

June 1, 1926.

1,586,953

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SWITCH MECHANISM

Filed July 30, 1924

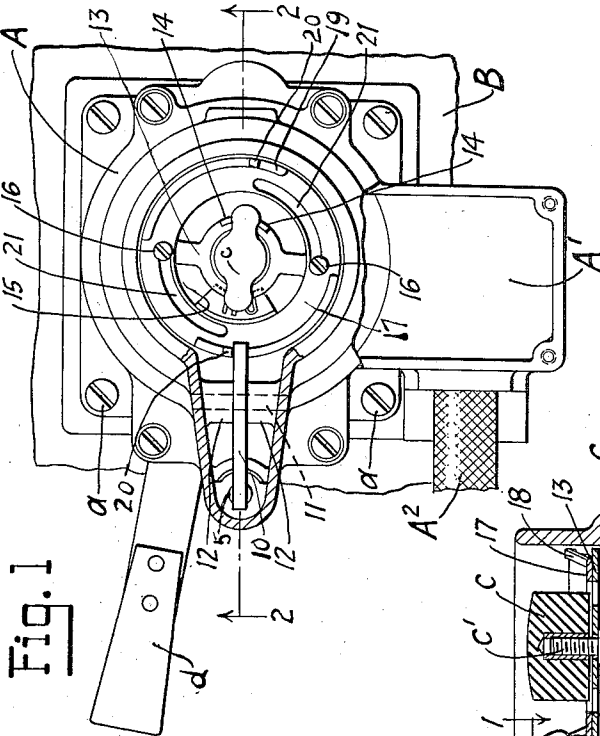


Fig. 1

Fig. 2

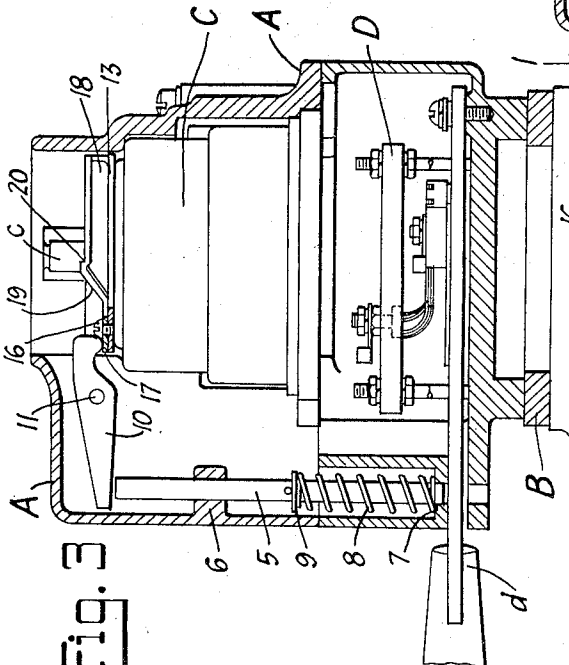
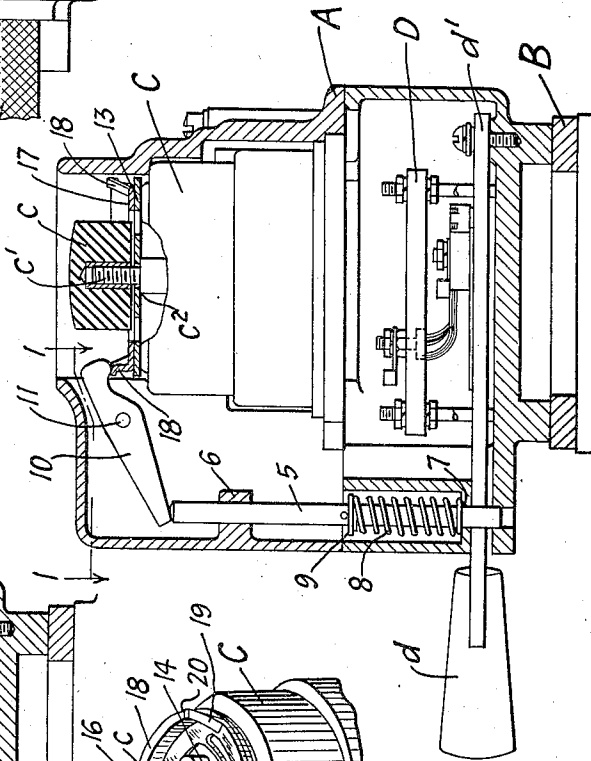


Fig. 3

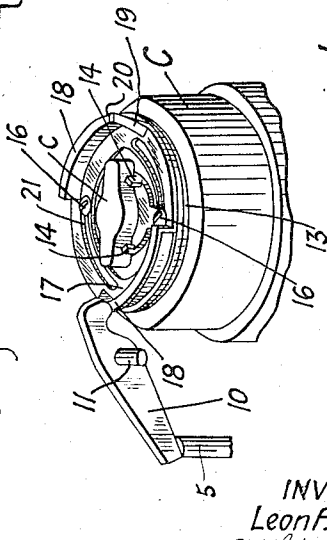


Fig. 4

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SWITCH MECHANISM.

