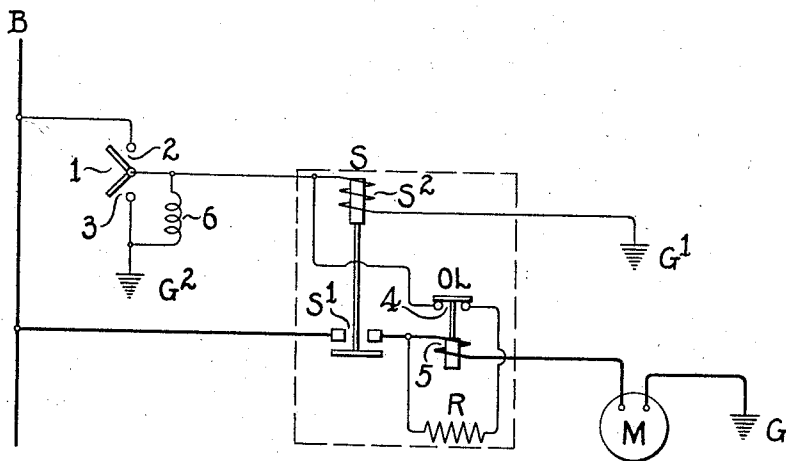


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ELECTRIC CIRCUIT CONTROLLER

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ELECTRIC CIRCUIT CONTROLLER

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5 Claims. (Cl. 175—294)

This invention relates to electric circuit controllers especially applicable to the electrical equipment of airplanes, but not limited to such application.

Airplanes are commonly equipped with electric motors employed for various purposes and the motors are apt to become overloaded, wherefore it is desirable to equip the motors with overload protective means affording automatic disconnection thereof prior to injury by overload. On the other hand, in some instances, particularly in the case of fighting airplanes, it is important to make possible in emergencies continued operation of the controlled motor after occurrence of overload conditions regardless of the danger of burnout.

An object of the present invention is to provide simple and reliable control means affording all aforementioned control and affording the aforementioned emergency control in a convenient and natural way.

Another object is to provide control means which upon termination of the aforementioned emergency operation leaves the controller in a condition to function in the usual manner.

Another object is to provide control means of the remote control type which will minimize danger of the motor circuit when closed, being opened as the result of damage to the remote control element or connection thereof.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates diagrammatically one embodiment of the invention which will now be described, it being understood that the invention is susceptible of embodiment in other forms without departing from the scope of the accompanying claims.

Referring to the drawing, the same shows a motor M to be connected to a power bus B and having a ground connection G. It is of course to be understood that the motor may be of any suitable type. Also it is to be understood that the motor circuit shown is merely a typical translating circuit and in lieu of a motor it might include some other translating device.

For connecting the motor to bus B there is provided an electromagnetic switch S having normally disengaged contacts S¹ and an electromagnetic winding S² to be energized to effect engagement of said contacts. In practice the switch S may be of any one of a number of well known types.

A two-way switch having sets of contacts 2 and 3 provides by engagement of its contacts 2 for

connection of one terminal of the winding S² to bus B, the other terminal of said winding having a ground connection G¹. Thus switch 1 provides for energizing the switch S to complete the circuit of motor M, but said switch preferably is of that well known type which returns to its intermediate or open position when released, thus tending to deenergize switch S. It will, of course, be understood that the two-way switch 1 might be replaced by two separate one-way switches each biased to open position.

For maintaining switch S energized following its energization by switch 1 there is provided a maintaining circuit including contacts 4 of overload switch OL, a resistance R and the contacts S¹ of switch S, the resistance R being of a value to prevent response of the motor to the current supplied thereto through said resistance upon engagement of contacts 2 of switch 1.

The overload switch contacts 4 are normally engaged and when the switch S responds it completes circuit from bus B, through its contacts S¹, resistance R and contacts 4 to the terminal of winding S² connected to switch 1.

