Dec. 9, 1958 T. A. MARTIN 2,863,960

CONTROL FOR ELECTRICAL START AND STOP SWITCH

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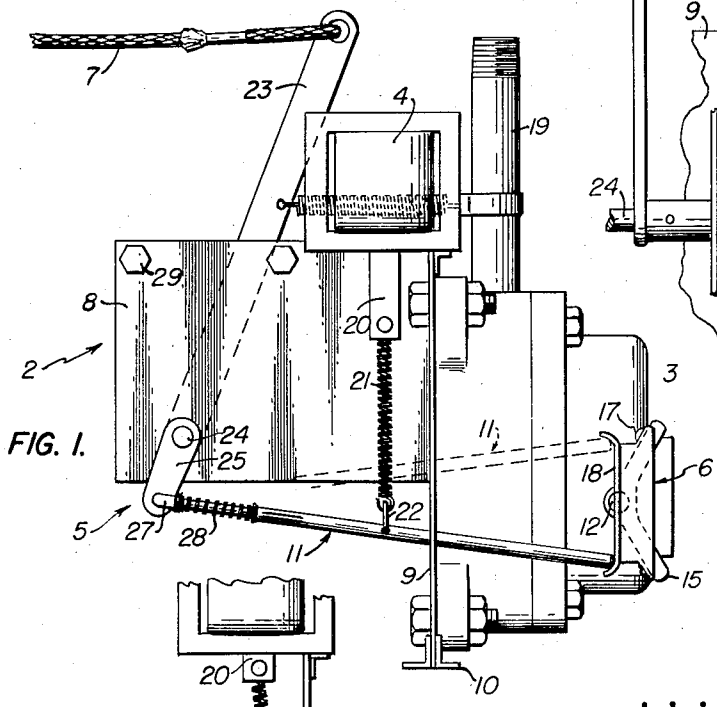


FIG. 1.

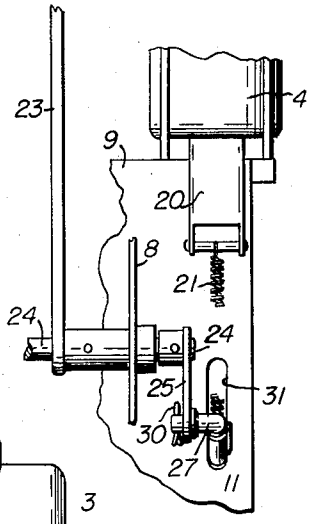


FIG. 2.

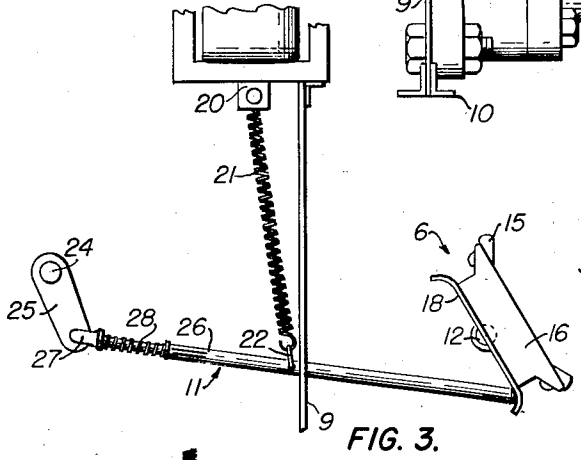


FIG. 3.

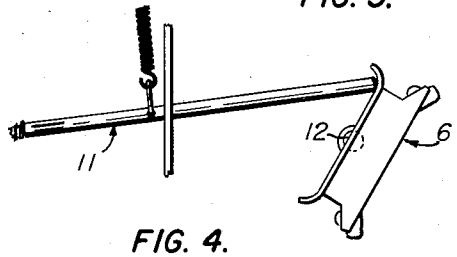


FIG. 4.

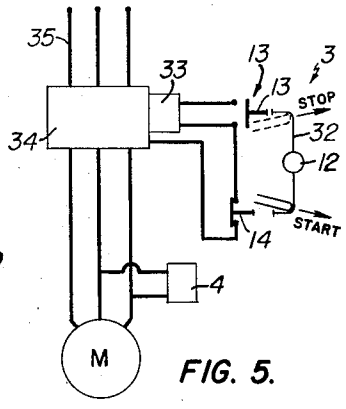


FIG. 5.

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CONTROL FOR ELECTRICAL START AND STOP SWITCH

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3 Claims. (Cl. 200—18)

This invention relates generally to electrical control apparatus and more specifically to a unique start and stop switch for circuits containing electrically operated equipment.

The primary object of this invention is to provide a novel combined electrical and mechanical switch assembly wherein a single pull from a remote location will close the switch and energize an electrical circuit, and at the same time place the switch assembly in condition to be opened upon the next successive pull.

Another object is to provide a switch assembly which includes means whereby a second successive pull on the remote control equipment may be caused to re-close the switch rather than open it as in normal procedure in the event of a momentary power failure in the main power supply source.

Another object is to provide a switch assembly for electrical circuits which is rugged enough to withstand a heavy operating pull by shop personnel and yet accurate enough to provide positive operation under the various conditions of use.

A still further object is to provide a switch assembly which includes a mechanically actuated switch push rod and includes automatic means by which the push rod is shifted from a starting to a stopping control position.

An additional object is to provide a switch assembly which includes a mechanically actuated switch push rod having automatic means which is adapted to first shift the push rod from a starting to a stopping control position and then shift the push rod back to the starting position in the event of a power failure.

Another object is to provide a switch assembly of the type described which is reliable and durable in operation and yet which is simple and compact in design and economical in construction.

These and other objects and advantages will be apparent from an examination of the following specification and drawing, in which:

Figure 1 represents a side elevational view of the complete switch assembly of this invention.