Application filed July 30, 1924. Serial No. 729,050.

This invention relates to control apparatus for electrical motors and machinery. More particularly it concerns locking mechanism controlled by one control device for temporarily rendering a second control device inoperative.

One object of the invention is to provide simple, positively acting locking mechanism of the character described. Another object is to adapt the ordinary snap switch to control the locking mechanism. Other objects will be apparent from the detailed description which follows.

While the invention is capable of general application, the particular form thereof herein used as an illustrative example is intended for use on electric coal drills having a main switch and a reversing switch, the locking mechanism being utilized to prevent careless and indifferent operators from reversing the drill while it is in operation.

In the drawings:

Fig. 1 is a plan view partly in section on the line 1—1 of Fig. 2;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1 with the greater part of the snap switch shown in elevation and the locking mechanism in operative position;

Fig. 3 is a view similar to Fig. 2 with the entire snap switch in elevation showing the locking mechanism in normal or inoperative position; and

Fig. 4 is a fragmentary perspective view diagrammatic in form showing the upper part of the snap switch and the associated elements of the locking mechanism, the casing being omitted.

The embodiment of the invention chosen for the purpose of illustration is contained in a casing A adapted to be secured in a suitable manner as by screw bolts *a* to the casing B of a coal drill, motor or other electrical device to be controlled. The casing, which may be in two or more parts and may include a junction box A', in which the end of the electric cable A² is made fast, houses superposed switches, a main switch C of the ordinary snap type having an actuating button C' and a reversing switch D having a control handle *d* projecting beyond the casing A and pivoted at *d'* therewithin for limited swinging movement.

The locking mechanism for restraining the control handle *d* of the reversing switch from movement when the main switch is

"on" comprises a rod or plunger 5 mounted for reciprocatory movement in bearings 6 and 7 within the casing A, a coil spring 8 encircling rod 5 and abutting against a washer 9 fixed thereto normally maintaining rod 5 out of the path of movement of control handle *d* or in inoperative position, as shown in Fig. 3. Rod 5 is moved to operative or locking position (shown in Fig. 2) when main switch C is "on" by a lever 10 pivoted on a pin 11 extending through guide bosses 12 within casing A. One end of lever 10 engages the upper end of rod 5 and the other end engages suitable actuating means on main switch C.

As previously stated, switch C is of the ordinary snap switch type operated by a button *c* threaded on a rotatable shaft *c'*, this shaft, during its rotation having two positions in which the switch is "on" and two in which it is "off," a quarter turn of button *c* being sufficient to effect the change in the condition of the switch. On shaft *c'* of the snap switch C is disposed the apparatus for actuating lever 10 and thereby the plunger 5 to lock reversing lever *d* against movement. This apparatus preferably takes the form of a plate 13 of sheet metal or other suitable material having an opening loosely receiving shaft *c'* and having two pairs of spaced opposed stops 14 arranged to closely engage opposite sides of the button *c* when the latter is screwed down upon plate 13 wedging the latter against the shoulder *c*² on shaft *c'*. By this arrangement plate 13 rotates with button *c* and with shaft *c'*. Plate 13 may be partly cut away as indicated at 15 to make visible to the operator the usual "on" and "off" indicia on the switch C. Upon plate 13 is secured by suitable means, such as screws 16, a cam ring 17 carrying one or more lateral projections 18 to engage the short arm of lever 10. Each projection 18 has at one end an inclined cam surface 19 on which the short end of the lever rides in an obvious manner. This cam surface extends slightly above the normal height of projections 18 (Fig. 3) forming a stop shoulder 20 to prevent reverse rotation of the button *c*, which would unlock reverse control *d* while the main switch was still "on." In order to insure that the projections 18 register with the "on" positions of the main switch button *c*; the cam ring 17 is adjustable relative to plate 13 by the pro-

vision of slots 21 in ring 17 through which screws 16 pass. By this arrangement any variations in the position of the switch button *c* relative to the indicia which may result through the interposition of plate 13 are readily compensated for when the switches are assembled in casing A. This adjustment once made does not have to be changed.

