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A. COTESWORTH ET AL
CONTROLLING MEANS FOR HOISTS

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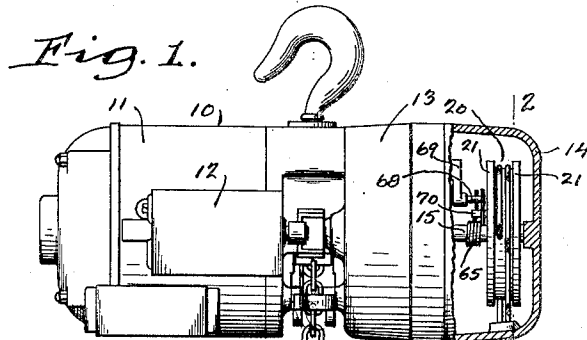


Fig. 3.

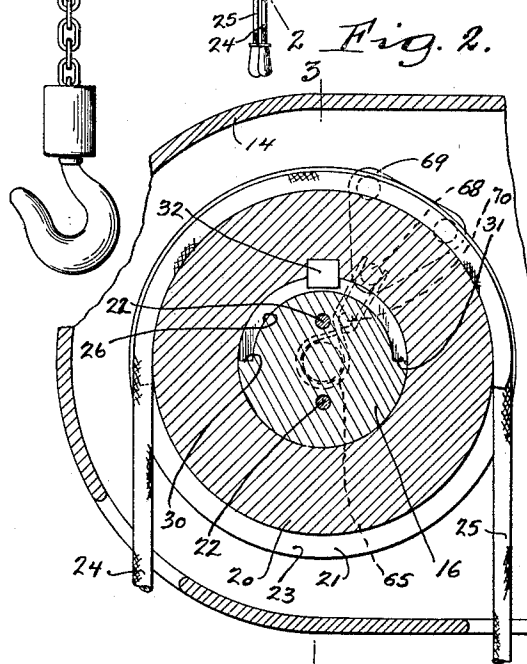
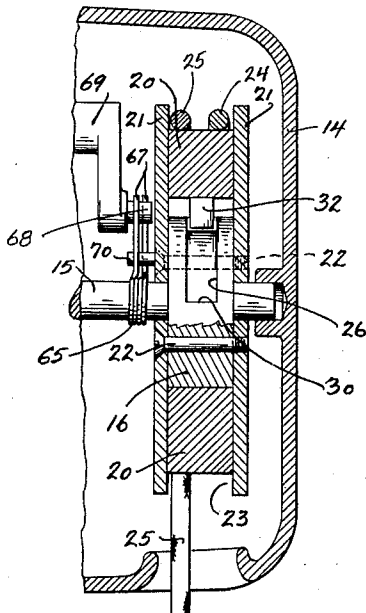


Fig. 4.

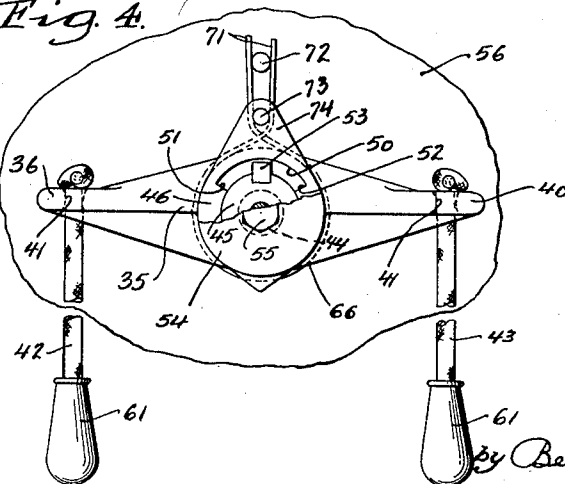
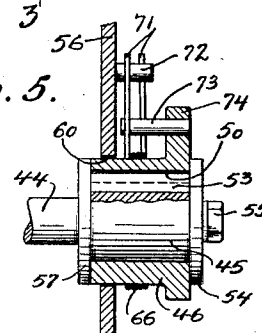


Fig. 5.



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CONTROLLING MEANS FOR HOISTS

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6 Claims. (Cl. 74-470)

Our invention relates in general to controlling means for 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 an electric motor of the single-phase, split-phase type or capacitor type are best suited for use in the manufacture of an inexpensive electric hoist. These motors, however, have a decided drawback in that it is necessary that the armature of such motors come to a standstill before reversal of direction of rotation can be brought about, since too rapid a movement of the controls will cause the motor to continue rotating in its initial direction.

One of the principal objects of our invention has been to provide a device whereby the controls, in their movement from one position to another to bring about a reversal of rotation, will cause sufficient delay to permit the motor armature to come to a standstill.

