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SWITCH FOR DRILLING MACHINES

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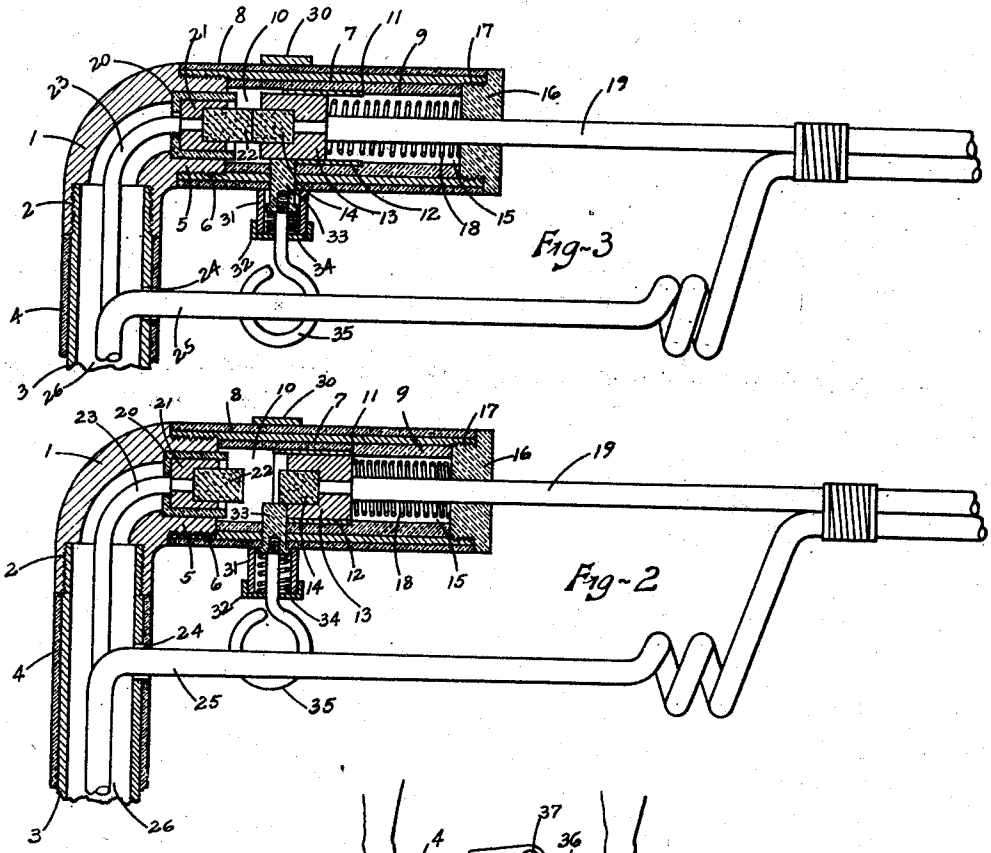


Fig-3

Fig-2

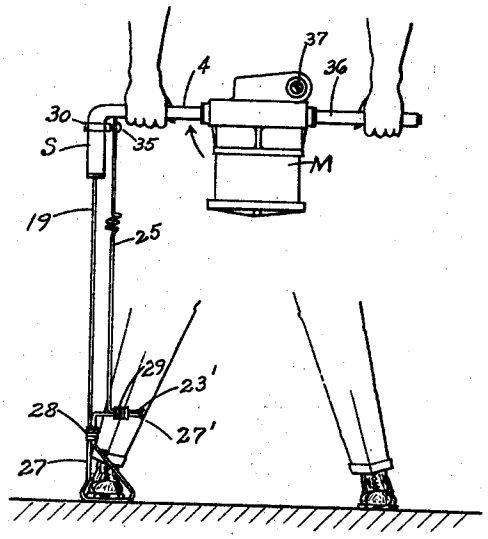


Fig-1

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UNITED STATES PATENT OFFICE

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SWITCH FOR DRILLING MACHINES

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My invention relates to an electric switch and its application to an electrically operated machine and has particular reference to a manual type of machine, that is, one which is held and controlled by the operator.

The object of my invention is to provide a switch to control the flow of current to an electrically operated machine such that the switch may be opened or closed manually at the will of the operator, or opened automatically if the operator is not able to control the manipulation of the machine.

