Feb. 24, 1942. K. W. STINSON 2,274,280

HOIST

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Fig. 1.

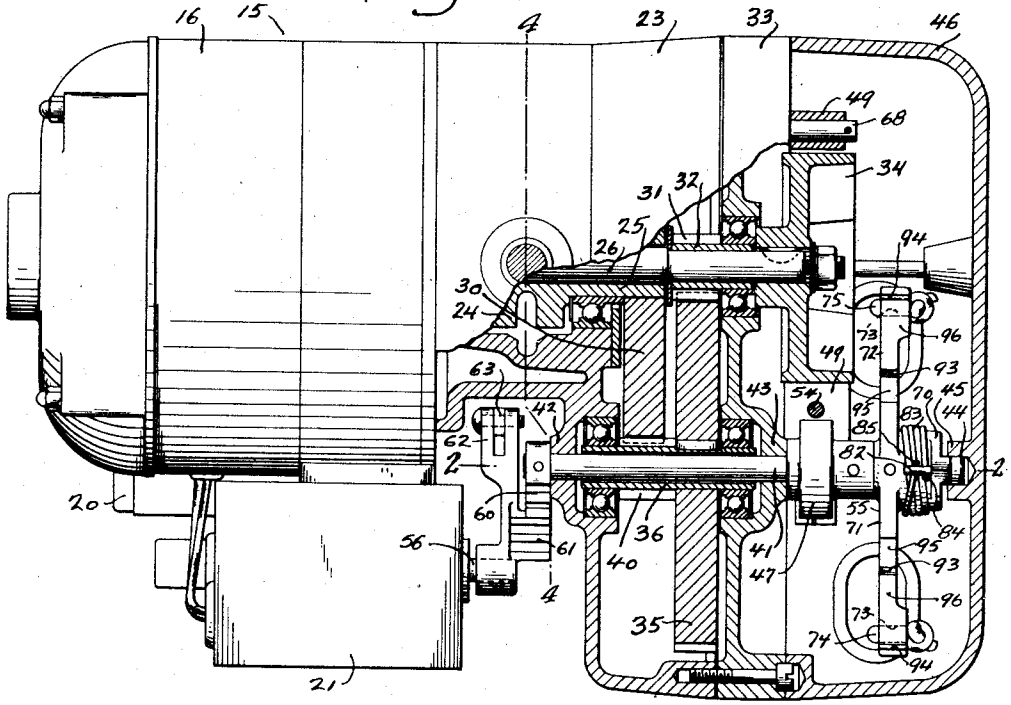
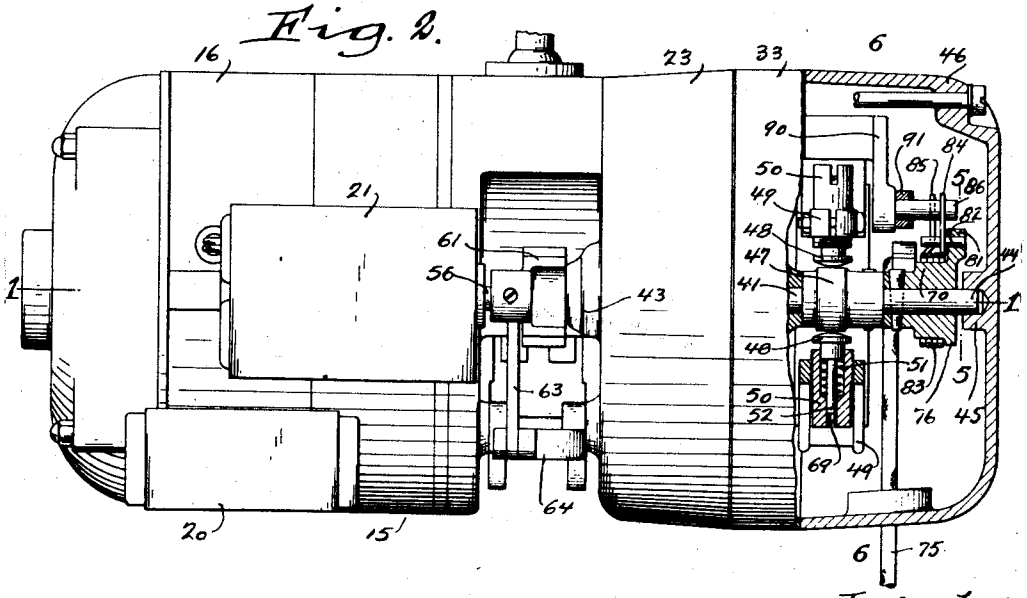


Fig. 2.



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Fig. 3.