Another object has been to provide a device which is not only inexpensive to manufacture, but may be easily applied to existing hoists without the necessity of redesigning or altering such hoists.

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

Fig. 1 is an exterior view of a hoist, having portions thereof broken away and showing our invention applied thereto.

Fig. 2 is an enlarged, sectional elevation of our invention taken on line 2-2 of Fig. 1.

Fig. 3 is an enlarged, transverse section taken on line 3-3 of Fig. 2.

Fig. 4 is a front elevation of a modified form of invention.

Fig. 5 is a longitudinal, sectional view of the form of invention shown in Fig. 4.

In the drawing, 10 represents the hoist which is equipped with a motor 11 permanently secured to and forming an integral part of the hoist structure. The controller switch is represented at 12. The motor is attached to the casing 13 of the hoist which is provided at the end with a cover 14. The casing contains the usual gearing (not shown) for reducing the speed of the motor shaft (not shown) to the load-lift wheel (not shown).

The control shaft of the hoist is represented at 15, and may be a continuation of a controller switch shaft or it may be connected thereto by suitable means. Carried by the shaft 15 is a head 16 which is cylindrical in form and upon

which is rotatably mounted a drum 20. The drum 20 is preferably the same thickness as the head 16 and a drum plate 21 is secured to each side of the head, preferably by means of bolts 22. These plates are larger in diameter than the drum and their peripheries, therefore, extend some distance beyond the periphery of the drum, as shown in the drawing, whereby a groove 23 is formed in the drum. The control cords 24 and 25 of the hoist are each extended around the drum in opposite directions and are secured to the periphery of the drum 20 by any suitable means. Sufficient cord is wound around the periphery of the drum to allow sufficient rotation of the drum to effect the proper operation of the controller switch.

In carrying out our invention, as hereinbefore pointed out, a certain amount of lost motion is provided between the control drum and the control shaft in order to delay the operation of the switch to either reversing position. In this form of our invention, this function is carried out by means of an annular groove 26 formed in the periphery of the head 16 and extending substantially 180° around the circumference of said head. A detent shoulder 30 is formed at one end of the groove and a detent shoulder 31 at the opposite end thereof. The drum carries a detent key 32 which is rigidly mounted in the drum and extends into the groove 26, whereby the drum is free to rotate upon the head 16 until the detent key engages with either detent shoulder 30 or 31 in the rotation of the drum.

In Figs. 4 and 5, we show our invention applied to a lever type of control where 35 represents the control lever which is formed with outwardly extending arms 36 and 40, each having a suitable aperture 41 for the reception of control cords 42 and 43. In Figs. 4 and 5 the control shaft is represented at 44, and this shaft preferably has a cylindrical head 45 upon which the hub 46 of the control lever 35 is mounted. The hub of the control lever is formed in its inner periphery with an arcuate groove 50 extending around its periphery for a predetermined distance, and formed at one end with a detent shoulder 51 and at its opposite end with a detent shoulder 52. The head 45 of the control shaft 44 is provided with a detent key 53 which projects above the periphery of the head and extends into the arcuate groove 50. The control lever 35 is preferably held in position against movement outwardly on the control shaft by means of a washer 54 through which a bolt 55 is passed, and said lever is held against move-

ment inwardly by means of a shoulder or collar 51, formed preferably on said shaft. In this form of invention the control lever is preferably mounted outside of the cover of the casing of the hoist, represented in Figs. 4 and 5 by the numeral 56, a suitable aperture 60 being formed through the cover for reception of the inner end of the hub of the control lever.

Each of the control cords of each form of invention may be provided with suitable operating handles 61 which are suitably secured to the lower ends of these cords.

Referring now to the form of invention shown in Figs. 1-3, inclusive, it will be obvious that when, for instance, the control cord 25 is operated, the drum 20 will be rotated in clockwise direction and the detent key 32 will freely move through the groove 26 until it strikes the detent shoulder 31 of the control shaft head 16 at the right of Fig. 2. The movement of the drum upon the head up to this point will be an idle movement and will perform no function except that of rotating the drum upon the head. When, however, the key strikes the shoulder 31, the control shaft 15 will be positively rotated to operate the controller switch. When it is now desired to reverse the hoist by pulling upon the cord 24 which will, of course, reverse the direction of rotation of the drum, it will be seen that the detent key will move from its engagement with the detent shoulder 31 around through the groove 26 a distance substantially equal to the length of the groove, whereupon the drum can then be positively operated in the reverse direction by the engagement of the key with the opposite detent shoulder 30. During such delayed or lost motion between the drum and the head 16, the motor of the hoist will have had opportunity to come to a standstill and the desired reversal of the motor can then be effected.

