Oct. 16, 1945. J. H. DERBY 2,387,125

RELEASE BOX

Filed April 3, 1943 2 Sheets-Sheet 1

Fig. 1.

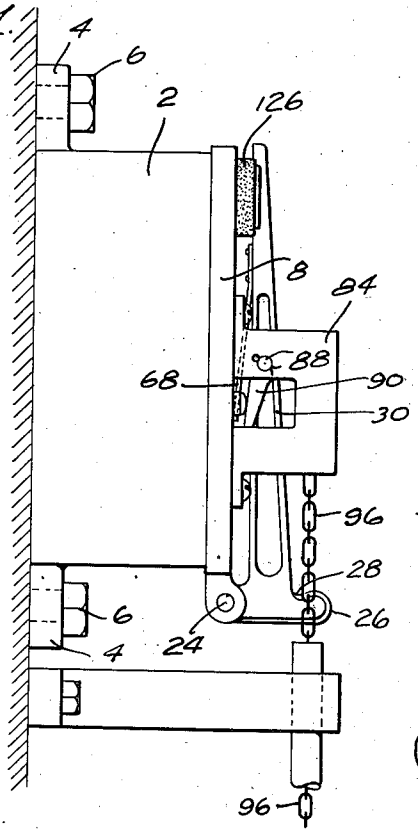


Fig. 2.

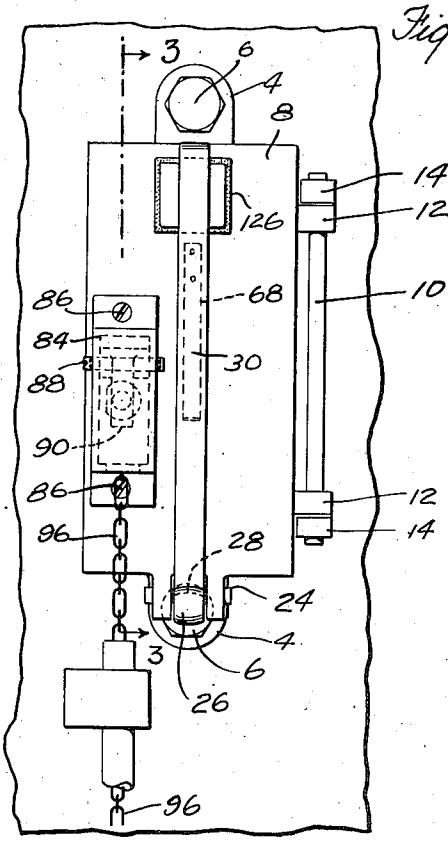
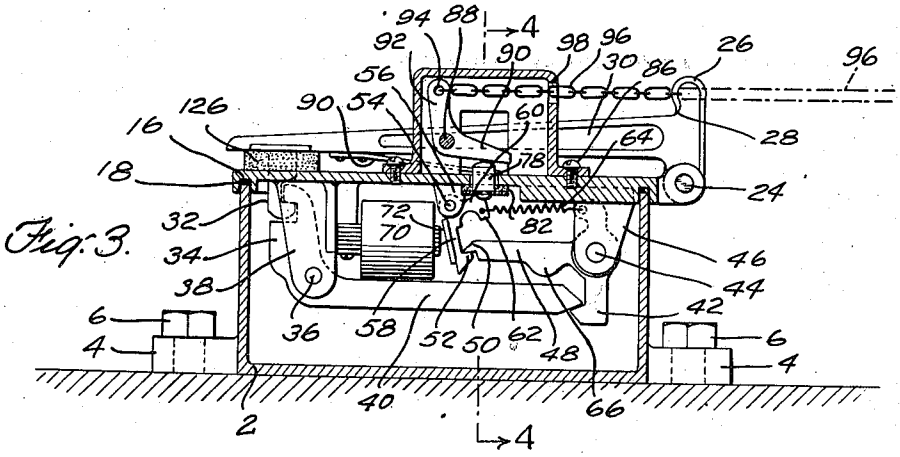


Fig. 3.



INVENTOR
JOHN H. DERBY.
BY
H. Dorsey Spencer
ATTORNEY

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Fig. 4.