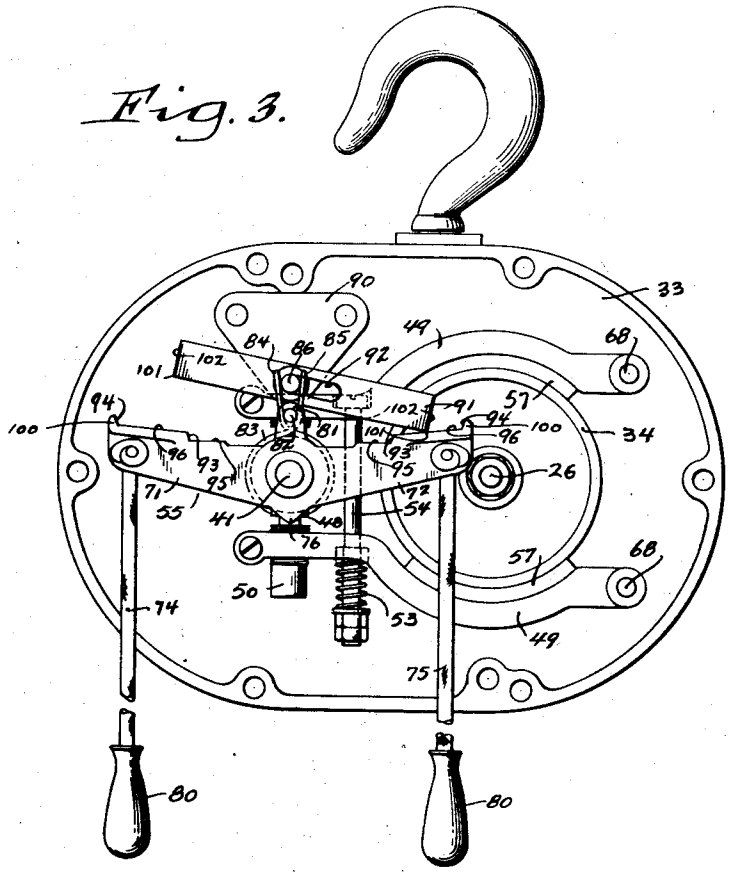


Fig. 8.

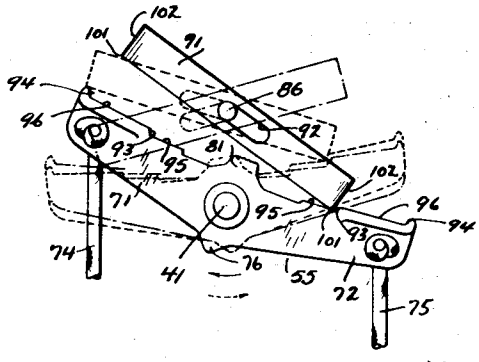
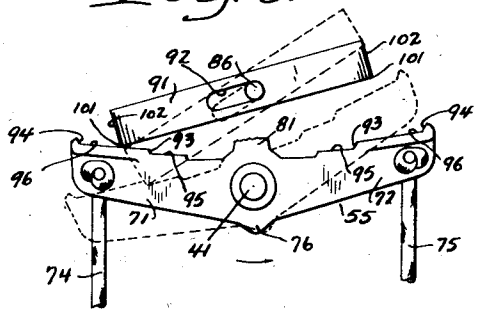


Fig. 9.



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HOIST

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Fig. 4.

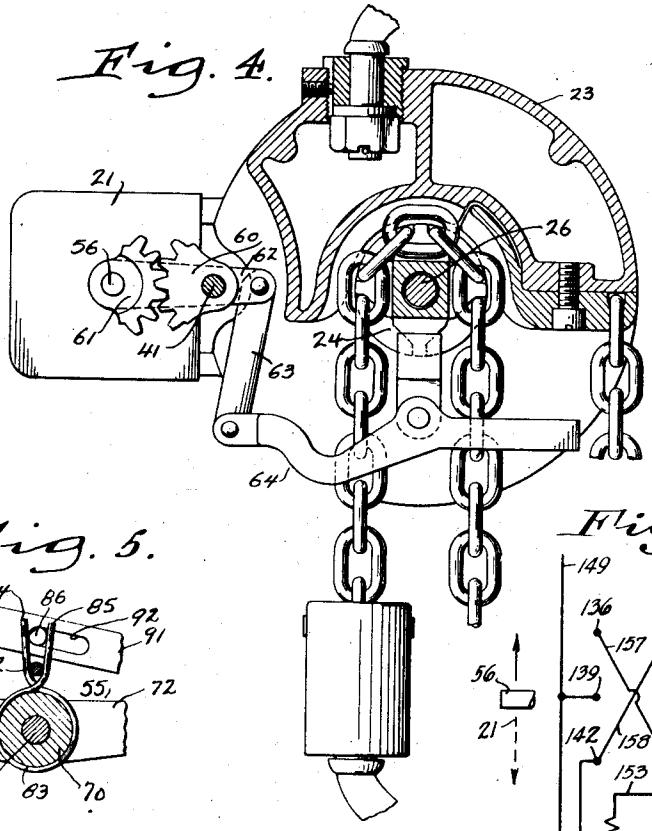


Fig. 5.

Fig. 15.

