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CONTROLLER MECHANISM

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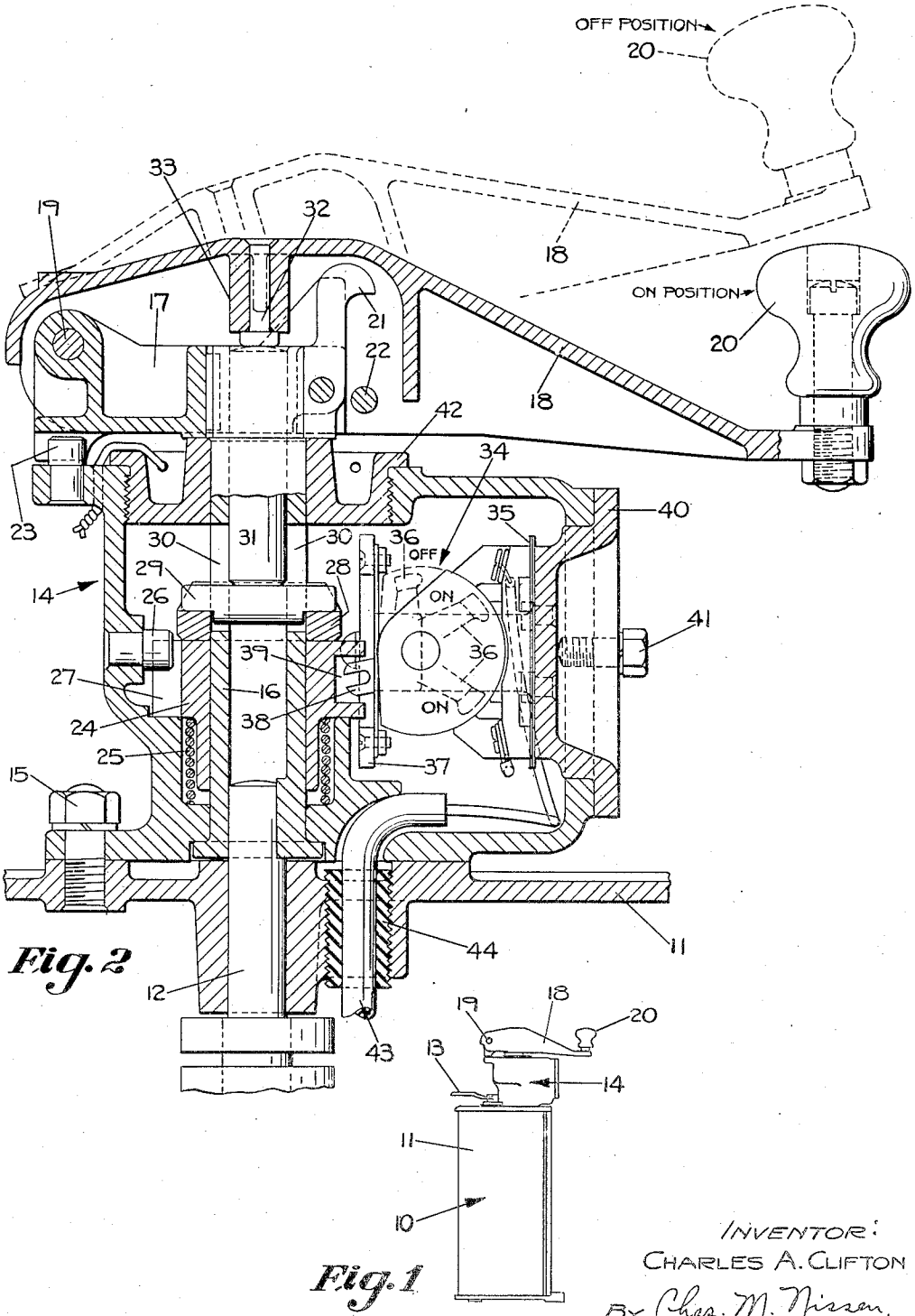


Fig. 2

Fig. 1

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CONTROLLER MECHANISM

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7 Claims. (Cl. 200—5)

This invention relates to controller mechanism and particularly to safety mechanism for an electrical controller which, for example, may be of the type employed in connection with mine locomotives although its application is not so limited.

An object of the invention, therefore, is to provide improved safety control lever operated mechanism for a controller of the type above mentioned.

A further object of the invention is to provide apparatus in which a quick-acting or snap switch is employed as a master control switch of an electrical controller which automatically moves to open circuit position when the controller operating handle is released.

Still another object of the invention is to provide apparatus of the above mentioned type in which the master control switch which is controlled by the operating handle is contained within an explosion proof casing having a removable cover upon which the master switch is mounted and can be readily removed as a unit by the simple process of removing the cover plate.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawing,

Fig. 1 is an assembly view of an electrical controller including the safety mechanism of my invention; and

Fig. 2 is a sectional elevational view showing particularly the safety mechanism.

