J. H. DERBY.

RELEASE BOX.

APPLICATION FILED NOV. 20, 1915.

1,312,895.

Patented Aug. 12, 1919.

2 SHEETS—SHEET 1.

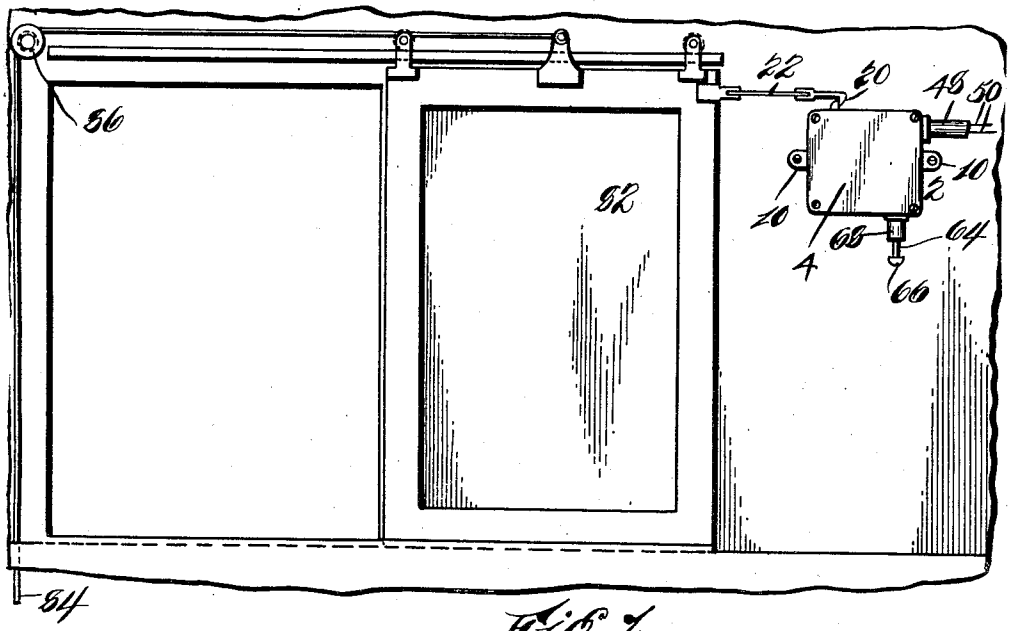
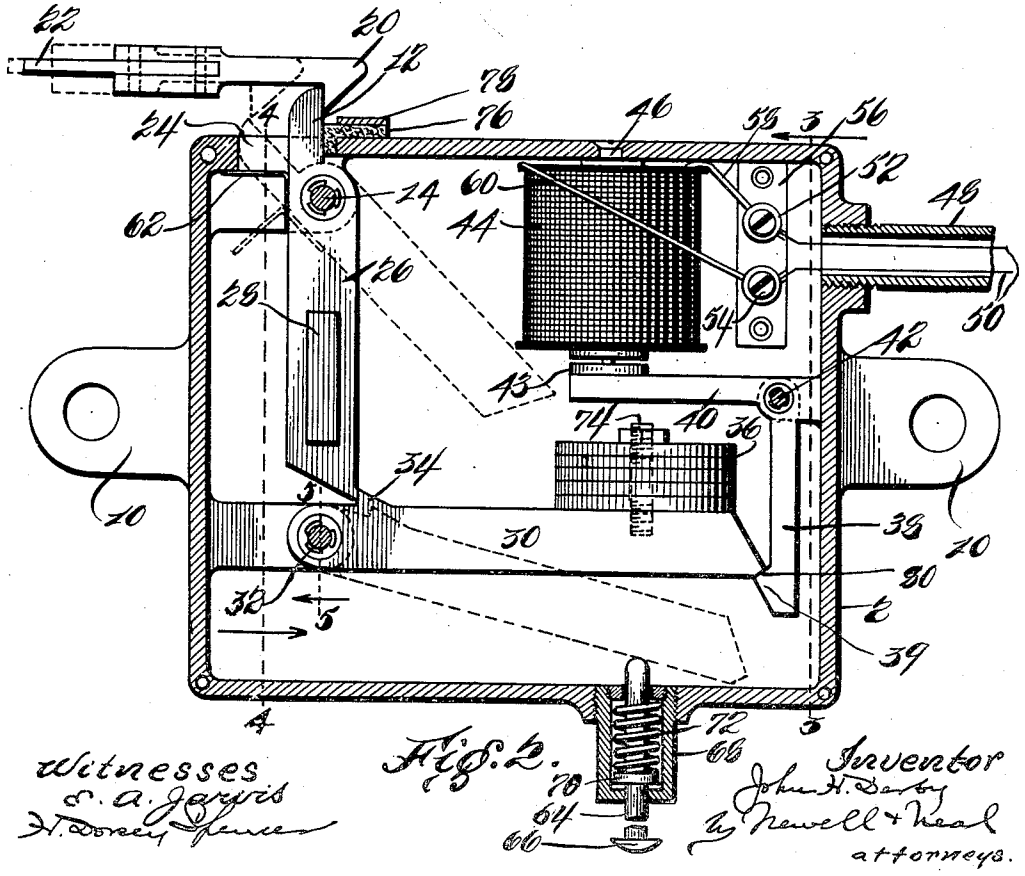