The switch portion of my invention is particularly adapted for use in connection with what are usually termed electrically operated hand drills, that is, drills having an electrically controlled mechanism for rotating the drill point, but the drill, as such, being held and manipulated by the operator. In the case of such drills, it is usual for an operator to desire to cause the drill to cut as rapidly as possible and under such conditions the drill point is likely to stick and cause the stalling of the mechanism operating the drill and this in turn may damage the mechanism or it may be dangerous to the operator of the drill if the operating mechanism is of considerable power as it may be in the case of a drill and cause the mechanism to instantly start to rotate if the drill point suddenly stops rotating due to its sticking. These conditions usually happen when the operator is not on his guard as would be the case if he is forcing the drilling, and it may happen due to the drill point suddenly striking some unusually hard substance which was not anticipated by the operator.

I have arranged a switch to be used in combination with the class of drilling mechanism referred to or with such other machines as the switch may be applicable to whereby the current will be instantly cut off from the operating mechanism should the mechanism be stalled, tending to rotate the mechanism out of normal position.

My invention resides in the new and novel construction, combination and relation of the various parts herein more fully described and disclosed in the drawing accompanying this specification.

In the drawing:

Fig. 1 is a view representing a drilling machine of the hand controlled type and shows the application of my switch mechanism thereto and its relation to the drilling mechanism and the operator.

Fig. 2 is a sectional view of the switch portion of my invention shown in an open position.

Fig. 3 is a sectional view of the switch portion of my invention, but in a closed position as is the case when current is flowing to the mechanism.

The switch portion of my invention comprises a member 1, preferably of metal, and while I have shown it of an elbow formation, it may be either straight or otherwise as may be required. One end of the member 1 is internally threaded at one end, as indicated by the threads 2, and to these threads is secured a member 3 preferably of metal and which is in turn secured to the machine M. The member 3 is protected by a tube 4 of insulating material which may be of the vulcanized fiber or phenolic compound construction.

To the opposite end of the member 1 I provide a projecting flange 5 which is provided with a thread 6 and to this threaded collar 5 is threadably secured a metal tube 7. The metal tube 7 is protected on the outside by an insulating tube 8 similar to the tube 4 and on the inside is protected by an insulating tube 9 which is counter-bored to form a recess 10 and a shoulder 11. Permanently mounted within the recess 10 and butting against the shoulder 11 is a metal lining 12. Slidably mounted within the metal lining 12 is a metal plunger 13 which has permanently secured therein a carbon element 14. The insulating tube 9 is provided with another chamber 15 and this chamber is closed at the end by the insulating member 16 which is threadably secured in position by means of the co-operating threads 17. Mounted within the chamber 15 is a spring 18 under compression when the switch is in an open position, as shown in Fig. 2. The member 13 is provided with a recess in which is secured, preferably by soldering, the

end of the conductor of the insulated cable 19.

The flange 5 is counter-bored to permanently receive an insulating cup-shaped member 20. In the member 20 is mounted a metal member 21 in which in turn is mounted a carbon member 22 to be engaged by the carbon member 14 when the switch is closed, as shown in Fig. 3. Secured to the member 21, preferably by soldering, is the insulated cable 23.

The insulating and metal tubes 3 and 4 are provided with an opening 24 through which passes an insulating cable 25. The cables 23 and 25 extend through the interior passage 26 of the tube 23 and to the electrically operating mechanism in the machine M. The cable 19 has formed a loop 27. The loop 27 is maintained by clamping means 28 which may consist of binding wire, tape or a clamping member. The cables 23 and 27 are bound together, as indicated at 29, for convenience, and the terminals 23′ and 27′ are connected to the source of power. In order to maintain the switch in an open position there is secured to the exterior of the insulating tube 8 a metal band or clamp 30, which may be forced into position and held there by friction or which may be secured thereto by a binding screw similar to that used in a hose clamp, and projecting from the band 30 is a projecting member 31 which has a screw cap 32 and a recess formed within the member 31. The recess in the member 31 is positioned over an opening extending through the side of the members 7, 8 and 9. Positioned within the recess in the member 31 and projecting through the last said opening is an insulating plug 33 which is held in an advanced position by means of the spring 34. Secured to the insulating plug 33 and projecting outwardly beyond the cap 32 is a handle 35 by means of which the insulating plug 33 may be drawn outwardly at the will of the operator. When the plug 33 is drawn outwardly through the medium of the handle 35 the spring 18 will advance the member 13 so that the carbon member 14 will engage with the carbon member 22 thereby closing the switch and completing the circuit from the source of power to the machine M. It will be noted that the switch cannot be opened by manipulation of the handle 35.