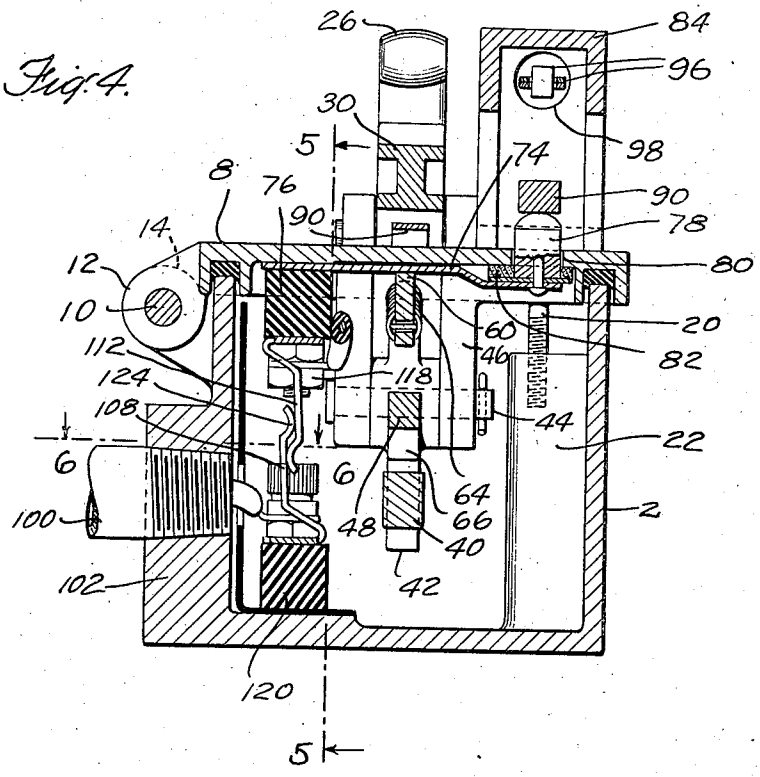


Fig. 5.

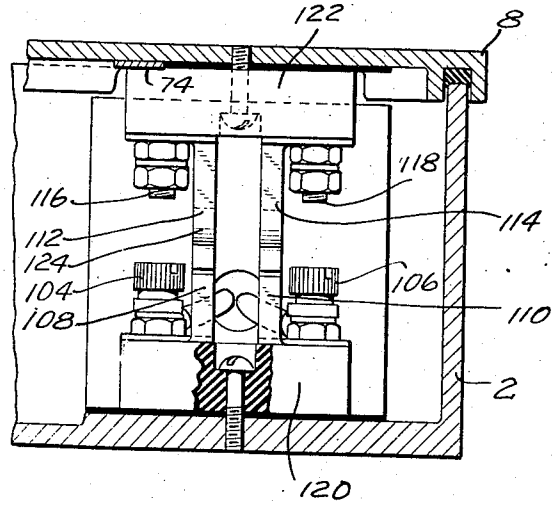
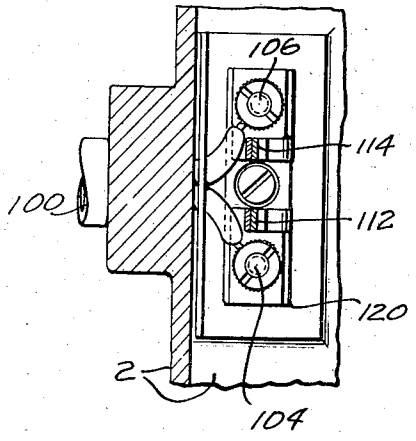


Fig. 6.



INVENTOR
JOHN H. DERBY.
BY
W. Dorsey Lewis
ATTORNEY

Patented Oct. 16, 1945 2,387,125

UNITED STATES PATENT OFFICE

2,387,125

RELEASE BOX

John H. Derby, Scarsdale, N. Y.

Application April 3, 1943, Serial No. 481,696

5 Claims. (Cl. 74—2)

This invention relates to devices known in the fire prevention art as "release boxes" or "electric releases." Release boxes, to improvements in which the invention is particularly directed, are devices which can be operated from a distance to release fire doors, fire dampers, theatre fire curtains, valves which control the release of liquids and gases used in fire extinguishing and other means for preventing the spread of fires, the parts to be released being held by said release boxes or electric releases against a normal tendency to move to another position. A release box or electric release of the general type to which the invention is directed is shown in U. S. Letters Patent to John H. Derby, No. 1,187,135, granted June 13, 1916, an improved form of this release box being also shown in U. S. Letters Patent No. 2,174,969, October 3, 1939, to T. G. Collings.

In the release box shown particularly in the latter of the two patents above identified, a series of power-multiplying bellcrank levers having trippable connections between the long arms and the short arms of successive levers of the series are fulcrumed upon the hinged cover of the release box, the outermost bellcrank in said series being fulcrumed upon the outside of said cover and having its short arm arranged to support the load to be released. A trip device, comprising a lever having a trip arm engageable with the last of the series of bellcranks, holds the levers in their inter-engaged relation, this trip lever being normally maintained in its holding positon by a spring and being arranged to be tripped by an electromagnet.

