Aug. 24, 1937. D. SCIAKY 2,091,219

SAFETY DEVICE FOR ELECTRIC MACHINES

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Fig. 1

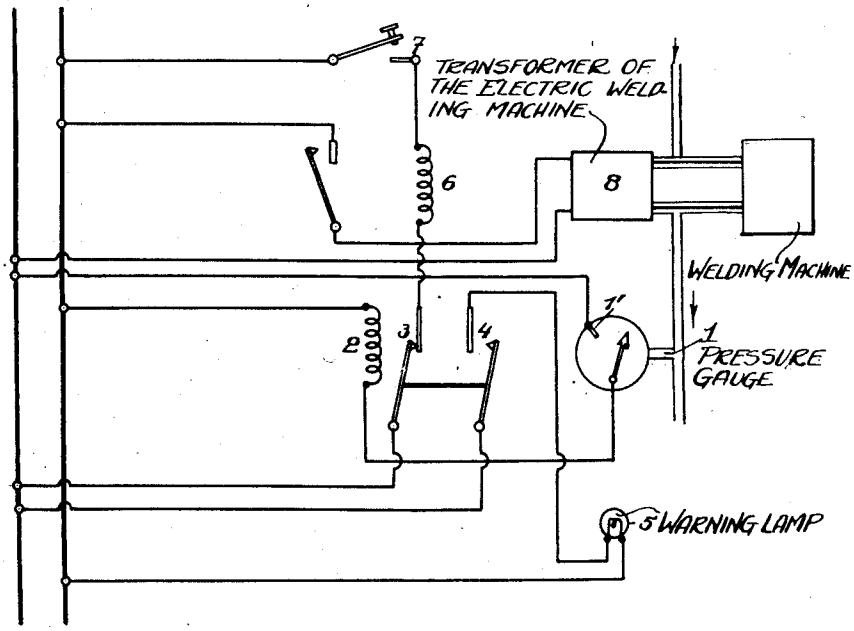
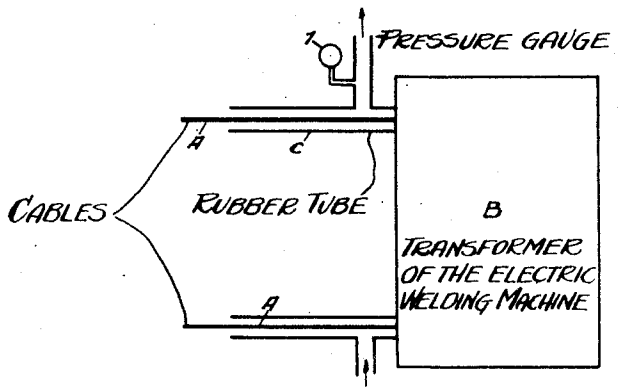


Fig. 2



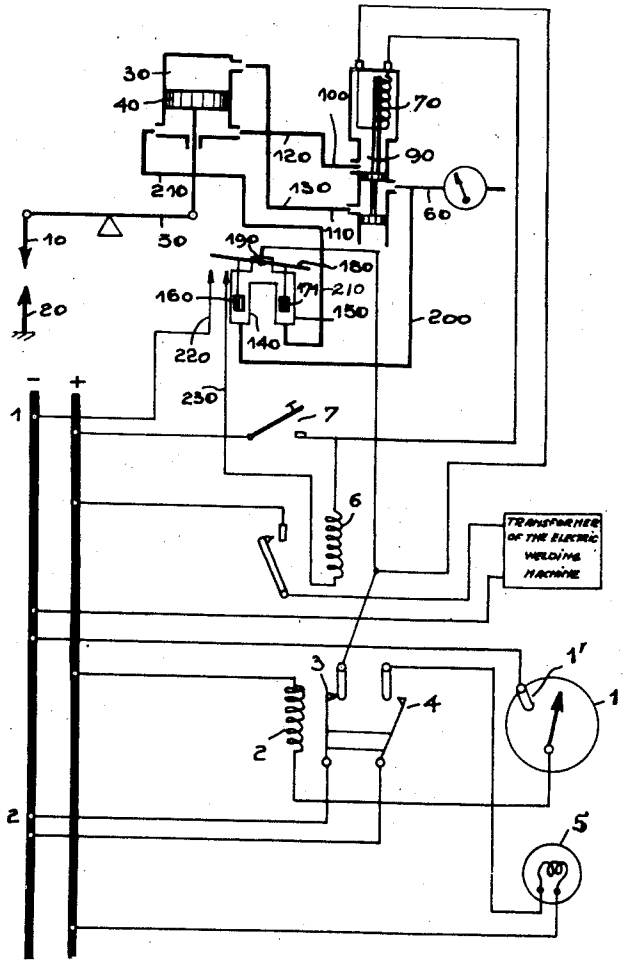
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Fig. 3



