Oct. 3, 1939. T. G. COLLINGS 2,174,969

RELEASE BOX

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Fig. 1

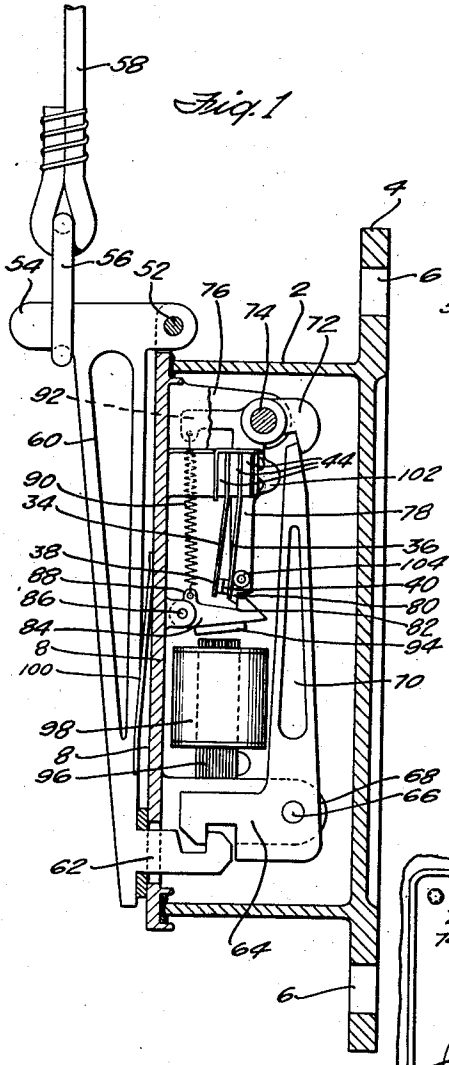


Fig. 2.

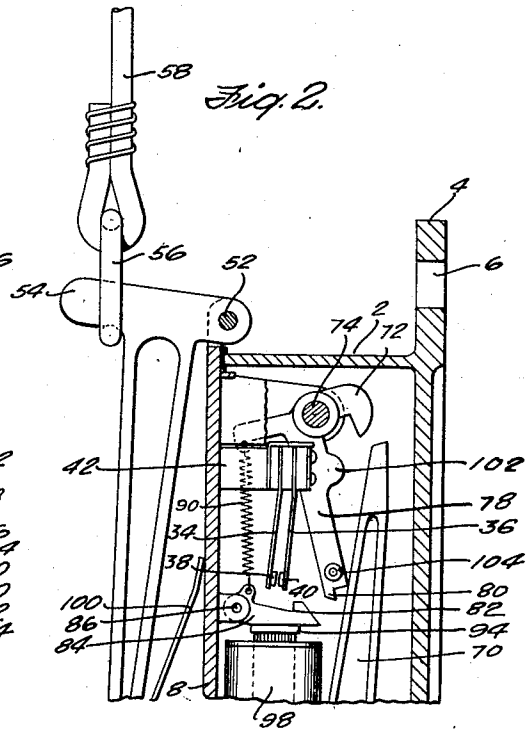
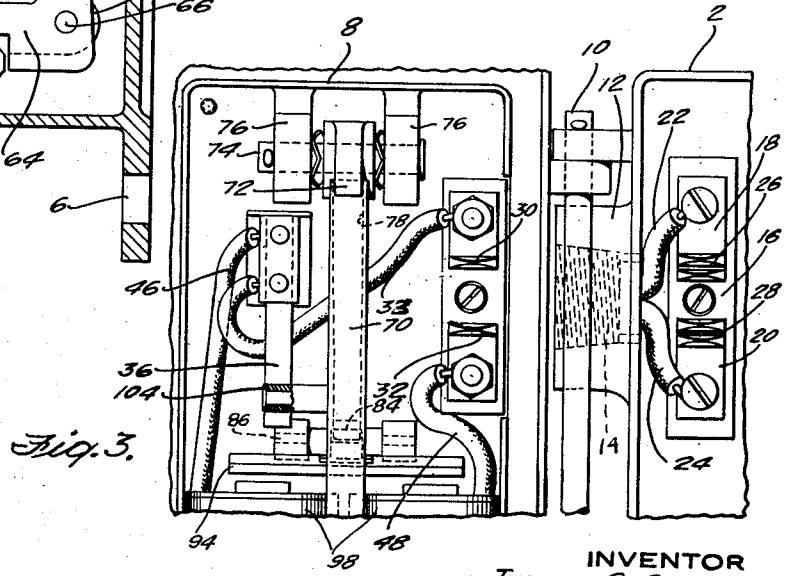


Fig. 3.