Release boxes of this type have been extensively used for the past twenty-five years or more and have effected much saving of property as a result of their successful operation. There are, however, possibilities of exceptional conditions attending the need for operation of a release box of this type, such, for example, as might be brought about by an explosion, in which the operating circuit to the release box might be broken before the box had been operated to release the part retained thereby. To anticipate such possibilities is one of the purposes of the present invention and to this end the invention aims, among other things, to provide improved manually operable release box tripping means, supplemental to the electro-magnetic means, which can also be controlled at a distance from the box, in the event of accidental destruction of the circuit to the electro-magnet of the release box.

In wiring release boxes of the type to which the present invention is particularly directed, it is advantageous that the main wiring come into and be connected to the non-movable parts of the box, to avoid the use of flexible wire connections to accommodate the cover movements, and that a switch be provided which will be closed when the box cover, carrying the interconnected release levers, is closed after any necessary inspection of the box. To be sure that such closing of the box cover establishes a positive and certain release box operating circuit, the present invention aims to provide an improved switch arranged to be opened and closed by the opening and closing of the cover.

Other object and novel 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 side elevation of a release box embodying the present invention, this figure showing the release box in position on the building wall and illustrating a portion of a conduit through which a flexible connection to the manually operable means for tripping the release may be extended to a distant point;

Figure 2 is a front elevation of the structure shown in Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a section on the line 4—4 of Figure 3;

Figure 5 is a section on the line 5—5 of Figure 4, and

Figure 6 is a section on the line 6—6 of Figure 5.

The illustrated release box, like that of the Letters Patent hereinabove referred to, comprises a cast metal box portion 2 having extensions 4 of the base to receive screws or bolts 6 by which the release box can be secured to the wall or other supporting structure in a room or building in which it is to perform its functions. A cover 8 upon which the release mechanism proper is mounted is hinged to the box by means of a hinge pin 10 passing through ears 12 on the cover and aligned ears 14 on the box. As shown, the cover is preferably formed with a packing receiving groove 16 which receives the upper edges of the side and end walls of the box 2 and which is provided with packing 18 to insure a dust tight closure. Further means for keeping dust and moisture out of the inside of the box 2 will be described hereinafter.

To secure the cover in closed condition, machine screws 20 having their heads countersunk in the outer face of the cover are threaded into integral quarter-round corner posts 22 in two of the inside corners of said box.

The series of interconnected levers constituting the retaining and releasing mechanism of the box are substantially identical with those shown in the Collings Patent No. 2,174,969 hereinabove referred to. As herein shown, an outside bellcrank fulcrumed at 24 between ears formed integral with the cover 8 of the box has a short arm 26 provided with a ring-receiving notch 28 to receive the ring of any suitable flexible connection to the part to be retained, such as the fire door. The long arm 30 of said outside bellcrank is pro-

vided with a hook member 32 which extends through an opening in the cover 8 into position to be engaged by a similarly shaped hook member 34 constituting the short arm of a second bellcrank fulcrumed at 36 between ears 38 integral with and depending from the under side of the cover 8.

The long arm 40 of the bellcrank just referred to is engaged by a specially shaped hook end of the short arm 42 of a third bellcrank fulcrumed at 44 between a second pair of ears 46 integral with and depending from the under side of the cover 8. The long arm 48 of the last mentioned bellcrank lever, that is, the third of the series, has a toothed end 50 which rests on a ledge 52 of a trip lever fulcrumed at 54 between a third pair of ears 56, also integral with and depending from the under side of the cover 8.

In the improved form of release box herein shown, the trip lever is in the form of a bellcrank having an arm 58 on which the ledge 52 is formed and a second arm 60 having a downwardly extending lug 62 to which one end of the spring 64 is connected, the other end of the spring 64 being connected to an extension, above the fulcrum 44, of the short arm 42 of the third bellcrank lever of the series. It will be seen that the action of the normally tensioned spring 64 is to hold the ledge 52 beneath the toothed end 50 of the long arm 48 of said third bellcrank lever when the release box is in its set condition, as shown in Figure 3 of the drawings, and, at the same time, to tend to rock the said third bellcrank in a counterclockwise direction, when the ledge 52 is withdrawn from its supporting relation to the tooth 50, and thus move the hook end of the short arm 42 of said bellcrank out of supporting relation to the long arm 40 of the second bellcrank of the series. At the same time this rocking movement of the third bellcrank brings a rounded boss 66 on the under side of the long arm 48 of said bellcrank into engagement with the front face of the long arm 40 of the second bellcrank of the series and rocks this lever about its fulcrum 36 in a clockwise direction in Figure 3 to cause disengagement of its hook member 34 from the hook member 32 of the outside bellcrank, thus permitting the outside bellcrank to release whatever is retained by it. This movement of the outside bellcrank into releasing position is aided and accelerated by a spring 68 riveted to the inner face of the long arm 30 of said outer bellcrank and so tensioned that it presses normally against the outerface of the cover 8 and tends to move the long arm 30 of the outer bellcrank away from the cover.