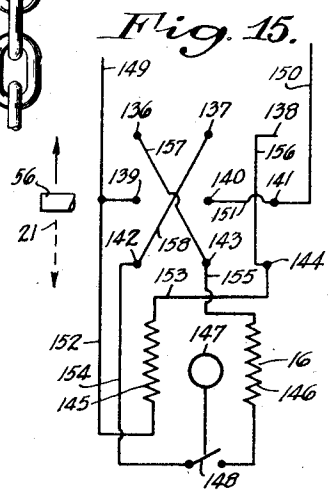


Fig. 6.

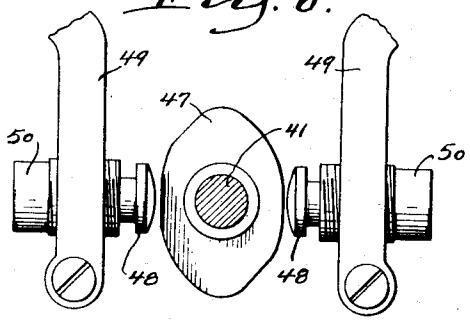
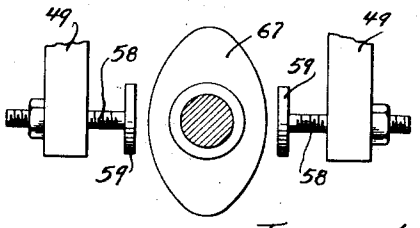


Fig. 7.



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HOIST

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Fig. 10.

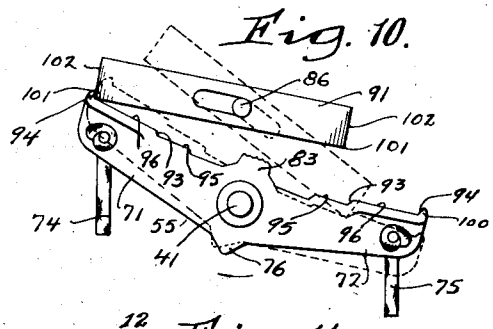


Fig. 11.

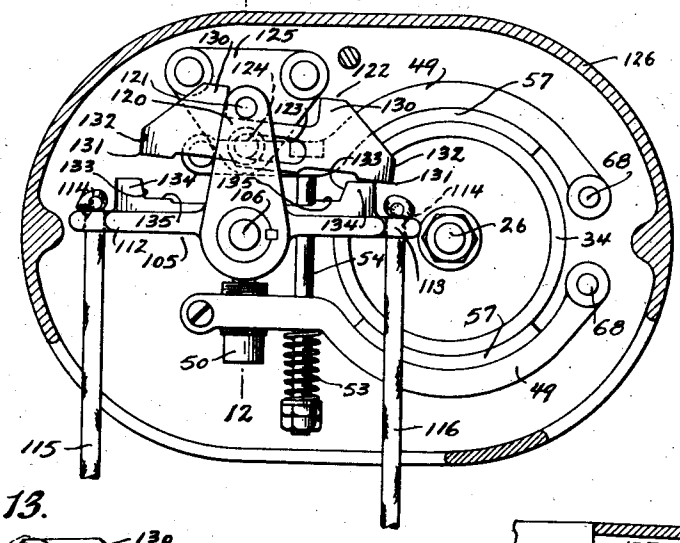


Fig. 13.

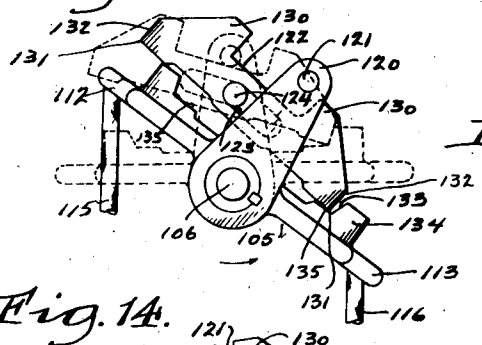


Fig. 14.

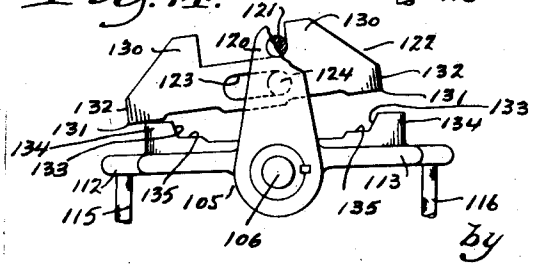
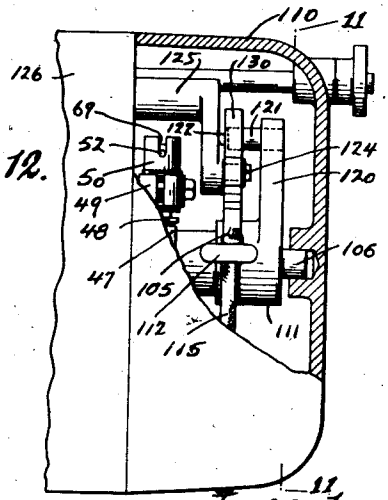


Fig. 12.