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RELEASE BOX

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2 Claims. (Cl. 74—2)

This invention relates to what are commonly termed "release boxes", that is, devices which can be operated from a distance to release fire doors, traps, dip tank covers, theatre ventilators, theatre drop curtains or other things which are held by said release boxes against a normal tendency to move to another position. A release box which has gone into extensive commercial use is illustrated and described in the patent to J. H. Derby, No. 1,187,135, granted June 13, 1916.

In the release box shown and described in the Letters Patent just identified, a series of bellcrank levers, each having a long arm and a short arm and each having its long arm connected with the short arm of the succeeding lever and having their long arms substantially parallel when the box is set, are held in their set position by an electromagnetically operated trip maintained by a spring in retaining relation to the long arm of the last of the series of said bellcranks. The illustrated release box of said Letters Patent comprises three bellcranks, one of which is mounted on the outside of the box and receives on its short arm the connection to the part to be released.

This release box, in the twenty odd years that it has been in use, has given great satisfaction and it is to this type of release box particularly that the present invention is directed, although the invention is applicable, of course, to release boxes of other constructions.

Since release boxes are used frequently as elements of fire prevention systems, and it is therefore important that their operation be sure and certain, particularly since they are likely to be operated only at very infrequent intervals, it is customary to have them so constructed and arranged in their operating circuits that they are under automatic supervision. This automatic supervision is usually effected by maintaining the operating circuit normally closed through resistance which holds the current flowing through the operating circuit below operating level, with a relay magnet in the operating circuit controlling a normally open trouble alarm circuit so that if there be any break in the operating circuit or failure of current supply the trouble alarm circuit will be closed by deenergization of the relay magnet and a trouble alarm given. Such supervision of fire alarm and fire prevention equipment is quite ordinary practice and will therefore not be illustrated and described in detail in this application.

When the automatically supervised apparatus, such as the release box to which the present invention is directed, is to be operated, means is usually provided for short-circuiting the resistance which maintains the current flow below operating level, thus permitting an increased flow of current, due to the higher voltage drop through the remainder of the circuit, with the result that in the case of the release box the magnets are fully energized, the armature connected with the trip is attracted to the magnets and the bellcranks move out of engagement with each other, thus releasing whatever is held by the box.

Space requirements in devices of this character and the necessity for sealing the operating mechanism within the boxes against dirt, moisture, acid fumes, etc., prevent the use of magnet coils of sufficient size to permit the dissipation of the heat which is produced when an electrical current of say 120 volts is passed through the coil, if the current is allowed to flow for any substantial length of time. When these boxes are used, as sometimes happens, on circuits where the operating voltage is as high as 250 volts, the liability to injury of the coils from heating is obviously much greater.

Proper maintenance of fire prevention apparatus requires, in addition to the automatic supervision of the circuits, an occasional operating test of the apparatus and its restoration to a condition where the automatic supervision will be resumed. It is therefore important in a satisfactory release box construction that it be so constructed that it can conveniently be reset, with assurance that, when reset, it will be in condition for automatic supervision.

A particular object of the present invention is to provide means for preventing injury to the magnetic coils of a release box of the general type of that shown and described in the Letters Patent above identified, by reason of too long flow of the operating current through said coils, by insuring that the operating current will be cut off from said coils when the box has been operated and at the same time so to arrange the circuit breaking mechanism that it will be automatically reset to restore the coils to automatic supervision when the box itself is reset in the usual manner.

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

Figure 1 is a longitudinal section through a release box of the general type of that disclosed in United States Letters Patent No. 1,187,135, granted June 13, 1916, with the present invention incorporated therein;

Figure 2 is a longitudinal section of one end of the box shown in Figure 1 with the parts in released position;

Figure 3 is a partial plan view of the box with the cover thereof in open position.

The release box herein shown, like that of the Letters Patent above identified, comprises a box portion 2 having an extended base 4 provided with screw or bolt holes 6 by which the box

may be attached to a supporting wall and a cover 8 hinged to the box 2, as shown at 10, the operating mechanism being carried by the cover.

The box is so constructed that when the cover is in open position the connections to the operating circuit are broken. As herein illustrated, the box is provided with a boss 12 having a threaded opening 14 into which may be screwed a conduit for electric wires and mounted upon insulation 16 in the bottom of the box are two terminals 18 and 20 to which are connected the circuit wires 22 and 24, the terminals 18 and 20 being provided with forked ends 26 and 28 adapted to receive between them the cover terminals 30 and 32 when the cover is moved into closed position. From the terminal 30 a wire 33 leads to the upper spring switch member 34 of a circuit-breaking switch having a lower spring member 36, the spring switch members 34 and 36 carrying respectively contact pieces 38 and 40 and being separated from each other and from the metallic bracket 42 on the cover by which they are carried by insulating blocks 44. The spring switch arms 34 and 36 are so tensioned that they tend to move the contact pieces 38 and 40 into separated relation. The lower switch member 36 is connected by wire 46 to one end of the magnet coils and the other end of the magnet coils is connected by a wire 48 to the cover terminal 32 which cooperates with the forked terminal end 28 in the box.