Fig. 1.



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Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

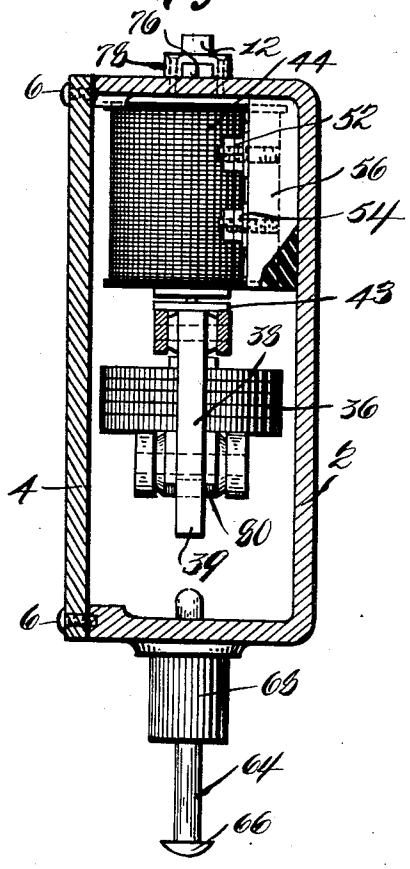


Fig. 4.

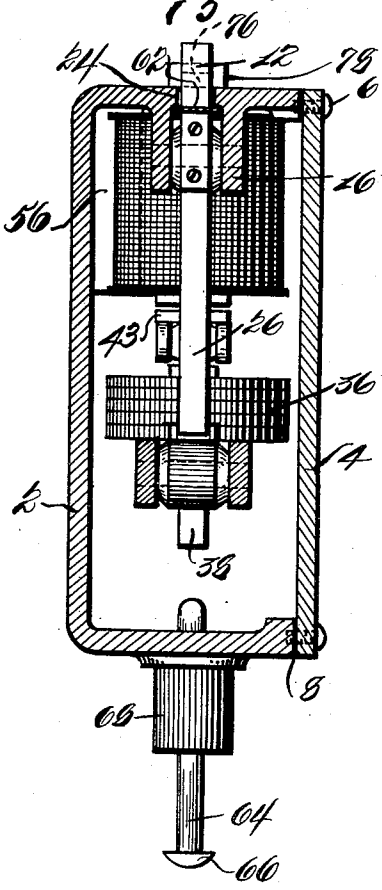


Fig. 5.