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2,274,280

UNITED STATES PATENT OFFICE

2,274,280

HOIST

Karl W. Stinson, Columbus, Ohio, assignor to Columbus McKinnon Chain Corporation, Tonawanda, N. Y., a corporation of New York

Application December 23, 1938, Serial No. 247,375

9 Claims. (Cl. 172—152)

My invention relates in general to hoists, and particularly to that type of hoist which is actuated by an electric motor forming an integral part of the structure.

It is well known to those skilled in the art that, in order to manufacture an inexpensive electric hoist, it is necessary that a motor of the single-phase, split-phase, or capacitor type induction motor be employed. The great drawback, however, in the use of such a type of motor, is that when reversing its direction of rotation, the shaft thereof must come to a substantial standstill before reversal can be effected. In other words, if the reversing switch controlling the motor is quickly reversed, which is not unusual when such a hoist is handled by the ordinary workman, the motor shaft will not have time to come to a standstill and be reversed but will continue to rotate in the same direction.

One of the principal objects of my invention has been to provide a hoist having mechanical means located between the control lever of the hoist and the controller switch thereof, whereby in the event that the control cords attached to the lever are too quickly operated in the act of reversing the rotation of the motor shaft, the control mechanism will be temporarily locked for a period of time sufficient to permit the motor to come to a standstill.

Another object has been to provide a hoist having resetting means, whereby the interlocking means will be returned to the position just preceding its actuation in the event that the load carried by the hoist is not to be reversed but is to be again moved in the same direction.

Moreover, my hoist may be inexpensively manufactured because of the fact that an inexpensive type of electric motor can be safely employed.

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

Fig. 1 is a plan view, partly in section, of a complete electric hoist embodying my invention, the section being taken on line 1—1 of Fig. 2.

Fig. 2 is a side elevation of the device, a portion thereof shown in section and taken on line 2—2 of Fig. 1.

Fig. 3 is an end elevation of the hoist with the end cover removed, showing my invention in one of its neutral positions.

Fig. 4 is a sectional elevation taken on line 4—4 of Fig. 1, showing details of my invention.

Fig. 5 is a fragmentary, sectional view taken on line 5—5 of Fig. 2.

Fig. 6 is a fragmentary, sectional view of the hoist taken on line 6—6 of Fig. 2.

Fig. 7 is a fragmentary, sectional view similar to Fig. 6 but showing the usual type of motor brake control.

Figs. 8, 9, and 10 are fragmentary views showing the control lever and locking mechanism of the form of my invention of Figs. 1–5, inclusive, in various positions of operation.

Fig. 11 is an end, sectional elevation of my hoist equipped with a modified form of interlocking means, taken on line 11—11 of Fig. 12.

Fig. 12 is a side, fragmentary, sectional elevation of the form of invention shown in Fig. 11, taken on line 12—12 of that figure.

Figs. 13 and 14 are fragmentary views showing the control and interlocking means of the form of invention shown in Figs. 11 and 12 in various positions of operation.

Fig. 15 is a wiring diagram of the motor and controller switch circuits.

Referring now to Figs. 1 to 5, inclusive, where I show the preferred embodiment of my invention, 15 represents an electric hoist embodying my invention. The hoist is equipped with an electric motor 16 which is of the single-phase, split-phase, or split-phase capacitor type which, as is well known in the art, is the most inexpensive type of electric motor. As hereinbefore pointed out, it is necessary to use this type of motor if an inexpensive electric hoist is to be manufactured. As shown in Figs. 1 and 2, the capacitor of the motor is shown at 20, and the controller switch is shown at 21. This controller switch, which is actuated by means to be hereinafter described, is, as is well known, for the purpose of connecting a source of electric current to the electric motor and is of such a nature that the motor can be run in either direction. In Fig. 15 I have shown such a switch connected to the motor in schematic manner. In this figure the controller switch 21 is represented in diagram and as having the customary three sets of stationary contacts 136, 139 and 142; 137, 140 and 143; and 138, 141 and 144. The actuating shaft of the controller is represented at 56 and this shaft carries the usual movable contacts of the switch (not shown).

In this diagram the circuits of the motor 16 are also shown, which comprise the usual running winding 145 and the starting winding 146. The armature of the motor is represented at 147, and the speed responsive switch of the motor is represented at 148. This speed responsive switch is the conventional type which is usually built

into the motor and which is utilized to open the starting winding 146 when the armature has reached the predetermined speed of acceleration.

In this sketch the line current is conducted to the switch and motor by means of leads 149 and 150. The lead 149 is connected to the stationary contact 139, and the lead 150 is connected to the stationary contact 141 of the controller switch. The stationary contact 141 is connected to the stationary contact 140 by means of a lead 151. The running winding 145 is connected at one side to the stationary contact 139 by means of a lead 152 and at its other side to the stationary contact 144 by means of a lead 143. The starting winding is connected at one side to the stationary contact 142 by means of a lead 154 and at its other side to the stationary connector 143 by means of a lead 155. The speed responsive switch 148 is preferably connected in the lead 154. The connector 144 is connected to the stationary connector 138 by means of a lead 156, and the stationary connectors 136 and 137 are connected, respectively, to the connectors 143 and 142 by means of leads 157 and 158, respectively.

