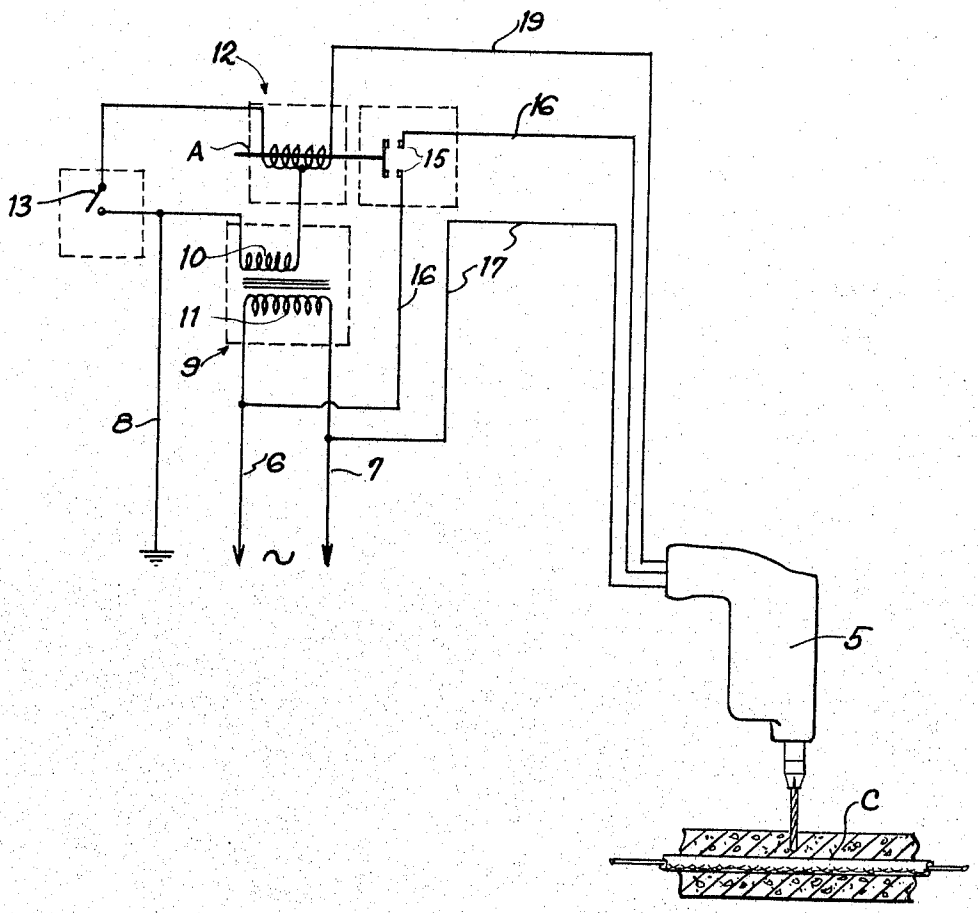
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SAFETY CUT-OFF FOR ELECTRICAL POWER OPERATED HAND TOOLS

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SAFETY CUT-OFF FOR ELECTRICAL POWER OPERATED HAND TOOLS

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This invention relates to an improved safety cut-off for electrical power operated hand tools.

One of the objects of my invention is the provision of means for use in combination with an electrical power operated hand tool used for cutting, drilling, or other working, which is operable to automatically cut-off the power and arrest operation of the tool, as soon as it has penetrated a layer of relatively non-electrically conducting material and has contacted an underlying layer of relatively high conducting material, so as to prevent injury both to the operator as well as to the underlying layer.

Another object of my invention is the provision of a supervisory electrical circuit in combination with an electrical power operated tool for cutting off power to the tool upon the occurrence of unsafe conditions under which it is desired to arrest operation of the tool.

A further object of my invention is the provision of means of the foregoing character which is simple in construction, effective in operation and economical to manufacture.

Other and further objects and advantages of this invention will become apparent from the following description when the same is considered in connection with the accompanying drawing, in which the single figure of the drawing illustrates a schematic representation of an electrical circuit according to my invention, shown in conjunction with a conventional electric drill, the latter being illustrated as drilling through a non-electrical conducting material underlying which is an electrical conductor within a conduit.