The mechanism of the release box herein shown, like that of the box of said Letters Patent, comprises an outside bellcrank fulcrumed at 52 between ears formed on the cover and having a short arm 54 provided with a ring-receiving notch for receiving a ring 56 connected by a cord 58 to the door, cover, trap or other device to be held in its inoperative position by the release box. The long arm 60 of the outside bellcrank is provided with a hook member 62 extending through an opening in the cover into position to be engaged with the correspondingly shaped member constituting the short arm 64 of a bellcrank fulcrumed at 66 between ears 68 depending from the cover. The long arm 70 of said last-mentioned bellcrank is engaged by the hooked end of the short arm 72 of a third bellcrank fulcrumed at 74 between ears 76 depending from the cover. The long arm 78 of the last mentioned bellcrank has a toothed end 80 which rests on a ledge 82 of a trip 84 fulcrumed at 86 between ears 88 depending from the cover, said trip 86 having an eye 88 connected by a spring 90 to a third arm 92 of the bellcrank 72, 78.

The trip lever 84 carries an armature 94 in line with the laminated core 96 of the electromagnet 98 so that when the electromagnet 98 is energized the attraction of the armature 94 by the core 96 releases the tooth 80 from the ledge 82 on the trip 84 and thus permits the train of bellcranks to move out of engagement with each other, the outer bellcrank arm 60 being provided with a spring 100 which tends to move it away from the cover as soon as the box is released.

When the electromagnet 98 is deenergized the spring 90 tends to pull the trip 84 back toward its position shown in Figure 1. The box may be reset, as more fully set forth in said Letters Patent 1,187,135, above identified, by pressing the outside bell-crank into the position shown in Figure 1 and then by a slight further movement bearing down on the ledge of the short arm 64 and thus pushing upward the long arm 70 of the second bell-crank until it engages the boss 102 on the third bellcrank, when the third bellcrank will be pushed upward until its tooth 80 slips into position over the ledge 82 of the trip 84, the beveled end of the tooth 80 and the beveled lower edge of the trip 84 serving to spring the trip back against the tension of the spring 90 until the tooth 80 is above the ledge 82, when the spring will bring the trip into box-setting position. The rocking of the bellcrank 72, 78, by the engagement of the arm 70 of the second bellcrank, with the boss 102, serves to bring the ledge on the short arm 72 of the bellcrank 72, 78 beneath the end of the long arm 70 of the second bellcrank and at the same time the hooked short arm of the second bellcrank will have been moved into interlocking relation to the hooked member 62 of the outer bellcrank.

As the arm 78 of the third bellcrank moves upward into box-setting position, a lateral extension which may be in the form of a small roller 104 from this arm engages the lower spring switch member 36 and moves it upward toward the upper switch member 34 until the contact 40 engages the contact 38, this movement continuing sufficiently far so that the upper switch member 34 is brought under tension, thus maintaining the contacts 38 and 40 firmly in engagement with each other and closing the operating and supervisory circuit through the magnet coils. When the box is released, as shown in Figure 2, the movement of the roller 104 out of engagement with the lower switch member 36 permits the contacts 38 and 40 to move into their normally separated position, thus breaking the circuit to the magnet coils after the magnet has operated to trip the box.

What is claimed as new is:

1. A release box comprising a series of successively interengageable power multiplying levers, a trip device engageable with the last of said series of levers for holding them in their interengaged position, an electromagnet and an operating circuit therefor for operating said trip to release said levers and permit their movement out of their interengaged relation, a switch in the operating circuit for said electromagnet tending normally to move to open position, a dust-tight box in which said electromagnet, said switch and all but one of said levers is enclosed, and means associated with one of the inside levers for moving said switch into and holding it in closed position when the release box is set.

2. A release box comprising a series of successively interengageable power multiplying levers, a trip device engageable with the last of said series of levers for holding them in their interengaged position, an electromagnet and an operating circuit therefor for operating said trip to release said levers and permit their movement out of their interengaged relation, a switch in the operating circuit for said electromagnet tending normally to move to open position, a dust-tight box in which said electromagnet, said switch and all but one of said levers is enclosed, said release box being settable or resettable by movement of said outside lever into its releasable-object retaining position, and means associated with one of the inside levers for moving said switch into and holding it in a closed position when said outside lever is moved into its releasable-object retaining position.

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