From the foregoing it will be clear that when the movable electrodes (not shown) of the controller switch are moved by movement of the shaft 56 of said switch upwardly in a direction indicated by the full-line arrow, current will flow from the lead 149 through running winding 145 to the stationary contact 144 through the leads 152 and 153. Current will be conducted from the stationary contact 144 to the line 150 through lead 156, and contacts 138 and 141. The starting winding will simultaneously be energized by current flowing from stationary contacts 139, 136 and 143 through the winding 146 and speed responsive switch 148 to the stationary contact 142 through lead 154. From stationary contact 142 the current will be conducted over lead 158 to stationary contacts 137 and 140, thence over lead 151 to stationary contact 141 and line lead 150. The starting winding will be deenergized in well-known manner by the opening of the speed responsive switch 148 just as soon as the speed of the armature has been accelerated to the predetermined point. When the shaft 56 is now rotated to move the movable contacts (not shown) of the switch in the direction indicated by the broken line arrow, the current will flow through the running winding in the same direction as heretofore, since both stationary contacts 138 and 144 are connected together by means of the lead 156. Current, however, will be reversed in the starting winding and will flow in the following manner. From contact 139 current will flow to connector 142, lead 154, through speed responsive switch 148, starting winding 146, lead 155 to stationary contact 143 to stationary contact 140 and to contact 141 through lead 151 to the lead line 150, whereby the flow of current will be reversed in the starting winding and cause the motor to rotate in the opposite direction. It is also obvious from the foregoing that the starting winding will not be energized until the speed of the motor has been decelerated to such point that the speed responsive switch 148 will again be closed.

The casing parts of the hoist are represented at 23 and 33 and enclose portions of the device. The load-lift wheel 24 of my device is made an integral part of a load-lift shaft 25, which is suitably mounted in bearings and concentrically arranged with respect to the axis of the motor shaft 26. The shaft 25 is hollow and the motor shaft 26 is preferably extended therethrough. The driving gear 30 of the hoist is mounted upon the outer end of the load-lift shaft 25. The motor shaft 26 is extended beyond the driving gear and has the motor pinion 31 mounted thereon. This pinion may be attached to the motor shaft or it may form a part of an integral sleeve 32 which is carried by the motor shaft and which is suitably mounted in a bearing formed in the casing part 33. The motor shaft is extended beyond the end of this sleeve 32 and has the brake drum 34 rigidly mounted thereon, to be hereinafter more fully described.

The intermediate gear 35 of the hoist is mounted upon an intermediate shaft 36 which is journalled in suitable bearings carried by the casing parts 23 and 33. The intermediate gear, of course, is in mesh with the motor pinion 31, and the intermediate shaft 36 has a driving pinion 40 either formed thereon or attached thereto, which pinion meshes with the driving gear 30.

The intermediate shaft 36 is tubular and provided with an axial bore through which the hoist control shaft 41 passes. This control shaft is mounted in suitable bearings 42 and 43 carried by the casing parts 23 and 33 and has its outer end 44 mounted in a suitable bearing 45 formed in the casing cover 46. This control shaft arrangement is the invention of Erford E. Robins and is the subject matter of a separate, copending application. The cover 46 is fastened by suitable means to the casing part 33 which, in turn, is secured to the casing part 23. Mounted upon the control shaft 41, and preferably immediately in front of the bearing 43, is the brake cam 47. This cam acts upon spring-pressed buttons 48 which are carried at the lower ends of the brake arms 49. Each of these buttons is mounted for limited axial movement within a sleeve 50, the exterior of which is screw-threaded and carried at the end of the brake arm in a suitable threaded aperture, whereby the position of each button with respect to the arm may be accurately adjusted. A spring 51 is carried by each of the sleeves for pressing each button inwardly and a pin 52, moving in a slot 69, limits the extreme inward movement of the buttons. The springs 51 are so designed that when the cam, which is carried by the control shaft, is operated in the direction of lowering of the load, these springs will counteract the tension of the brake spring 53. This brake spring is mounted upon a bolt 54 which, as is customary, passes through both brake arms 49, the tension of the spring being adjusted by suitable screwthreaded means. Each of the brake arms 49 is provided with suitable brake shoes 57 which engage with the brake drum 34. Each of the brake arms 49 is pivotally attached to the casing by means of pins 68. The brake releasing means just described is the invention of Erford E. Robins and is the subject matter of a co-pending application. It is obvious that my brake control invention may be applied not only to a hoist having the specific type of brake releasing means just described, but also to a hoist having the usual motor brake releasing mechanism, as shown in Fig. 7. As here shown, the brake arms 49 (shown in fragmentary manner) carry screws 58 in adjustable manner, on the inner end of each of which is the usual cam-engaging disc 59. These discs are engaged by the cam 67 when rotated in either direction to

cause the brake arms to be separated so as to release the brake.