The operation of the locking mechanism is obvious from the drawings. When the cam ring 17 has been properly adjusted so that projections 18 register beneath the short end of lever 10 when the main switch C is "on", it will be clear that the locking rod or plunger 5 will be depressed or moved to operative position (Fig. 2) to prevent throwing of the reversing control handle *d*. When the button *c* is turned to throw the main switch to "off" position, the flats on the cam ring 17 will register with the lever 10 and locking plunger 5 will be restored to its normal inoperative position (Fig. 3) by its spring 8. Inasmuch as both switches and the locking mechanism are entirely enclosed in the casing A, these parts cannot readily be tampered with by the operator so that the present arrangement prevents reversing the motor while the main switch is "on", which procedure is dangerous to the operator and ordinarily burns out the motor. It will be further evident that casing A protects the switches and locking mechanism in an efficient manner against accidental injury. This construction provides efficient locking mechanism in conjunction with the standard type of snap switch which is inexpensive and efficient and renders unnecessary the building of special switches to secure the highly desirable locking of the reversing switch when the main switch is "on".

While a preferred form of switch mechanism has been herein shown and described, it is to be understood that the invention is not confined to the specific details and structural arrangement thereof but includes all changes, modifications and adaptations within the scope of the appended claims.

I claim:

1. In combination, a snap switch and a reversing switch, locking means for said reversing switch comprising a reciprocable member and a lever for actuating the latter, and means on said snap switch cooperating with said lever for controlling said member and for preventing reverse rotation of the snap switch.
2. In combination, a snap switch and a reversing switch, locking mechanism for the latter including a plunger and a lever, an actuator on said snap switch arranged for operating said locking mechanism, and a stop on said actuator cooperating with said lever for preventing reverse rotation of the control shaft of said snap switch.

3. In combination, a snap switch and a reversing switch, movable means for locking said reversing switch, and means constructed and arranged to actuate said first named means to locking position when the snap switch is in "on" position and to limit rotation of the snap switch to one direction only.

4. In combination, a snap switch and a reversing switch, movable means for locking said reversing switch, and means constructed and arranged to actuate said first named means to locking position when the snap switch is in "on" position and to prevent a reverse rotation of said snap switch including a member rotatable with the button on said snap switch and having a cam projection terminating in a stop.

5. In combination, a snap switch and a reversing switch, movable means for locking said reversing switch, and means constructed and arranged to actuate said first named means to locking position when the snap switch is in "on" position including cam means rotatable with the button on said snap switch and adjustable relative thereto.

6. In combination, a casing, a snap switch and a reversing switch within said casing, locking means within said casing for said reversing switch controlled by said snap switch comprising a rod reciprocably mounted in guides in said casing to be projected into and out of the path of movement of the reversing switch control member, resilient means normally maintaining said rod in inoperative position, a lever pivotally mounted on the walls of said casing for moving said rod against said resilient means to locking position, and an actuator member rotatable with the control button of said snap switch and adjustable relative thereto for actuating said lever.

7. In combination, a casing, a main switch and a reversing switch in said casing in superposed relation, a rod reciprocably mounted in guides in said casing to be projected into and out of the path of movement of the reversing switch control to lock the latter, a lever pivotally mounted on the walls of said casing for actuating said rod, and cam means on said main switch for actuating said lever when in "on" position.

8. The combination with a snap switch having a rotatable shaft, a control member secured to said shaft, and an actuator plate loosely engaging said shaft and having lugs engaging said member whereby said actuator is keyed to said member for rotation therewith and means providing for adjustment of said actuator relative to said member.

9. The combination with a snap switch having a shouldered rotatable shaft threaded above said shoulder, a control button threaded on said shaft, and an actuator plate clamped between said button and shoulder and keyed to said button.

10. The combination with a snap switch having a shouldered rotatable shaft threaded above said shoulder, a control button threaded on said shaft, an actuator plate loosely engaging said shaft and clamped against said shoulder by said button, said plate having lugs engaging opposite sides of said button.

11. The combination with a snap switch having a shouldered rotatable shaft threaded above said shoulder, a control button threaded on said shaft, a plate loosely mounted on said shaft clamped between said button and said shoulder, means keying said plate to said button for movement therewith, and a cam projection adjustably secured to said plate.

12. The combination with a snap switch having a shouldered rotatable shaft threaded above said shoulder, a control button threaded on said shaft, a plate loosely mounted on said shaft clamped between said button and said shoulder, means keying said plate to said button for movement therewith,

and a cam ring adjustably secured to said plate.

13. An actuator device for quick attachment to a snap switch comprising a support plate constructed and arranged to be clamped on the shaft of the switch by the control button of the latter, said plate having projecting lugs arranged to engage said button to insure rotation of the plate with the latter, and a cam projection adjustably secured to said plate.

14. An actuator device for quick attachment to a snap switch comprising a support plate constructed and arranged to be clamped on the shaft of the switch by the control button of the latter, said plate having projecting lugs arranged to engage said button to insure rotation of the plate with the latter, and a cam ring adjustably secured to said plate.

Signed by me at Cleveland, Ohio this 25th day of July 1924.

LEON MEUNIER.