As hereinabove suggested, an important feature of the present invention is the provision of improved means for effecting manual operation of the release box when the electric circuit, which includes the trip-operating electromagnets 70, is broken. These magnets, when energized sufficiently, attract an armature 72 carried by the arm 58 of the bellcrank trip lever. As in most properly installed electrical equipment, there is preferably a normal supervisory current flowing through the coils of these magnets 70 at all times but this normal supervising current is, of course, not sufficient to energize the magnets to trip the release box. Such energization is usually effected by short-circuiting suitable resistance in the circuit that maintains the supervisory current below the operating level.

It might happen, however, in the case of an explosion or some unexpected catastrophe associated with a fire, or, rather, which might take place before the necessity for operating the release box has occurred, that the circuit which includes the electromagnets 70, might become completely inoperative. In such an event it is important to have means for manually effecting a release of the box. In the release boxes of the prior patents above referred to, no such means was accessible from the outside of the box and the only way in which the release box could be operated, if the electrical connections were destroyed, was to unscrew the screws 8 in order to obtain access to the interior of the box.

In the improved release box of the present invention means are provided, accessible from the outside of the box, for engaging the arm 60 of the bellcrank trip lever in such manner as to rock this lever in the clockwise direction in Figure 3 of the drawings and thus move the ledge 52 out of supporting relation to the tooth 50 to trip the box. The illustrative means, as shown particularly in Figure 4 of the drawings, comprises a spring leaf 74, anchored at one end against the inside face of the cover 8 in any suitable manner, as, for example, by clamping it between the insulation 76 and the face of the cover, this spring being normally engaged by the outer face of the arm 60 of the bellcrank trip lever and extending sufficiently beyond said lever 60 to receive a push button 78 by which it may be depressed against its normal tension which tends to hold it against the under face of the cover 8. Such depression of the spring 74 by the push button 78 serves to rock the trip lever into release box tripping position.

The push button 78 extends through an opening 80 in the cover 8 of the release box so that it may be engaged from outside the box. To seal this opening against dust, the leaf spring 74 is preferably offset sufficiently to receive a felt washer 82 fitting tightly about the push button 78 and of a diameter sufficiently greater that that of the opening 80 to cover the opening and completely seal it as it is held thereagainst by the tension of the spring 74. It will further be seen that, not only does the fact that the member 74 is itself resilient tend to hold the washer in sealing relation to the opening 80, but the pressure of the arm 60 of the trip lever against the member 74 also holds the washer 82 in sealing relation to the opening 80. To insure such contact the arm 60 is preferably provided with a slight boss-like elevation that engages the leaf member 74 and serves as a stop to determine the tripped position of the arm 58.

It will be obvious that the push button 78 might serve as a push button to be engaged directly by hand for operating the release box at the box. Since the primary purpose of a release box is to make it operable from a distant point, it is preferable to provide means for effecting such manual tripping from a distant point. This may readily be done by mounting upon the outside of the cover 8 of the release box still another bellcrank lever which can be rocked to depress the push button 78 and cause the tripping of the release box. In the illustrative embodiment of the invention a small housing 84 is shown as secured to the cover 8 by screws 86, this housing 84 having therein a fulcrum 88 for a bellcrank lever, one arm 90 of which extends along the outer face of the cover 8 and is arranged to engage the push button 78. The other arm 92 of the push button operating bellcrank is provided with a hole 94 for connection thereto of any flex-

ible operating means such as a chain 96 extending outside the housing 84 through an opening 98 in line with the perforated end of the arm 92. It will be seen that the housing 84 is symmetrically arranged with respect to the push button 78 so that by merely turning it through 180 degrees the chain 96 may be arranged to pull in the other direction. This permits extending the chain either upwardly or downwardly from the release box as it is shown in Figure 1.

