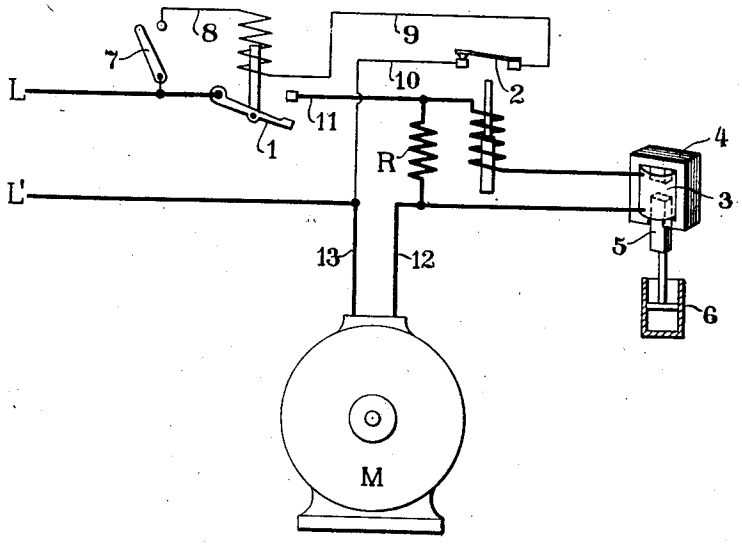
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OVERLOAD PROTECTIVE DEVICE.

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1,199,936.

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Witnesses-

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OVERLOAD PROTECTIVE DEVICE.

1,199,936. Specification of Letters Patent. Patented Oct. 3, 1916.

Application filed December 26, 1913. Serial No. 808,843.

To all whom it may concern:

Be it known that I, ARTHUR SIMON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Overload Protective Devices, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to improvements in overload protective devices and is particularly applicable to those employed in connection with electric motors.

The invention has among its objects to provide simple and efficient overload protective means which will be responsive at one current value upon initial closure of the controlled circuit and at another current value after a temporary period, sufficient for example to permit starting of an electric motor.

A further object is to provide means of the aforesaid character which may be readily arranged to respond at one current value upon initial closure of circuit and after the lapse of a temporary period only respond at a predetermined higher current value.

Various other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates the preferred embodiment of the invention as applied to an alternating current motor. It should be understood, however, that various modifications may be made in the controller illustrated without departing from the scope of the appended claims and that certain features of the invention are applicable as well to D. C. motors.

Referring more specifically to the drawing, the same illustrates a conventional type of single phase motor M provided with an electro-responsive main line switch 1, and an overload switch 2 responsive to deënergize switch 1. The overload switch has its winding connected in series with the motor and is responsive subject to the effect of the means which will now be described. This means includes a variable inductance device 3 in series with the overload winding and a resistance R in shunt with said overload winding and said variable inductance device. The variable inductance device may in practice assume various different forms. As illustrated, it comprises a solenoid having a laminated frame 4 and plunger 5 and, as will be understood, the inductance of this solenoid varies with the position of its plunger. When the plunger 5 is in down position the inductance is at its minimum and is gradually increased as the plunger is attracted.

It will thus be observed that with the aforesaid arrangement the shunt resistance R diverts from the overload winding and solenoid coil a portion of the motor current; that the effectiveness of the resistance shunt is at its minimum upon initial closure of circuit and that the effectiveness of said resistance shunt is increased as the solenoid 3 draws in its plunger to increase the inductance of the shunted circuit. In other words, the percentage of the total motor current shunted from the overload coil by the resistance R increases as the inductance of the solenoid 3 increases following the closure of the controlled circuit. Thus, with the overload set to respond at definite current values it will be more sensitive to increases in the motor current upon initial closure of circuit than after operation of the solenoid 3. Accordingly by proper design and adjustment of the parts described, the overload switch may be rendered sensitive to any predetermined current value for starting and thereafter automatically rendered less sensitive to permit a predetermined increase in current for running.