Mounted upon the extreme outer end of the control shaft 41 is the control lever 55 of my device. The control shaft, due to the proportions of the hoist, is out of alignment with the controller switch shaft 56, and these two shafts are connected together for rotative operation by means of a segmental gear 60 carried by the control shaft 41 and an intermeshing, segmental gear 61 carried by the switch shaft 56. The segmental gear 61 carries an arm 62 which is connected by a suitable link 63 to the usual safety trip lever 64 of the hoist. As is well known, this trip lever serves to shut off the motor when the hoist is inadvertently operated in either direction to the limit of its movements, thereby preventing the hoist from being operated beyond predetermined points.

The control lever 55 is provided with a hub 70 and two outwardly extending arms 71 and 72. Each of the arms 71 and 72 is provided with an aperture 73, through which the upper ends of the operating ropes 74 and 75 may be passed. A knot is preferably formed at the end of each of the ropes after its passage through the aperture for retaining the same in place. These ropes extend downwardly to within reach of the operator of the hoist, where a suitable handle 80 is provided. The control lever 55 is provided with an upwardly extending arm 81 which carries an inwardly extending pin 82. A centralizing spring 83 is mounted upon the hub 70 of the lever and has its ends 84 and 85 extended upwardly and in engagement with the pin 82. The spring is held in position by means of the upwardly extending arm 81 and by means of a lug 76 projecting downwardly from the hub 70 of the control lever. The ends 84 and 85 are of such length that they also engage with a stationary lock bar pin 86, which is carried by a bracket 90. The bracket 90 is preferably secured by suitable means to the casing part 33. By means of the centralizing spring 83, and the pins 82 and 86, the control lever 55 will be held normally in its neutral position, as shown in Fig. 3.

The lock bar 91 of my device is mounted above the control lever 55 and upon the lock bar pin 86 carried by the bracket 90. The lock bar is provided with a centrally arranged slot 92 which permits longitudinal sliding and oscillatory movement of the bar upon the pin 86.

The control lever arms 71 and 72 of my device are symmetrically arranged about the axis of oscillation of the lever and each of them is provided on its upper surface with a locking abutment 93 and with a resetting abutment 94. The locking abutment 93 is provided by the stepped arrangement of the upper surfaces 95 and 96 of the arm. The resetting abutment 94 is provided on each arm by an upstanding lug 100. The locking abutments 93 and resetting abutments 94 are engageable with the lower corner edge 101 and the end surface 102 at either end of the lock bar during the operation of the control lever, as hereinafter described.

Referring now to the form of invention shown in Figs. 11 and 12, 105 is the control lever which is mounted upon a control shaft 106, supported at its outer end by the cover part 110 and at its inner end by a casing 126 in a manner described in connection with the other form of invention. This control lever has a hub 111 and two control arms 112 and 113. Each of these arms is provided with an aperture 114 through which the control cords 115 and 116 are passed. The control lever in this form of invention is provided with an upwardly extending reset arm 120 which carries a reset pin 121. The lock bar 122 of this form of invention is provided, like in the other form of invention, with a longitudinally arranged slot 123 which is mounted for longitudinal movement and for oscillation upon a detent pin 124. This detent pin is carried by a detent bracket 125, which is suitably secured to the casing part 126 of the hoist.

The lock bar in this form of invention is provided at each side of the center with a reset arm 130, which arms are interspaced in relation to each other. The reset pin 120 is movable within this space and between said reset arms. This bar 122 is provided at each end with an edge 131 and an end surface 132. The edge 131 and the end surface 132 at each end of the lock bar are engageable with a locking abutment 133 carried at each end of the control lever and formed by a lug 134 provided at the end of each of the arms. Each of the locking abutments 133 terminates at a surface 135 formed on each of the arms of the control lever.

As pointed out in the preamble, it is an object of my invention to prevent the too rapid operation of the control lever when reversing the motor. In carrying out this function by the invention shown in Figs. 1–5, inclusive, and 8–10, inclusive, let it be assumed that the operating cord 74 when pulled operates the controller switch 21 to elevate the load carried by the hoist. As will be clear from the structure hereinbefore described, when the cord 74 is pulled downwardly, the control lever 55 will cause the rotation of the control shaft 41 in clockwise direction, as viewed in Fig. 3. The shaft 56 of the controller switch will be operated in counterclockwise direction through the medium of the segmental gears 60 and 61 carried, respectively, by the control shaft and the controller switch shaft. When the controller switch shaft is thus rotated, the current from any suitable source will be allowed to flow through the motor, causing its shaft to rotate in clockwise direction. The load carried by the hook of the hoist will, therefore, be elevated. As the control lever is being rotated in clockwise direction to the position where the hoist will be operated to elevate the load, it will be moved to the position shown in Fig. 8. As shown in this view, the right-hand end of the lock bar 91 will ride along the surface 96 and drop down to the surface 95 past the locking abutment 93. It is to be assumed that the lock bar has been moved to the right to the position where the pin 86 will be at the left-hand end of the slot by gravity or by the resetting abutment 94 at the opposite end of the lever, to be hereinafter described, and as shown in Figs. 3 and 8. When the control lever is now allowed to return to neutral, by means of the centralizing spring 83, the right-hand edge 101 will move along the surface 95 until the end surface 102 at that end of the lock bar contacts the locking abutment 93. From this point, further counterclockwise movement of the control lever will cause the lock bar to be moved up and along on the lock bar pin 86. If such movement is so timed that the motor has an opportunity to stop before reversal of its shaft is effected, the lock bar will ride on the pin until it has passed its center of gravity, whereupon it will fall in counterclockwise direction so that the left-hand edge 101 will contact with the surface 96 at the left-hand end of the control lever, where it will

