casing 15, in toothed engagement with the pinion 31, which is mounted for rotation on the shaft 32 carried by the supporting lugs 33 and 34 in said casing, as best shown in Fig. 3, and which is connected with the train of reducing gears, and as best shown in Fig. 4 is in toothed engagement with the gear 35, which, as best shown in Fig. 5, is rotatably mounted on the shaft 36, conveniently supported at one end in the

hanger 37 and at the other end by the removable bearing plate or partition 38, to which it is secured in stationary relation by the nut 39.

5 The hub 40 of the gear 35 is conveniently provided with bearing sleeves 41 and is extended to carry the gear 42 which rotates therewith in toothed engagement with the pinion 43 on the shaft 44 of the lowering
10 brake mechanism 45, which shaft 44 is journaled in the bearing 46 in the plate 38, which separates the reducing gear chamber from the lowering brake chamber, and in the bracket bearing 47 in the latter chamber.

15 It may be here noted that the lowering brake mechanism herein employed is of a well known construction, and will, therefore, not be described in detail, but however includes the gear 48 which is operative to
20 rotate the shaft 44, being in toothed engagement with the pinion 49 on the shaft 50 of the gear 51, which is driven by its toothed engagement with the pinion 52 on the shaft 53 of the motor 54.

25 The motor 54 comprises the field coils 55, armature 56, and commutator 57 inclosed in a suitable casing 58, the bulk of which extends within the gear casing 15, and conveniently forms a closure therefor,
30 having a flange 61 by which it is removably bolted to the end of said gear casing 15. Said motor casing includes a separable end cap 62, having apertures 63 for affording access to the commutator 57 and the parts
35 coöperative therewith. The motor shaft 53 is journaled at its inner end in the bearing 65 having the oil cup 66, which is automatically supplied with oil carried up by the gears and dripped from the teat 68 on the
40 hanger 37, and is journaled at its outer end in the bearing 69 having the oil cup 70, and carries the brake drum 71 coöperative with the electric brake mechanism to be hereinafter described.

45 As before stated, the plate or partition 38 separates the gear chamber from the lowering brake chamber, which is provided with the closure 72 having a flange 73 removably bolted to the end of the gear casing 15, and
50 having the detachable cap 74 bolted thereto, as best shown in Fig. 5, for affording convenient access to the lowering brake mechanism.

The electric brake mechanism above referred to, which automatically locks the
55 hoisting mechanism and holds the load suspended when the power is shut off, comprises the separable bracket 75 detachably supported by the motor casing 58 and forming the casing 76 for the coils 77 of the solenoid
60 having the plunger 79, which is connected by the bolt 80 with the cross-head 81, to which the inner ends of the levers 82 and 83 are pivotally engaged. Said levers 82 and
65 83, as best shown in Fig. 1, are pivotally

supported at 84 and 85, intermediate of their length upon the lugs 86 and 87, extended upwardly from the solenoid casing, and said levers are pivotally connected at their outer ends with the brake shoe levers 90 and 91,
70 which are pivotally supported at 92 and 93 for relative oscillation to the upwardly extending lug 95 on the casing 76 of the solenoid. Said brake shoe levers 90 and 91 respectively have the substantially semi-circular flanged recesses forming shoes 96 and
75 97 provided with facings 98 and 99 of leather, fiber or other suitable material, embracing the brake drum 71, and normally forced into engagement therewith by the springs 100 and 101, which are mounted on
80 the bolt 102 loosely extended through the bosses 103 and 104 on the respective brake shoe levers 90 and 91, said springs being normally under compression between said
85 bosses 103 and 104 and the respective washers 106 and 107, and being adjustable by the nuts 108 and 109.

It will be obvious from the foregoing description that by connecting the solenoid
90 and driving motor in series, any electric current supplied to rotate the motor will contemporaneously actuate the solenoid to effect the release of the brake shoes 96 and 97 from the brake drum 71 and permit the
95 free rotation of the motor and the untrammelled actuation of the mechanism connected therewith.

As best shown in Fig. 1, the motor and solenoid are electrically connected through
100 the conduit 110 inclosing wires 111 and 112, with the controlling mechanism 114 and resistance 115 which, being of well known construction, is deemed unnecessary to herein set forth the structure in detail, other than
105 to invite attention to the fact that it forms one of the separable units of the hoist structure.

It is highly essential that the throw or travel of the load hook be limited, which
110 may be conveniently effected by providing means actuated by the rotation of the winding drums and connected to cut off the power; such mechanism is best shown in Fig. 6 and comprises a bracket 116, carried
115 by the drum 23, and provided with the threaded bearing 117, having the stop shoulder 118, in which the screw 119 is mounted to be rotated by the miter gear 120, which is keyed to rotate said screw 119 but
120 capable of permitting a relative axial movement of said screw therein. Said miter gear 120 is in toothed engagement with the miter gear 122, which is mounted for rotation on the stud shaft 123 projecting from the bearing 117 in coaxial relation with the drum 23,
125 and carries the band wheel or pulley 124, which is connected by the crossed bands or cords 125, as best shown in Fig. 1, with the band wheel or pulley 126 on the shaft 127
130

of the controller or rheostat 114, it being noted that said cords may be conveniently attached to said pulleys 124 and 126 to insure their positive synchronous rotation.