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SAFETY DEVICE FOR ELECTRIC MACHINES

David Sciaky, Paris, France

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2 Claims. (Cl. 219—4)

The present invention relates to electric welding machines and especially to electric welding machines the good working of which is dependent on the circulation of a cooling fluid.

It is known for instance that the cables of the secondary circuit of movable electric welding machines are necessarily of a relatively small cross section, which makes it absolutely necessary to cool them by means of a circulation of water. When, due to a mistake, the current is switched on without the water of the system being caused to circulate, there is a serious risk of overheating the conductors and of injuring their insulating coating.

The object of the present invention is to provide a safety device for obviating these drawbacks.

The device according to my invention is characterized in that it stops the working of the machine or prevents it from being brought into action when the circulation of the cooling fluid is not established, when this circulation of fluid is stopped for any reason whatever, or when it becomes insufficient.

Another object is to provide the safety device according to my invention with warning means so that the operator may be aware that the machine is no longer working and of the reason of this stopping.

A preferred embodiment of the present invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 shows the electric connections of the device according to the present invention; and

Fig. 2 shows a detail.

Fig. 3 shows a modification.

In the example shown in the drawings, the working of the welding machine is controlled by a pressure-gauge 1 placed close to the outlet of the water circulation system through which the cables A connecting transformer B with the electrodes (Fig. 2) are cooled. It would not be so advantageous to branch the manometer to the circulation system close to the water inlet, because, in this case, an obstruction of the conduits for the circulation of water would not cause the pressure to drop in the manometer. On the contrary, this pressure would rather tend to increase and the rubber tube C that surrounds the conductors might even burst under the pressure of water beginning to vaporize. Consequently, the arrangement of the pressure gauge close to the water outlet constitutes a protection for the operator.

The pressure gauge 1 is provided with a contact 1' arranged to be closed for a minimum value of the pressure. This contact is inserted in a shunt including the coil 2 of a relay. This relay includes a contact 3 which is closed when coil 2 is not energized and another contact 4 which is closed only when this coil is energized. Contact 4 is inserted in a shunt arranged to feed current to a warning device, such as a lamp 5, an electric bell, or both. As for contact 3, it is inserted in a shunt which includes the coil 6 of the main contactor or switch and a circuit breaker 7 for controlling the working of the welding machine.

This main contactor or switch closes the circuit of the machine 8 when its coil is energized.

As soon as the pressure of the water drops at the outlet of the machine below the minimum value corresponding to the adjustment of the device, the circuit of relay 2 is closed by the contact 1' of the pressure-gauge 1. The circuit of the coil 6 of the main switch is therefore opened at 3, so that the operator can no longer send electric current into the welding machine by acting on the control switch 7. Simultaneously, contact 4 is closed so that lamp 5 is switched on, thus warning the operator that the welding machine is no longer working. Furthermore, lamp 5 may be, for instance, so arranged as to illuminate a panel on which is written "Open the water circulation system".

In a welding machine having a pneumatic control of the electrodes including an electro-valve, I may insert the supplementary relay 2—3—4 in the circuit of the electro-valve, instead of inserting it in the circuit of the main contactor or switch. In this case, if the water circulation system comes to fail, it becomes impossible to establish the compressed air pressure.

I may also prevent the current from passing through the machine if the flow is controlled by a "pilot" relay arranged to permit the closing of the welding circuit only when the electrodes exert the required pressure on the piece to be welded, as described in my French patent, filed January 23, 1933, for "Improvements in electric welding machines".