be in position to engage with the abutment 93 at the left-hand side of the control lever when the lever is returned from its reversed or counterclockwise movement when and if such lever is moved to such reversed position. Assume now that instead of a slow, measured movement of the control lever from the position shown in Fig. 8 to its neutral position (shown by full lines in Fig. 9), or to a position of reversal (shown by dotted lines in Fig. 9, the lever is given a quick movement to and through its neutral position toward its reverse position, the abutment 93 of arm 72 will cause the lock bar 91 to be moved upwardly upon the lock bar pin 86 to the end of the slot 92 thereof, but because of the frictional engagement of the abutment with the bar caused by the rapid movement, the bar will not be permitted to fall by gravity but will be locked between the pin and the abutment (as shown in dotted lines in Fig. 8), whereby the control arm will be prevented from moving to its reverse position. So long as the tension is applied to the operating rope 74, the surfaces will remain in frictional engagement, but when the tension on the operating cord 74 is released and the lever is moved slightly in clockwise direction by the centralizing spring 83, as shown in the dot-and-dash lines of Fig. 8, the left-hand end of the lock bar will be permitted to fall by gravity into engagement with either the surface 96 or the surface 95 at the left-hand end of the lever, as also shown in this figure by the dot-and-dash lines. During such delayed movement of the control lever, the motor of the hoist has had opportunity to come to a standstill before the control lever can be operated to its reverse position.

In the event that the control lever has been locked, as just above described, and the motor is to be operated in the same direction without first reversing the direction thereof, the resetting abutment 94 at the left-hand end of the control lever will engage the edge 101 and surface 102 at the left-hand end of the lock bar, as shown in Fig. 10, and will serve to push the lock bar along to the right with its slot riding over the pin 86 until the lock bar has reached a point beyond the center of gravity, whereby the right-hand end of the bar will fall, its edge 101 coming in contact with the surface 95 of the arm 72 of the control lever at the right of such lever, as shown by the dotted lines of Fig. 10, where it will be ready to again engage the locking abutment 93 of the arm 72 when the control lever is returned to its neutral position or is moved on to the reversing position.

When the control lever is moved counterclockwise to effect a reversal of the motor shaft and, therefore, a lowering of the load carried by the hoist, the lever will be moved from the full line position of Fig. 9 to the dotted line position thereof, during which movement the lock bar 91 will be also moved to the dotted line position where the left-hand edge 101 and surface 102 will be engageable with the locking abutment 93 of the arm 71 of the lever when the lever is moved to its neutral position or to the position where the motor shaft will have its direction of rotation reversed.

It will thus be seen that each time the control lever is returned too rapidly to neutral it will be effectively locked and that, in the interim required to unlock the same, the motor will have had time to come to rest before reversal of the direction of rotation thereof can be effected.

In the operation of the form of device shown in Figs. 11 and 12, substantially the same functions are performed, as shown by Figs. 13 and 14. When the operating cord 116 is pulled to elevate the load, the control lever 105 will be rotated in clockwise direction to the full line position shown in Fig. 13. If the lock bar has not been moved to the right beyond its center of gravity in which position its lower edge 131 will be riding on the surface 135, the reset pin 121 carried by the reset arm 120 will bear against the inner surface of the reset lug 130 at the right of the lock bar and thus cause the bar to be moved along on the detent pin 124 until the left-hand end of the slot of the bar is in contact with the pin, as shown in full lines in Fig. 13. When the control lever now is moved counterclockwise by the operation of the cord 115, the surface 132 at the right-hand end of the lock bar or arm 113 will engage with the locking abutment 133 at the right-hand end of the control lever which will serve to push the lock bar along on the detent pin 124. The end of the lock bar will remain in contact with the engaged locking abutment if the movement is too rapid and the movement of the lock bar will continue along on the pin until the right-hand end of the slot 123 is brought in engagement with the detent pin 124, as shown by dotted lines in Fig. 13, where the control lever will be locked against further movement. Such locked position will be maintained so long as the tension on the cord 115 is maintained. Upon release of such tension, in a manner similar to that described in connection with the form of invention shown in Fig. 8, the lock bar will be permitted to tip with the detent pin 124 as an axis, whereby the left-hand end of this lock bar will be brought to rest upon either the top surface of the lug 134 (see Fig. 14) or the surface 135, where it will be ready to cooperate with the control lever in locking the same, should such lever be operated in counterclockwise direction to the reverse position and then operated too quickly in clockwise direction. If the control lever is not operated to reverse the motor shaft but is again operated in the same direction, i. e., clockwise to elevate the load, the lock bar 122 will be moved to a position where it will cooperate with the control lever upon its return movement by the engagement of the reset pin 121 with the surface of the right-hand reset lug 130 thereof.