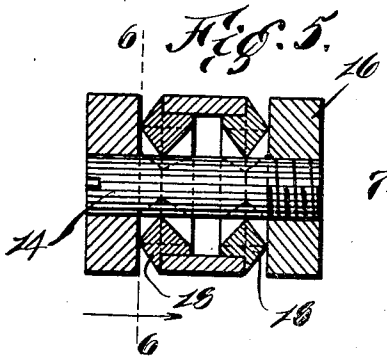


Fig. 6.

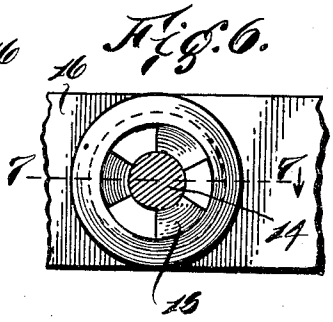
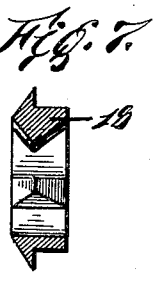


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN H. DERBY, OF NEW YORK, N. Y.

RELEASE-BOX.

1,312,895. Specification of Letters Patent. Patented Aug. 12, 1919.

Application filed November 20, 1915. Serial No. 62,580.

To all whom it may concern:

Be it known that I, JOHN H. DERBY, a citizen of the United States, residing at New York city, borough of Manhattan, county and State of New York, have invented certain new and useful Improvements in Release-Boxes, of which the following is a clear, full, and exact description.

This invention relates to devices for controlling the operation of movable parts, and is herein shown as embodied in a device, commonly termed a "release box", for controlling the operation of fire doors, traps, dip tank covers, theater ventilators, theater drop curtains and for shutting down blower systems and other machinery, although it will be understood that the invention is not restricted to the illustrated embodiment or to the particular uses above enumerated.

An object of the invention is to provide a release box which will not easily get out of order and which will operate with certainty whenever an occasion for its operation arises.

Another object of the invention is to provide a device of the class described which is very sensitive so that it may be operated by a comparatively small force.

An important feature of the invention is its construction and arrangement for operation in a closed electric circuit, whereby any interruption of the circuit will be indicated by the operation of the device and thus the system in which the device is installed will be substantially self-testing.

Other objects and important features of the invention will appear from the following description and claims when considered in connection with the accompanying drawings, in which—

Figure 1 is a front view of the release box of the present invention, showing one of the uses to which it may be put;

Fig. 2 is a longitudinal section through the box showing the release mechanism;

Figs. 3 and 4 are, respectively, sections on the lines 3—3 and 4—4 of Fig. 2, looking in the directions of the arrows;

Figs. 5, 6 and 7 are detail sections of the knife edge bearing, respectively upon the lines 5—5 Fig. 2, 6—6 Fig. 5, and 7—7 Fig. 6.

Release boxes for the purposes for which the illustrated box is intended are usually installed in places where they are operated very infrequently, as, for example, when they constitute a part of a fire prevention system, and are thus exposed to changes in temperature and frequently to moisture and dust. It is therefore important that the mechanism of the device be protected as much as possible from conditions which might impair its efficiency. To this end, in the illustrated construction, the mechanism is inclosed in a box 2 of cast iron or other suitable material which is provided with a cover-plate 4 attached to the body of the box by machine screws 6. Between the cover-plate 4 and the body 2 a felt gasket 8 is preferably located. The box 2 is also provided with perforated lugs 10 for use in attaching the box to a wall, column or partition, by means of bolts or lag screws.

The part of the device to be engaged for holding the movable part controlled by the device against movement comprises, in the illustrated construction, a latch 12 constituted by the upper arm of a lever fulcrumed upon a pivot pin 14, carried by two lugs 16 preferably integral with the box. The lever 12 is preferably formed of bronze or other not easily corrodible material, and is preferably provided with three-point knife bearings 18 to reduce the friction of its bearing upon the pivot 14. Coöperating with the latch 12 to hold the door, curtain or other movable part against movement, is a catch 20 which may be connected by a flexible metal strip or strap 22 to the part to be controlled. The latch 12 projects through an opening 24 in the box 2, and this opening is of such shape that the latch may swing down into the opening to release the catch 20. When in operative position, however, the latch 12 is substantially vertical, and to maintain it in this position it is provided with an operating arm 26 constituting the other arm of the lever turning about the pivot 14, the arm 26 being provided with a weight 28 which may be formed by filling a recess in the arm with lead or other heavy material, the purpose of the weight being to tend to swing the latch into its operative position.