Such an arrangement is shown by Fig. 3. In this figure, the movable electrode 10 moves with respect to the stationary electrode 20 under the action of a fluid under pressure acting, in cylinder 30, on a piston 40 operatively connected to the electrode 10 through a system of jointed links.

The fluid under pressure, for instance compressed air, is fed from a pipe 60 and is conveyed to a three-way valve 90, operated through an electro-magnetic relay 70. The outlets 100 and 110 of this valve are connected through pipes 120 and 130 respectively to the opposite ends of cylinder 30.

The cylinders 140 and 150 are provided with pistons 160 and 170 respectively, which move in connection with a movable member 180, pivoted at 190 to the stationary part of the device, Cylinders 140 and 150 are respectively connected, through pipes 200 and 210, on the one hand to pipe 60 and on the other hand to the portion of cylinder 30 in which compressed air acts on piston 40 for displacing the electrode 10 in a downward direction. Movable member 180 controls the working of the make and break device 220—230.

The operation of this machine, which is connected with the safety device above described (by inserting make and break device 220—230 in the circuit of coil 6 and inserting contact 3 in a circuit branched to switch 7 and including the electro-valve 70, instead of connecting said contact 3 in series with coil 6 as in the preceding embodiments) is the following:

As long as the rate of flow of the cooling fluid is sufficiently high, contact 3 remains closed, and the closing of switch 7 causes valve 70 to move distribution valve 90 in an upward direction. As soon as the electrode is applied against the piece of work with the desired pressure, the pressure acting on piston 150 applies member 180 against contacts 220—230. This closes the circuit of coil 6 and the transformer feeds current to the electrodes.

If the rate of flow of the cooling fluid drops below a predetermined value, contact 3 opens, as above explained. This does not immediately cut off the current flowing through the electrodes, but after the welding operation is completed, relay 70 can no longer operate and the working of the welding machine is stopped as long as the rate of flow of the cooling fluid keeps below the predetermined value above referred to.

This embodiment has the advantage that it does not stop a welding operation that is taking place, but nevertheless stops the working of the machine for further operations.

It should be well understood that the main feature of my invention is that the machine is prevented from working when the cooling becomes insufficient. My invention is not limited to the specific means described in the foregoing examples.

On the other hand, my invention is not limited to its application to welding machines but it can be utilized in connection with any other machines or plants in which the same problem is met with.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the appended claims.

What I claim is:

1. In a machine including two electrodes and a welding transformer for feeding current to said electrodes, the combination of a primary circuit for said transformer, a make and break in said circuit, a relay for operating said make and break, a circuit for said relay, a fluid pressure responsive member for applying at least one of said electrodes against the piece of work, a source of fluid under pressure, means, including an electrically operated valve, and a circuit for said valve, for controlling the action of said fluid under pressure on said member, a make and break in the second mentioned circuit, means operative by the fluid pressure acting on said member, for bringing the last mentioned make and break to the closed position when said electrode is being applied against said piece of work with the desired pressure, secondary conductors for said transformer, a cooling fluid circulation system for said secondary conductors, means for preventing current from being sent through the third mentioned circuit, and means, responsive to the fluid pressure in said cooling fluid circulation system, for operating said last mentioned means.

2. In a machine including two electrodes and a welding transformer for feeding current to said electrodes, the combination of a primary circuit for said transformer, a make and break in said circuit, a relay for operating said make and break, a circuit for said relay, a fluid pressure operated member for applying at least one of said electrodes against the piece of work, a source of fluid under pressure for operating said member, means, including an electrically operated valve and a circuit for said valve, for controlling the operation of said member by said fluid, a make and break in the second mentioned circuit, means operative by the fluid pressure acting on said member for bringing the last mentioned make and break to the closed position when said electrode is being applied by said member against the piece of work with the desired pressure, secondary conductors for said transformer, a cooling fluid circulation system for said conductors, and means, responsive to variations of the rate of flow of said cooling fluid in said circulation system, for acting on said third mentioned circuit so as to prevent further operation thereof once it has been stopped working in the case of said rate of flow dropping below a predetermined minimum value.

DAVID SCIAKY.