Figure 2 is a fragmentary end elevational view of the push rod linkage shown in Figure 1.

Figure 3 is a fragmentary detail view of the push rod of Figure 1 shown in its start control position.

Figure 4 is a partial view of the push rod of Figure 3 showing the rod in its stop control position.

Figure 5 is a circuit diagram partly in schematic showing the electrical operation of the switch of this invention.

Referring now more particularly to the characters of reference on the drawing it will be observed that the complete switch assembly of this invention consists basically of a frame 2 which supports a heavy duty electric switch 3 and a holding solenoid 4 and on which frame a control linkage identified generally at 5 is installed in operational relation to the switch rocker arm 6. A flexible cord 7 provides the means by which linkage 5 may be operated from a remote location to trip rocker arm 6 to selectively start or stop switch 3.

In examining the details of construction, the frame 2 is seen to include a pair of side plates 8, and an end plate 9 which serves as a mounting base for the switch 3 and cooperates with one side plate 8 to support the solenoid 4. The frame 2 and all of its attached components may be supported at its point of installation by a bottom flange or flanges 10 to a base or mount (not shown); however, it will be obvious that the complete switch assembly may be mounted in any desired manner so long as the push rod 11 of the control linkage 5 is permitted a gravity fall.

The switch 3 may be of any suitable commercial type, of which there are several, and reference is made to one such type, Cutler-Hammer Bul. 10250H653, for the purpose of example and not of limitation. The switch 3 includes a rocker shaft 12 by which the internally located switch contacts 13 and 14 (Figure 5) are operated. The rocker arm referred to generally at 6 actually consists of a basic "L-shaped" arm 15 which is supplied with the commercial switch 3, and an additional arm actuator 16 which is added to this arm for the purposes of this invention. Actuator 16 is attached to arm 15 in any suitable manner such as by screws 17 which pass through an underturned lip extending in overlapping relation to the upper and lower ends of the arm 15; and the actuator 16 includes another larger lip which extends in a direction away from arm 15 and defines an operating sector 18 against which the push rod 11 may operate. A conduit 19 threads into the top of switch 3 and provides the means through which the incoming and outgoing leads are operatively connected internally to the switch 3.

Solenoid 4 is supported by end wall 9 and from side walls 8 in any suitable manner and includes a downwardly projecting armature 20 which normally drops to the position shown in Figure 1 under its own weight and which is raised to the position shown in Figure 3 when the solenoid 4 is energized. A tension spring 21 is attached at its upper end to the lower end of armature 20, and at its lower end to ring 22 which pivotally engages rod 11; and the tension of this spring is set so that when armature 20 is in its uppermost position, the spring will lift rod 11 from its lower or start control position (as shown in solid lines in Figure 1) up to its upper or stop control position (as shown in dotted lines in Figure 1).

The control linkage 5 is made up of a main lever 23 rigidly attached to a transverse shaft 24 which is pivotally supported in side plates 8, and a short lever 25 attached to the shaft 24 at a position on the opposite side of plate 8 from the main lever 23, and a push rod 11 which is pivoted to short lever 25 at the desired radial distance from shaft 24. Numeral 11 is the reference number used to identify the functional push rod member which in actual construction is made up of a tube 26 into which an end rod 27 telescopes. A compression spring 28 is anchored at one end to the rod 27 and at its other end to tube 26 so that in order to transmit a longitudinal force, rod 27 must first slightly compress spring 28; this feature will prevent damage to the rocker arm 6 and will permit lever 23 to be pulled with substantial force against its stop bolt 29 without endangering the sensitive operational parts of this switch assembly. That portion of rod end 27 which pivotally engages short lever 25 is curved and at right angles to the balance of the rod end. A cotter 30 then locks the rod end 25 in its operational position. A slot 31 in end plate 9 permits push rod 11 to extend from short lever 25 to sector 18 in both a guided and protected manner. The slot 31 also positively limits the upper and lower positions of the push rod 11 to insure a continual contact with sector 18.

From the above description it will be recognized that the switch 3 may be installed at a remote location from the operator, and the operator may pull the cord 7 with a substantial force without fear of damage to close the

switch and operate the electrical equipment such as motor M shown in Figure 5. After the normally open start switch 13 has been closed by the action of push rod 11 which rotates shaft 12 as previously described to move internal actuator arm 32 against its proper contact members 13' and 14', then solenoid 4 is energized simultaneously with contactor holding interlock 33 and main contactor 34, and armature 20 raises the push rod 11 to its upper position so that the next pull of cord 7 will operate shaft 12 in the "stop" direction (Figure 5). However, if a power shortage occurs in the main supply lines 35 then solenoid 4 is de-energized and armature 20 and push rod 11 fall to the lower or "start" position, so that the next successive pull on cord 7 will re-start the cycle of operation.

The invention is not limited to the exemplary construction herein shown and described, but may be made in various ways within the scope of the appended claims.

What is claimed is:

1. A control for an electrical start and stop switch having a switch rocker arm shaft, said control comprising a frame mounted on one side of said switch, a lever pivotally mounted on said frame, a generally vertical operating plate mounted intermediate its ends on said shaft, a generally horizontal push rod pivotally connected at one end thereof with said lever, the remaining end of said rod being in sliding contact with a face of said operating plate, a solenoid mounted above said push rod, said solenoid having a depending armature, means connecting said armature with said push rod, means limiting the up and down movement of said push rod, and means actuating said solenoid when said switch is in a closed position.

2. A control for an electrical start and stop switch as defined in claim 1, and wherein said means connecting said armature with said push rod is a tension spring.

3. A control for an electrical start and stop switch as defined in claim 2, and wherein said push rod is of telescoping construction and includes spring means normally urging the rod toward an extended position.

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