Referring particularly to Fig. 1 of the drawing there is seen a main controller 10 which is provided with an enclosing housing 11 within which is the controller mechanism which may follow any standard construction. For example, it may include a main operating drum or cylinder provided with an operating shaft 12 (see Fig. 2). The controller 10 also is preferably provided with a reversing drum or cylinder operable by a lever 13. To provide the safety feature for the controller I provide a housing 14 adapted to be attached to the top of the casing or housing 11, as by spaced nuts and bolts, one of which is seen at 15. Within the housing 14 is a hollow operating shaft 16 which at its bottom is provided with a female receiving opening which is other than round and is adapted to receive the upward extension of the shaft 12 so as to effect a driving rotary relation between the shaft 12 and the hollow shaft 16 which, for functional purposes, may be considered as a single shaft. The shaft or extension 16 extends through the housing 14 and at its upper end is keyed to a bracket 17 which bracket has pivotally attached to it an operating handle 18 by virtue of the pivotal connection 19. The handle 18 is provided with an operator's knob 20. The handle 18 is illustrated in full lines in the "on" or operating position of the mechanism and in dotted lines in the "off" position. Limited pivotal movement of the handle 18 about the pivot 19 is provided by virtue of a stop 21 formed on the bracket 17 and a cooperating pin 22 extending between the opposite side walls of the handle 18.

As illustrated in the drawing, the handle 18 is essentially hollow in construction and when in the "on" position substantially houses the bracket 17. It is evident that by rotating the shaft 16—12, the main contacts of the controller 10 may be operated and this rotation may be effected by swinging the handle 18.

It may be further pointed out that cooperating stop means 23 is provided between the bracket 17 and the housing 14 to determine the extreme opposite positions of adjustment of the handle 18 with reference to its swinging movement about the axis of the shaft 16—12.

To provide a safety feature whereby the handle 18 will automatically move to circuit opening or "off" position whenever it is released, for example to render the controller inoperative in case of any accident to the operator, I provide mechanism which will now be described.

Journaled loosely on the shaft 16 for longitudinal movement with respect thereto is a bushing, collar or sleeve 24. The bottom of said bushing 24 is provided with a shoulder against which the top of a coil or helical spring 25 abuts. The bottom of said spring 25 is received in the bottom of a cup formed in the housing 14. It is obvious that the spring 25 urges the bushing 24 upwardly and slidably along the shaft 16. Guide mechanism which prevents rotation of the sleeve 24 is provided and is in the form of a stop or projection 26 which extends into a longtiudinal or axial groove 27 formed on one side of the bushing or sleeve 24. The bushing or sleeve 24 abuts a ring 28 which is mounted on the shaft 16, said ring 28 being provided with a radial groove which receives a transversely extending or radial key 29, said key 29 having a projection on its bottom which cooperates with the ring 28 to lock it in position under normal conditions. Said key 29 extends through longitudinally extending slots 30—30 formed in opposite sides of the hollow shaft 16, thus permitting free axial or longitudinal upward movement of the bushing

24, ring 28 and key 29 under the action of the spring 25 unless these parts are held down by the handle 18 and cooperating mechanism now to be described.

Extending through the hollow upper portion of the shaft 16 is a cylinder or plunger 31 which abuts the central portion of the key 29, the upper end of said plunger 31 abutting the wear head of a rivet 32 which is carried in an inwardly or downwardly extending boss 33 provided on the inside of the hollow handle 18. It is evident from Fig. 2 of the drawing that when the handle 18 is held down the abutting head of the rivet 32 will cooperate with the cylinder or plunger 31 to hold the key 29, ring 28 and bushing 24 down to the switch operating "on" position as hereinafter described.

The mechanism just described constitutes in part the automatically operating mechanism for a master switch 34 which is preferably of the quick acting or snap type, that is, the switch 34 controls the current flow to the contacts of the controller 10 so that when it is in its "off" position it is impossible to close any of the circuits controlled by the controller contacts. The internal details of the switch 34 can follow any desired construction of snap action or quick make and break type. It is an important feature of my invention, however, that this switch be made of the quick acting or snap type so that whenever the circuit is broken by lifting of the handle 18 to the "off" position it will be broken by a snap action.

As illustrated, the switch 34 includes a base 35 and preferably is a double pole switch. In addition I prefer a switch in which the circuit is broken in each line at two places simultaneously and to this end each line of the switch is provided with a pair of swing contact arms, one pair of which is seen at 36, 36 in the drawing designated in the "on" position. The switch also includes an insulating guide plate 37 through which a switch operating lever 38 extends, said lever 38 being received in a pocket 39 formed in the bushing or sleeve 24 so that the longitudinal movement of said bushing will be imparted to the lever 38.

It is further to be noted that the switch 34 as well as all of its operating mechanism including the sleeve 24, etc., is contained within the housing 14 which is preferably gas tight and explosion proof.