Obviously, if the control lever of either form of invention is, for instance, operated to elevate the load and then, after being in neutral position, is again operated to further lift the load without first moving the lever in reverse position, the lock bar will be returned to its right-hand position where it will be in cooperative relation with the locking abutment of the control lever at the right-hand end thereof when operated the second time for further load-lifting. Likewise, when the control lever is repeatedly operated to lower the load, the movements of the lock bar will be identical with the movements above described except that the bar will be moved in the opposite direction.

While I have shown the intermediate gear 35 and the operating shaft as separate parts, it is obvious that these parts may be made in one integral piece. Furthermore, the form of invention shown in Figs. 1, 2, 3, 8, 9 and 10 is provided with the resetting abutments 94, but it is obvious that these abutments may be omitted if desired since the frictional engagement of the lock bar 91 with the surfaces 96 may be, and usually is,

sufficient to cause longitudinal movement of such lock bar along the pin 86. These and other modifications of the details herein shown and described may be made without departing from the spirit of my invention or the scope of the appended claims, and I do not, therefore, wish to be limited to the exact embodiments herein shown and described, the forms shown being merely preferred embodiments thereof.

Having thus described my invention, what I claim is:

1. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, and means for moving the switch from a lifting position to a lowering position, including normally inactive time-delay means, said delay means being operable only above a predetermined speed of operation of the means for moving the switch for compelling the lapse of a predetermined time interval from one switch position to another.

2. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, single lever means connected to said switch for moving the switch from one extreme operating position to another through neutral, and normally inactive time-delay means associated with said lever means, said delay means being operable only above a predetermined speed of operation of the means for moving the switch and only when said switch is in neutral position.

3. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, and means for delaying the reversal of the motor shaft, including a pivotally mounted control lever connected to said control switch, and a normally inactive lock bar associated with the control lever, said bar being engageable in interlocked relation with said lever to hold said switch open only when the speed of operation of the control lever is beyond a predetermined amount.

4. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, and means for delaying the reversal of the motor shaft, including a pivotally mounted control lever connected to said control switch and having locking abutments and resetting abutments, and a normally inactive lock bar associated with the control lever and having its ends engageable with the locking abutments and the resetting abutments thereof, said bar being engageable in interlocking relation with said locking abutments to hold said switch open only when the speed of operation of said lever is beyond a predetermined amount, and said lock bar being engageable with said resetting abutments to reset said bar when subsequent movement of said lever is in the same direction as its initial movement.

5. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, and means for delaying the reversal of the motor shaft, including a pivotally mounted control lever connected to said control switch, a stationarily arranged detent pin carried by the hoist, and a normally inactive lock bar formed with a centrally arranged slot, said bar being mounted upon said pin and cooperating with said control lever, said bar being engageable in interlocking relation with said lever to hold said switch open only when the speed of operation of the said lever is beyond a predetermined amount.

6. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, and means for delaying the reversal of the motor shaft, including a pivotally mounted control lever connected to said control switch and having locking abutments, a stationarily arranged detent pin carried by the hoist, and a normally inactive lock bar formed with a centrally arranged slot, said lock bar being mounted upon said pin and having its ends engageable in interlocked relation with said locking abutments to hold said switch open only when the speed of operation of said lever is beyond a predetermined rate.

7. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, and means for delaying the reversal of the motor shaft, including a pivotally mounted control lever connected to said control switch, a normally inactive lock bar pivotally mounted above the control lever and coacting with the same to interlock said lever and said bar to hold said switch open only when the speed of operation of the control lever is beyond a predetermined rate, and resetting means carried by said control lever and said lock bar for resetting the lock bar.

8. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, and means for delaying the reversal of the motor shaft, including a pivotally mounted control lever connected to said control switch and having locking abutments, a normally inactive lock bar associated with said control lever and having its ends engageable with the locking abutments thereof, and resetting means carried by said control lever and said lock bar, said bar being engageable in interlocking relation with said locking abutments to hold said switch open only when the speed of operation of said lever is beyond a predetermined amount, and said bar be-

ing engageable with said resetting means to reset said bar when subsequent movement of said lever is in the same direction as its initial movement.

9. An electric hoist, comprising a single-phase, reversing electric motor of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, a reversing control switch for said motor, said motor being operable substantially instantaneously upon closing of said switch, and means for delaying the reversal of the motor shaft, including a pivotally mounted control lever connected to said control switch and having two interspaced locking abutments, one arranged on each side of the center of oscillation of the lever, a resetting abutment formed on each end of said lever and at a point remote from each locking abutment, a detent bracket carried by the hoist, a detent pin carried by said bracket, and a normally inactive lock bar formed with a centrally arranged slot for pivotal and slidable engagement with said pin, said bar having its ends in interlocking relation with said locking abutment to hold said switch open only when the speed of operation of said lever is beyond a predetermined amount, and said bar being engageable with said resetting abutments to reset said bar when subsequent movement of the lever is in the same direction as the initial movement.

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