The overload switch OL which in practice may be of any preferred type, either thermal or electromagnetic, is shown as having an operating coil 5 in series with the motor M and upon responding said overload switch opens the maintaining circuit of switch S to deenergize the latter for disconnection of the motor M, assuming switch 1 to be open. On the other hand, the switch 1 may in emergencies be operated and held to engage its contacts 2 thereby to insure continued energization of switch S regardless of the action of the overload switch, and upon release of switch 1 the switch S is again placed under control of the overload switch.

In practice the switch S, the overload switch OL and the resistor R are preferably built in unit form or at least assembled in a close relationship for concentration of the maintaining connections of switch S and consequent minimization of danger of these connections being hit and damaged in battle. As will appear, the connection between the winding of switch S and the remote control switch 1 may be completely shot away without affecting the switch S if at that instant it is energized for completion of the motor circuit. Under such conditions the switch S would remain energized to keep the motor in action pending response of the overload switch.

The control switch 1 through operation to engage its contacts 3 provides for deenergization of

switch S at will. Contacts 3 of switch 1 complete a ground connection G² diverting current from the winding S² of switch S to ground.

If it be desired to provide for indication of the position of the contacts of switch S the controller enables such provision to be easily made. Thus as shown a coil 6 for a suitable indicator may be connected between the pivot of switch 1 and ground connection G² whereby its circuit will be completed by operation of switch 1 to energize switch S and whereby it will be short circuited by operation of switch 1 to deenergize switch S. Also the means described for maintaining the circuit of switch S will maintain the circuit of coil 6.

It will be noted that when the switch S is deenergized by the overload switch the switch S will remain deenergized pending operation of the pilot switch 1 to engage its contacts 2.

What we claim as new and desire to secure by Letters Patent is:

1. In combination, a translating circuit, a normally open switch in said circuit, said switch having a winding by energization of which it is closed, a normally closed switch responsive to an overload condition of said translating circuit, a circuit for said winding of the first mentioned switch extending through said normally closed switch, and means to afford said winding control at will from a remote point and optionally to render continued energization of said winding dependent upon said overload responsive switch or independent thereof at any time.

2. In combination, a translating circuit, a normally open switch in said circuit, said switch having a winding by energization of which it is closed, a normally closed switch responsive to an overload condition of said translating circuit, a circuit for said winding of the first mentioned switch extending through said normally closed switch, and means to afford said winding control at will from a remote point, said means to afford energization of said winding requiring operation in a given manner under all conditions and thereupon being releasable to render continued energization of said winding dependent upon said overload responsive switch or alternatively being restrainable to render continued energization of said winding independent of said overload responsive switch.

3. In combination, a translating circuit, a normally open switch in said circuit, said switch having a winding by energization of which it is closed, a switch responsive to an abnormal electrical condition in said translating circuit, a pilot switch, energizing connections for said switch winding controlled by said pilot switch alone and a maintaining circuit for said switch winding comprising a connection between one terminal of said switch winding and one side of said translating circuit at a point in the latter between the first recited switch and the translating device of said translating circuit, said connection including a resistor and contacts of said switch responsive to an abnormal condition.

4. In combination, a translating device having a ground connection, a switch to establish a bus connection for said translating device, said switch having an electroresponsive winding to effect its closing operation and said winding having a ground connection, a pilot switch to establish a bus connection for said winding, a switch responsive to an overload condition of said translating device and a maintaining circuit extending from said winding to the first recited switch for bus connection therethrough in common with the bus connection of said translating device, said maintaining circuit including a resistor and contacts of said overload responsive switch.

5. In combination, a translating device having a ground connection, a switch to establish a bus connection for said translating device, said switch having an electroresponsive winding to effect its closing operation and said winding having for one terminal thereof a ground connection, remote control means for said winding optionally to establish a bus connection or a ground connection for the opposite terminal of said winding, a switch responsive to an overload condition of said translating device and a maintaining circuit extending from said winding to the first recited switch for bus connection therethrough in common with the bus connection of said translating device, said maintaining circuit including a resistor and contacts of said overload responsive switch.

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