Another feature of my invention lies in the fact that the switch 34 can be readily removed for inspection or repair and this does not require any disconnection of pins, cotter keys, nuts or the like. To this end the base 35 of the switch 34 and consequently the entire switch 34 is mounted upon a removable cover plate 40 which is removably attached to and forms a part of the housing 14 by virtue of machine screws, one of which is seen at 41.

It may also be pointed out that the top of the housing is provided with a removable threaded closure 42 which permits ready removal of the shaft 16, bushing 24, ring 28, key 29, etc., once it is unscrewed. It may be pointed out still further that an electric cable 43 extends from the controller housing 11 into the housing 14 and provides conductors connected to the master control 34, an insulating bushing 44 preferably being provided for the cable 43 where it passes through the housing 11.

In the operation of the apparatus, the parts will be in the positions illustrated in Figs. 1 and 2 of the drawing because the operator will have his hand on the knob 20. By rotation of the handle 18 about the axis of the shaft 16, 12, the controller 10 can be operated to control electric mechanism such as a motor of a mine locomotive. Under these conditions the master control switch 34 will be closed. Should the operator release the knob 20 the spring 25 will push upwardly on the bushing 24 and through the ring 28, key 29 and plunger 31 swing the arm 18 about the pivotal connection 19 to the dotted line position illustrated in Fig. 2 which is the "off" position. Upward movement of the bushing 24 by virtue of the loose operating connection afforded by means of the cooperating recess 39 and cooperating lever 38 will move said lever 38 upwardly to the "off" position and the two pivoted contact arms 36 in each line of the master switch 34 will swing in a counterclockwise direction with a snap or quick action so that the upper of each of said arms 36 will assume a substantially upright position which is an "off" or switch opening position, said "off" position of one of the arms 36 being illustrated in Fig. 2 of the drawing. This, of course, opens all the contacts of the master switch 34 and renders the control ineffective. To place the controller in circuit controlling condition the operator pushes down on the knob 20 and the parts are restored to the positions illustrated in Fig. 2 of the drawing in which the contacts of the switch 34 are closed with a snap action.

As previously mentioned, the switch 34 is contained within a flame proof housing 14 and so are its operating mechanisms. In addition, said switch 34 is readily removable as a unit by the simple process of removing the cover plate 40.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and I wish therefore not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of my invention, what I now desire to secure by Letters Patent of the United States is:

1. In an electrical controller, the combination with an operating shaft, mechanism including a sleeve journaled on said shaft for longitudinal movement, spring means coiled about said shaft urging said sleeve to an off switch operating position, a snap switch mounted adjacent said sleeve having an operating member connected to and controlled by the position of said sleeve and constructed to be in circuit closing position when said sleeve is moved against said spring to one position and to be in circuit opening position when said sleeve is moved under the influence of said spring to another position, and an operating handle for turning said shaft and also for moving said sleeve against the action of said spring to said other position.

2. Controller mechanism including a controller operating shaft, a gas tight housing through which said shaft extends, a removable cover plate for said housing, a snap switch mounted on said cover plate and removable as a unit therewith, spring biased operating mechanism for said switch mounted on said shaft, and an operating handle outside said housing for operating said shaft and said spring biased operating mechanism.

3. Controller mechanism including a controller operating shaft, a housing through which said shaft extends, a removable cover plate for said

housing, a snap switch mounted on said cover plate and removable as a unit therewith, spring biased operating mechanism for said switch mounted on said shaft, and an operating handle outside said housing for operating said shaft and said spring biased operating mechanism.

4. Controller mechanism including a controller operating shaft, a housing through which said shaft extends, a removable cover plate for said housing, a switch mounted on said cover plate and removable as a unit therewith, spring biased operating mechanism for said switch mounted on said shaft, and an operating handle outside said housing for operating said shaft and said spring biased operating mechanism.

5. Controller mechanism including a controller operating shaft, a gas tight housing through which said shaft extends, a removable cover plate for said housing, a switch mounted on said cover plate and removable as a unit therewith, spring biased operating mechanism for said switch mounted on said shaft, and an operating handle outside said housing for operating said shaft and said spring biased operating mechanism.

6. A controller mechanism including a rotatable switch operating shaft, a housing through which said shaft extends, a collar on said shaft having a switch operating member thereon, means for shifting said collar on said shaft, a closure for said housing, a switch mounted on said housing closure and removable as a unit therewith upon removal of said closure, said switch having a loose but operative connection with said operating member of said collar when said switch and closure are assembled, said connection providing for free removal of said switch as aforesaid.

7. In an electrical controller, the combination with an operating shaft mounted for rotation, switch operating mechanism including a switch operating sleeve journaled on said shaft for longitudinal movement, spring means coiled about said shaft and bearing directly against said sleeve urging it in one direction, and means including a pivoted operating handle connected to rotate said shaft and swingable about its pivot to move said sleeve against said spring, said spring alone urging both said handle and said sleeve to one position.

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