Coöperating with the arm 26 is a second lever 30 fulcrumed upon pivot 32 and having a stop 34 arranged to be moved into the path of movement of the arm 26, the stop 34 being located relatively near the fulcrum 32 of the lever 30 and said lever having a rela-

tively long operating arm. Mounted upon the lever 30 at a point near its outer end is a weight 36 so arranged that it tends to move said lever 30 into releasing relation to the arm 26.

In order to maintain said lever 30 in retaining relation to the arm 26, a third lever comprising a bell-crank having arms 38 and 40 is provided, this last mentioned lever being fulcrumed upon a pivot 42 and having a stop which engages the lever 30 when said bell-crank is in operative relation thereto. In order to maintain the bell-crank in operative relation to the lever, its arm 40 is provided with an armature 43 which is acted upon by an electromagnet 44 which is attached to the box 2 by a machine screw 46. The electromagnet 44 is in a closed circuit, the box 2 being provided with a threaded opening for a conduit 48 for electric wires 50, which are received upon terminals 52 and 54 carried by a fiber or other insulating block 56 attached to the box, the wires 58 and 60 from the magnet being also received upon said terminals.

From an inspection of Fig. 2 of the drawings it will be noted that the latch 12 is so shaped upon its back side that when it is moved into release position, it will substantially fill the opening 24 in the box, thus preventing dirt or water from entering this opening at this time. In order to cover the opening 24 at other times, a flexible sheet 62 of bronze, or other suitable resilient material, is attached to the side of the latch 12 in such manner that it projects over the opening 24 and abuts against the inner side of the box when the latch is in the position shown in Fig. 2. This metal covering 62 is preferably of such resiliency that it tends to move the latch 12 slightly out of its vertical position but not sufficiently to interfere with the resetting of the box.

The illustrated means for resetting the box when it has been released comprises a push-pin 64 having a button 66 to be engaged by the hand, this pin sliding in a socket 68 threaded into the bottom of the box 2 and having a shoulder 70 which bears against a spring 72 confined in said socket. At its upper end the pin 64 engages the underface of the lever 30, whereby when the pin 64 is pushed into the box it operates to raise the lever 30. As the lever 30 is raised the pin 74, which holds the weight or weights 36 upon the lever 30, engages the arm 40 of the bell-crank levers 38, 40, and raises the armature into the field of action of the magnet 44, which then attracts the armature, thus rocking the bell-crank so that the stop 39 on the arm 38 of said bell-crank comes into retaining position under the end of the lever 40. The weight 28 has already operated to bring the arm 26 into substantially vertical position so that the stop 34 comes in front of the lower end of this arm and the box is thus set ready to be engaged by the catch 20.

In order further to seal the opening 24 against dust and also to provide a non-corrosive surface for engagement by the latch 12, a piece of felt 76 is confined at the edge of the opening 24 by a metal strip 78.

As hereinabove suggested, the bearings for the levers 26, 30 and 38, 40 are preferably three-point knife edge bearings, as shown in detail in Figs. 5, 6 and 7, thereby reducing the friction in these bearings as much as practicable and providing very narrow surfaces of contact which will be substantially unaffected by corrosion. In order further to facilitate the releasing action of the box, the engaging surfaces between the levers and their coöperating stops may be inclined to the direction of relative movement, as shown at 80 in Fig. 2.