Assuming that the switch S is secured to the drilling mechanism M through the medium of the insulating tube 4 and its reinforcing metal tube 3, the members 3 and 4 will constitute a handle for one of the operator's hands and the oppositely disposed end secured to the drilling mechanism M is another projecting handle 36 to be grasped by the other hand of the operator. The operator will grasp the handles 4 and 36 and place his foot through the loop 27, assuming a relative position with respect to the mechanism M, as shown in Fig. 1. To start the drill operating, he will pull out the handle 35 which will permit carbon contacts 14 and 22 to engage thereby closing the circuit to the drill M. Drills of the character shown are usually provided with means for pressing the body against the drill and this the operator will do in order to force the drill bit 37 against the material to be drilled.

Should the operation of the drill bit 37 stop suddenly while the switch S is closed, the tendency will be for the drilling mechanism M to rotate relative to the drill bit 37 about the axis of the drill bit and in the direction indicated by the arrow. This will instantly cause a pull upon the cable 19 which will operate the carbons 14 and 29 and thereby open the circuit and instantly the mechanism will cease functioning and the insulating plug 33 will move into an interlocked position with the member 13 through the action of the spring 34 thereby maintaining the switch in an open position.

In order to open the switch under normal conditions while the mechanism M is in operation, it is not necessary for the operator to take his hand from the handle 4 in order to operate the handle 35, but by merely pulling upwardly on the handle 4 he will cause a pull upon the cable 19 which in turn will open the switch S, as already described above.

It will be apparent that a switch so combined with the mechanism M that it will open under the conditions described will be a decided advantage to the operator and be the means of preventing accident to the operator and to the mechanism.

It is quite evident that I have arranged an automatic opening mechanism in combination with an electrically operated machine whereby the current to the mechanism is automatically cut off in case of sudden tendency for the mechanism to change its normal operating position. It is also evident that in place of using the conductor 19 as the means for attachment to a stationary object that a separate means, such as a heavy cord, could be connected to the member 13 in addition to the member 19 and the cord could have a loop formed convenient for attachment to the foot or other stationary object.

It is also apparent that the switch S in place of being mounted in connection with the machine M might be placed convenient to the foot of the operator and held thereby and connected to the handle 4 by the cable 19 which would cause the switch to open if the handle 4 were rotated as described.

I claim:

1. The combination of a drilling machine, electrical means to rotate the drill bit of the machine relative to the machine, handles fixed to the machine to be gripped by an operator to hold the machine in a predetermined position, a switch having a pair of contacts mounted on the machine and arranged to

open a circuit leading to the electrical means and means arranged to be engaged by the operator's foot at a point remote from the machine and connected to the switch to open the switch if the drill bit sticks and the machine is rotated counter to the drill bit.

2. An electric switch to control a circuit on which a machine operates comprising a casing, a fixed contact within the casing, a movable contact within the casing and means to mechanically connect the movable contact to an externally fixed object remote from the switch and means to secure the casing to a manually held and electrically operated machine and so positioned that the movement of the machine about a fixed axis of rotation and away from the fixed object will cause the fixed contact to move relative to the movable contact and open the switch and the circuit to the machine.

3. An electric switch to control a circuit on which a machine depends comprising a casing, a fixed contact within the casing and means to connect the movable contact to an external remote and fixed object and means to secure the casing to a manually held and electrically operated drilling machine and so positioned that the rotation of the machine about the drill axis from a predetermined position will cause the fixed contact to move relative to the movable contact and open the switch and the circuit to the machine and means to automatically engage the movable contact when the two contacts are moved relative to each other to an open position to maintain the contacts separated and the circuit open.

In testimony whereof I affix my signature.

HOMER P. CHANDLER.