Said screw 119 carries the adjustable collars 130 and 131 respectively, having shoulders 132 and 133, the shoulder 133 being arranged to engage the shoulder 118 on the bearing 117 to limit the upward movement of said screw from the position shown in Fig. 6, and the shoulder 132 being operative to engage the shoulder 135 of the bearing 136 to limit the downward movement of said screw from the position shown in said figure. The controller shaft 127 also carries the manually actuated band wheel or pulley 138, having the cords 139 and 140 secured thereto in any suitable manner and depending tangentially from its diametrically opposite sides, through eyes 141 and 142 in the guide 143 and provided with handles 144 and 145 respectively, by which the controller shaft 127 may be actuated.

The controller shaft 127 is normally maintained in its inoperative position by the spring 146, which encircles said shaft and has its opposite ends extended laterally upon opposite sides of the pin 147 projecting from the pulley 138, and the pin 148 projecting from the casing of the controller 114.

It will be obvious from the foregoing description that when one or other of the hand grips 139 or 140 is pulled by the operator, the shaft 127 will be rotated correspondingly to throw on power which effects the rotation of the drums 22 and 23, and that such rotation of the drum 23 carries the miter gear 120 in a cylindrical path about the axis of rotation of said drum, in toothed engagement with the miter gear 122, which being held stationary causes the gear 120 to rotate the screw shaft 119 until one of the stop collars on said screw contacts with one of the shoulders 132 or 133, which prevents further relative rotation of the screw 119, thereby locking the gears in relatively fixed relation, so that the further rotation of the winding drums effects a similar rotation of the gear 122 and the controlling mechanism connected therewith, to return the shaft 127 to its neutral or inoperative position.

As shown in Figs. 1 and 3, the plates 9 and 10 respectively carry rope guides 149 and 150, extending outwardly in such relation to the winding drums 22 and 23 so as to prevent the rope or cable 25 from climbing or overlapping, and said guides are each provided with a lateral flange 151 for preventing the rope or cable from slipping over the edge of the drums.

As best shown in Figs. 1 and 2, the gear casing 15 is provided with the oil gage 152 having the indicator 153 to indicate the

level of oil in said casing, in which the gears are partly submerged, and which may be poured there through the inlet 154.

It is not desired to limit this invention to the precise details of construction and arrangement herein set forth, as various modifications may be made therein without departing from the essential features of the invention, as defined in the appended claims.

Having thus described my invention, I claim:

1. An electric hoist comprising independently removable units including the reducing gearing, a casing for said gearing, lowering brake mechanism, a partition in said casing separating the gearing from said mechanism and providing bearings therefor, a removable closure for said casing, embracing said mechanism, a motor, a casing for said motor forming a closure for the gear casing and extending therein and removable therefrom, electric brake mechanism detachably carried by said motor casing and connected to actuate synchronously with said motor to release, and a controller detachably supported by said gear casing, all assembled in independently detachable relation to form a compact composite unitary structure.

2. An electric hoist comprising a gear casing having a lateral extension, reducing gears in said casing, lowering brake mechanism in said casing, a motor, a casing for said motor supported by and extending into said casing, a drum driving gear rotatably mounted in bearings in said lateral extension, a shaft for said gear extending oppositely from said extension, winding drums mounted on said shaft upon opposite sides of said lateral extension, a hoisting cable having its opposite ends helically wound around the respective drums, and its intermediate bight depending in a plane of the center of gravity of the hoist structure thus formed, and means suspended by said cable for engaging the load to be hoisted.

3. An electric hoist comprising reducing gearing, a motor for actuating said reducing gearing, separated coaxially mounted winding drums, a drum driving gear disposed between said drums, in toothed engagement with one of the gears of said reducing gearing, a hoisting cable having its opposite ends attached to and helically wound around the respective drums, and having its intermediate bight depending in a plane tangential to the cylindrical surface of said drums and the pitch circumference of said drum driving gear, and guides for holding said cable against the surface of said drums.

4. An electric hoist comprising a gear casing, reducing gears in the casing, lowering brake mechanism, a motor, a casing for the motor supported by and extending into the

gear casing, a rotatably mounted drum driving gear, a shaft for said gear, winding drums mounted on said shaft, a hoisting cable having its opposite ends helically wound around the respective drums, and its intermediate bight depending in a plane of the center of gravity of the hoist structure thus formed, and means suspended by said cable for engaging the load to be hoisted.

5. In an electric hoist comprising independently removable units including the reducing gearing, a casing for said gearing, lowering brake mechanism, a removable closure for said casing, a motor, a

casing for the motor forming a closure for the gear casing and extending therein and removable therefrom, electric brake mechanism detachably carried by said motor casing and connected to actuate synchronously with the motor to release, and a controller detachably supported by said gear casing, all assembled in independently detachable relation.

In testimony whereof I affix my signature in presence of two witnesses.

HERBERT S. VALENTINE.

Witnesses:

MARY E. S. OFFER,
ED. A. KELLEY.