As herein shown, the fixed wiring connections to the release box preferably enter the box through a conduit 100 screwed into a threaded opening provided therefor in the boss 102 cast with the box, the two ends of the outside circuit thus brought into the box being connected to binding posts 104 and 106 which are respectively connected to the two lower spring switch members 108 and 110. As shown particularly in Figure 4 of the drawings, the switch members 108 and 110 are in the form of springs which are arranged to engage similarly shaped switch members 112 and 114, respectively, depending from binding posts 116 and 118 on the cover 8. The binding posts 104 and 106 are mounted on insulation 120 and the binding posts 116 and 118 are mounted on insulation 122. As shown in Figure 4, the pairs of switch members 108, 112 and 110, 114 are so tensioned that when the screws 20 which secure the cover in its closed position are released the springs tend to rock the cover about its hinge into a partly open position. The advantage of this is that when the cover is secured in its closed position against the tension of the spring switch members, the switch members are held in contact with each other under considerable tension. It will be noted that each one of them is also provided with a curved portion 124 which insures a rubbing contact as they are moved into and out of engagement with each other.

The binding posts 116 and 118 are connected to the two terminals of the electromagnet coils 70 and thus, when the cover of the box is closed, an electric circuit is established through the electromagnet coils 70.

The illustrated release box, like the release box shown in the Collings Patent 2,174,969, may be reset, when it has been released, by merely pressing the long arm 30 of the outer bellcrank into the position shown in Figure 3 of the drawings. It will be noted that the end of the hook 32 is rounded, that the end of the long arm 40, which, when released, will be below the hook on the short arm 42 of the third bellcrank is bevelled and that, therefore, as the hook 30 engages the hook 34 and tends to rock the arm 40 in the counterclockwise direction in Figure 3, the arm 40 will engage first the boss 66 on the arm 48 of the third bellcrank and rock this into the position shown in Figure 3. If this third bellcrank should by any chance be in any such position that the arm 40 did not immediately engage the boss 66, the bevelled end of the arm 40 would engage the hooked end of the arm 42 and rock it into position to bring the parts into their proper relation. As the arm 40 rocks the arm 48 in a clockwise direction the bevelled end of the tooth 50 will engage the bevelled underside of the arm 58 and snap the trip lever into retaining relation to the tube 50. To insure keeping the release box dust-tight, the hook 32 on the arm 30 of the outside bellcrank is surrounded with a felt washer 126 which fits it tightly and which is pressed against the outside face of the cover 8 and seals the opening in the cover through which the hook 32 projects.

From the foregoing description it will be seen that the improved release box of the present invention has provision not only for insuring release, in the event that the operating circuit for the electromagnet 70 is in any way destroyed, but that it also provides means for insuring a proper completion of the circuit between the movable and the fixed parts of the box by reason of the improved switch arrangement.

What is claimed as new is:

1. A release box comprising a box having a normally closed cover, a series of successively interengageable power multiplying levers all fulcrumed upon said cover, a trip device also fulcrumed upon said cover and engageable with the last of said series of levers for holding said levers in their interengaged relation, an electromagnet carried by said cover for operating said trip to release said levers from their interengaged relation, said trip device having a bellcrank arm by which it may also be rocked manually into lever-releasing position, a spring yieldingly maintaining said trip device in its holding position and means, carried by said cover, laterally offset from the plane of the interengageable lever system and including a plunger extending through said cover, for effecting the manual rocking of said trip device against the action of its retaining spring into its release box tripping position, all of said parts being arranged to maintain their operative relations to each other both in the open and in the closed condition of said cover.

2. A release box according to claim 1 in which there is provided still another bellcrank fulcrumed upon the outside of said cover and having one arm engaging said plunger whereby operation of said plunger may be effected by pull on the other arm of said bellcrank in a direction parallel to the plane of said cover.

3. A release box according to claim 1 in which the cover is hinged and in which an electric circuit, including said electromagnet, is broken by the opening of said cover, a resilient switch member carried by the cover and a resilient switch member fixed in the box being brought into yielding engagement with each other by the swing of the cover into closed position, the resilience of said switch members maintaining them in intimate contact to establish operative connections between the part of said electromagnet circuit by the cover and the part which is carried by the box.

4. A release box according to claim 1 in which another bellcrank is carried upon the outside of the cover of the box, a removable housing in which said bellcrank is fulcrumed being so arranged upon said cover that one arm of said bellcrank is normally in engagement with said plunger.

5. A release box according to claim 1 in which another bellcrank is carried upon the outside of the cover of the box, a removable housing in which said bellcrank is fulcrumed being so arranged upon said cover that one arm of said bellcrank is normally in engagement with said plunger, said removable housing being reversibly mounted on said cover whereby operation of said bellcrank may be effected by pull upon the other arm thereof in either one of two opposite directions, according to the mounting.

JOHN H. DERBY.