The operation of the box will be readily understood from the foregoing description, but may be briefly recapitulated as follows: If the box is to be used in connection with a fire door of ordinary construction, such as shown at 82 in Fig. 1, the box will be so located that it will hold the fire door in open position against its tendency to close under the action of a weight or other operating means carried upon a rope 84 connected to said door and passing over a pulley 86 at the end of the path of the closing travel of said door. The parts being in the position shown in Figs. 1 and 2, in which position they are held by reason of the fact that the electromagnet 44 is in a closed circuit, any interruption of the flow of current through the magnet 44 will release the armature 43 and thus permit the bell-crank 38, 40, to rock about its pivot 42, its tendency to rock into releasing relation to the lever 30, by reason of the weight of the armature upon the arm 40, being accentuated by the pressure of the lever 30 upon the inclined engaging surface 80 under the action of the weight 36. As the lever 30 moves out of engagement with the bell crank 38, 40, its stop 34 moves out of engagement with the operating arm 26 of the latch 12, and the latch is thus permitted to move into the position shown in dotted lines in Fig. 2, in which position it releases the catch 20 and permits the fire door 82 to close. Upon again closing the circuit through the electromagnet 44, the box can be reset in the manner hereinabove described.

What I claim as new is:—

1. A release box comprising a series of connected multiplying levers adapted to move into separated relation to each other when the box is released, said levers having engaging faces so located with respect to the directions of movement of successive levers that a component of the force exerted upon

the initial lever by the part to be released is transmitted at each connection to the succeeding member of the series and tends to rock said member and break the connection, and that another component is transmitted directly to the lever fulcrum and is thus neutralized and electromagnetic means for retaining the last member of the series and thereby the connected series against the tendency of said transmitted pull to break the connections.

2. A release box comprising a series of connected multiplying levers adapted to move into separated relation to each other when the box is released, said levers having engaging faces so located with respect to the directions of movement of successive levers that a component of the force exerted upon the initial lever by the part to be released is transmitted at each connection to the succeeding member of the series and tends to rock said member and break the connection, and that another component is transmitted directly to the lever fulcrum and is thus neutralized, electromagnetic means for retaining the last member of the series and thereby the connected series against the tendency of said transmitted pull to break the connections, said series of connections being arranged to break successively from said retaining means to the part to be released, and means arranged to accentuate the breaking tendency of the connection first to be broken.

3. A release box comprising two connected multiplying levers adapted to move into separated relation to each other when the box is released, one of said levers being weighted and so supported that it tends to move into reset position under the action of gravity, and the other being weighted and so supported with respect to the first mentioned lever that it tends to move into release position, and electro-magnetically controlled tripping means normally retaining said last mentioned lever in set position.

4. A release box comprising two connected multiplying levers adapted to move into separated relation to each other when the box is released and having engaging faces so located with respect to the directions of movement of successive levers that the pull exerted upon one by the part to be released tends to rock the other and to break the connection, one of said levers being weighted and so supported that it tends to move into reset position under the action of gravity, and the other being weighted and so supported with respect to the first mentioned lever that it tends to move into release position, tripping means presenting a retaining face to said last mentioned lever so shaped that the weight of said lever tends to move said tripping means out of retaining position, and an electromagnet for retaining said tripping means in lever-supporting position.

5. In a device of the class described, a movable latch member, a pivoted member adapted to retain said latch member in latching position but normally tending to gravitate out of retaining position, a third member adapted to retain said second member in latch retaining position but so pivoted that said intermediate member tends to rock said last mentioned member out of retaining position, and an electromagnet in a closed circuit for holding said third member against releasing movement.

6. In a device of the class described, a pivoted latch member counterweighted to gravitate into latching position, a lever adapted to retain said latch member in latching position but normally tending to gravitate out of retaining position, a weight upon said last-mentioned lever tending to accentuate said aforementioned tendency, and means for retaining said lever in latch-retaining position, comprising an electromagnet and an armature lever adapted to engage said latch retaining lever but so pivoted that said latch retaining lever tends to rock said armature lever into releasing position.

Signed at New York, N. Y., this 19th day of November, 1915.

JOHN H. DERBY.

Witnesses:
BEATRICE MIRVIS,
CHAS. CLARK.