The same functions occur when operating the device shown in Figs. 4 and 5. In this form, however, when the control cord 43, for instance, is operated, the control lever will be rotated upon the head 45 and the arcuate groove 50 will move over the key 53 carried by the head until the shoulder 51 is engaged with the key, after which further pulling upon the cord 43 will cause the control shaft 44 to be positively operated. Upon reversal, by pulling the cord 42, the groove 50 will first be moved over the key 53 until the opposite detent shoulder 52 is brought in contact therewith, after which further movement of the cord 42 will cause the control shaft to be positively operated in the reverse direction.

It is desirable that the control drum and the control lever be returned to their neutral positions. In order to accomplish this, we provide a return spring 65 on the form of invention shown in Figs. 1-3, inclusive, and a return spring 66 on the form of invention shown in Figs. 4 and 5. The spring 65 is provided with upstanding ends 67 which engage opposite sides of a lug 68 carried by the bracket 69 which is secured to the hoist. These spring ends also engage with a lug 70 carried by one of the plates 21 of the drum. The spring 65 is mounted about the control shaft 15. The spring 66 of the other form of invention is provided with upstanding arms 71 which engage opposite sides of a lug 72, carried by the cover 56 and a lug or pin 73, carried by the upstanding arm 74 of the control lever 35. These springs serve to keep the control drum and lever in their neutral positions. The shafts 15 and 44 of the two forms of inventions are maintained in neutral position by means of the spring usually provided in the controller

switch. This is not shown or further described since it does not form a part of our invention.

Having thus described our invention, what we claim is:

1. A control for single-phase, reversing electric motors of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, comprising a control member freely movable in two directions, manually actuated control means oscillatably mounted upon the control member for unrestrained idle relative movement therewith through a limited path in either direction, whereby to afford time delay in the movement of said member to its actuating positions, and interspaced detent means carried by the control member and the control means for coupling said member and said means at the extremities of said idle relative movement to positively actuate said control member in either direction.

2. A control for single-phase, reversing electric motors of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, comprising a control shaft freely movable in two directions, manually actuated control means oscillatably mounted upon the control shaft for unrestrained idle relative movement therewith through a limited path in either direction, whereby to afford time delay in the movement of said shaft to its actuating positions, and detent means carried by the control shaft and the control means for coupling said shaft and said means at the extremities of said idle relative movement to positively actuate said control shaft in either direction, said detent means being so interspaced that the idle relative movement provides sufficient time for the motor to come to rest before the operator can move the control member to a reversing position.

3. A control for single-phase, reversing electric motors of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, comprising a control shaft freely movable in two directions, manually actuated control means oscillatably mounted upon the control shaft for unrestrained idle relative movement therewith through a limited arcuate path in either direction, whereby to afford time delay in the movement of said shaft to its actuating positions, and detent means carried by the control shaft and the control means for coupling said shaft and said means at the extremities of said idle relative movement to positively actuate said control shaft in either direction, said detent means being so interspaced that the idle relative movement provides sufficient time for the motor to come to rest before the operator can move the control member to a reversing position.

4. A control for single-phase, reversing electric motors of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, comprising a control shaft freely movable in two directions, a cylindrical head carried by the control shaft, manually actuated control means oscillatably mounted upon said head for unrestrained idle relative movement therewith through a limited arcuate path in either direction, whereby to afford time delay in the movement of said shaft to its actuating positions, and detent means carried by the control shaft and the control means for coupling said shaft and said means at the extremities of said movement to positively actuate the shaft in either direction, said detent

means being so interspaced that the motor will have sufficient time to come to rest before the operator can move the control lever to its reversing position.

5. A control for single-phase, reversing electric motors of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, comprising a control shaft freely movable in two directions, a head carried by the control shaft, interspaced 5
detent abutments carried by the head, a control drum oscillatably mounted upon the head 10
for unrestrained idle relative movement therewith through a limited arcuate path in either direction, whereby to afford time delay in the 15
movement of said shaft to its actuating positions, and a detent carried by the head and engageable with said detent abutments for coupling said shaft and said drum at the extremities of said 20
movement to positively actuate the shaft in either direction, whereby the motor will have sufficient time to come to rest before the operator

can move the control lever to its reversing position.

6. A control for single-phase, reversing electric motors of the type which continues its operation uni-directionally upon too rapid operation of the reversing means, comprising a control shaft freely movable in two directions, a head carried by the control shaft, said head being formed with an arcuate groove having a detent abutment at each end thereof, a drum oscillatably mounted upon the head for unrestrained idle relative movement therewith through a limited path in either direction, whereby to afford time delay in the movement of said shaft to its actuating positions, a detent key carried by the drum and engageable with said abutments for coupling said drum and said shaft at the extremities of said idle relative movement to positively actuate said shaft in either direction.

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