Referring to the drawing, the electrical tool for purposes of representation is shown as a conventional electrical drill **5**. The supervisory electrical circuit is preferably contained in a housing, not shown. Power for the circuit and for the tool is derived through a three wire male plug, not shown, which is adapted to be received in and make contact with a conventional 120 volt AC receptacle or other alternating current supply of higher voltage, depending upon the characteristics of the tool used. Three conductors running from the plug consist of hot wire **6**, neutral wire **7** and building ground wire **8**.

Control power for the circuit is derived through step-down transformer **9**, the primary winding **11** of which is connected across wires **6** and **7** and the secondary winding of which is connected at one side to ground wire **8** and reset switch **13**, the other side being connected to an intermediate point of the coil of relay **12**. The transformer **9** is adapted to step-down the supply current to 24 v. A.C. on the secondary winding terminals.

The relay **12**, illustrated, has a split coil design with one set of relay contacts **15**. One half of the coil is operable to close the line voltage circuit and the other half to open it. A suitable construction of relay, as herein described, is General Electric Catalog No. RR–3 which operates on a 24 volt switch circuit for controlling a 125, 250 or 277 volt circuit.

Reset switch **13** also is connected in circuit with a terminal of the split coil of relay **12**, the other terminal of the split coil of relay **12** being grounded to the housing of drill **5** through conductor **19**. The power for drill **5** is derived through conductors **16** and **17** connected respectively to power lines **6–7**, with conductor **16** being connected to relay contacts **15**.

When the drill **5** is not operating, the relay contacts **15** are in the position illustrated in the drawing. In order to render the drill **5** operative, reset switch **13** is momentarily depressed to close the circuit through secondary winding **10** and the left one-half of relay coil **12**, thereby energizing said coil and moving the armature A towards contacts **15** and establishing current flow across said contacts. After the reset switch **13** is released the armature A is mechanically maintained in circuit closing relationship with contacts **15**. When the switch connected to the motor of drill **5** is actuated, a circuit is completed between the power lines **6** and **7** and drill **5** through conductors **16** and **17** thereby effecting operation of the drill.

In the event that the bit of the drill **5** makes grounding contact with a concealed pipe, electric conduit, or the like, the right one-half of relay coil **12** is immediately energized by current flow through it from the secondary winding **10** of the transformer, through conductor **19**, through the drill bit, grounded contact C and through conductor **8**. As a result of such energization, armature A which has been mechanically held in circuit closing condition is caused to move to the left, disengaging relay contacts **15** and opening the circuit to the motor of drill **5**, causing the same to be stopped. Further operation of the drill is rendered impossible until reset switch **13** is again actuated. It will thus be seen that injury both to the operator and to the tool is thereby avoided.

It will be understood that various changes and modifications may be made from the foregoing without departing from the spirit and scope of the appended claims.

I claim:

1. A safety cut-off means comprising, in combination, an electrical power driven hand tool, a current source, a split coil relay having a pair of relay contacts, a power circuit for said tool including only said relay contacts in series with said tool, a step-down transformer the primary of which is connected across said current source, one side of the secondary of said transformer being connected intermediate said split relay coil, the other of said secondary being connected to one side of said relay coil and to a ground lead, the other side of said relay coil being connected to the housing of said tool, one-half of said relay coil when energized effecting closing of said contacts to close the power circuit to said tool, the other one-half of said relay coil being energized upon the housing of said tool being grounded whereby said contacts are opened thereby cutting off power and stopping operation of said tool.

2. The invention as defined in claim **1** in which a normally opened reset switch is connected in the line between said other side of said secondary and said one side of said relay.

3. A safety cut-off means comprising, in combination, an electric power driven hand tool, a source of electric current, a first electric circuit connected to said source affording power for operating said tool, a split coil relay,

said circuit including only a pair of relay contacts in series with said tool, a second electric circuit connected to said source and including the operating coil of said relay, means in said second circuit for energizing one-half of said coil to effect closing of said contacts to complete said first electric circuit, and means in said second electric circuit for energizing said second one-half coil to open said contacts responsive to conditions under which it is desired to stop operation of the tool.

References Cited

FOREIGN PATENTS

839,744	1/1939	France.
334,602	9/1930	Great Britain.
551,090	2/1943	Great Britain.

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