If desired, an increased time interval for the aforesaid automatic readjustment of the overload may be obtained in various ways, as, for example, by the dash-pot 6 shown as attached to the plunger 5 to retard its attraction.

The circuit arrangement illustrated is as follows: The winding of switch 1 is controlled by a suitable switch 7 which when closed completes circuit from line L by conductor 8 through said winding, by conduc-

tor 9 through the overload switch, by conductor 10 to line L'. Switch 1 when closed completes circuit from line L by conductor 11, thence dividingly through resistance R on the one hand and overload winding 2 and solenoid winding 3 on the other hand, by conductor 12 through the motor, by conductor 13 to line L'. With such connections it will be observed that switch 1 controls the continuity of the motor circuit and that overload switch 2 upon responding deënergizes switch 1 to disconnect the motor from circuit.

Controllers affording the protection above set forth may be very advantageously used in numerous instances, as, for example, in connection with motors starting under light loads. On the other hand, it is often desirable to provide for just the reverse conditions, namely, a greater current for starting than for running and in such instances the desired protection may be readily obtained by a slightly different use of the means illustrated. For example, it may be readily obtained by holding the plunger 5 of solenoid 3 in raised position upon initial closure of the motor circuit and thereafter withdrawing the same from the solenoid winding. Under such conditions the inductance would be at its maximum upon initial closure of circuit, thereby giving the overload its maximum range, whereas the withdrawal of the plunger would decrease the reluctance, thereby decreasing the range of said overload. Such an operation of the solenoid plunger might obviously be effected in various different ways and either manually or automatically with or without a definite time element.

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

1. In combination, a load circuit, an overload protective device therefor responsive at a predetermined value of the load current upon initial closure of said circuit, and means thereafter operating automatically to reduce the sensitiveness of said device to increases in the load current.

2. In combination, a load circuit, an overload protective device therefor responsive at a predetermined value of the load current upon initial closure of said circuit, and means thereafter operating automatically to reduce the sensitiveness of said device to increases in the load current, said means having a definite time element.

3. In combination, a load circuit, an overload protective device therefor having its winding subjected to a certain percentage of the load current upon initial closure of circuit, and means thereafter reducing the percentage of the load current traversing the winding of said overload device.

4. In combination, a load circuit, an overload protective device therefor having an operating winding, and means associated with said winding to subject the same to different percentages of the load current, said means automatically operating after closure of said load circuit to reduce the percentage of load current traversing said winding.

5. In combination, a load circuit, an overload protective device therefor having an operating winding subjected to a definite percentage of the load current upon initial closure of said load circuit, and means automatically effecting a reduction in the percentage of load current traversing said winding after a temporary period.

6. In combination, a load circuit, an overload protective device therefor having an operating winding subjected to a definite percentage of the load current upon initial closure of said load circuit, and means automatically effecting a reduction in the percentage of load current traversing said winding after a temporary period, said means having a definite time element.

7. In combination, a load circuit, an overload protective device therefor having a winding in series in said load circuit, a shunt around said winding, and means operating after closure of said load circuit to increase the effectiveness of said shunt.

8. In combination, an alternating current load circuit, an overload protective device therefor having a winding in series in said load circuit, a shunt around said winding, and means operating after closure of said load circuit to increase the effectiveness of said shunt, said means including a variable inductance device.

9. In combination, an alternating current load circuit, an overload protective device therefor having a winding connected therein, an inductance device in series with said overload winding and having an adjustable part to vary its effectiveness and a shunt around said overload winding and said inductance device.

10. In combination, an alternating current load circuit, an overload protective device therefor having a winding connected therein, an inductance device in series with said overload winding, said inductance device having an adjustable part to vary its effectiveness with means to adjust said part automatically and a shunt around said overload winding and said inductance device.

11. In combination, a load circuit, an overload protective device therefor having a winding connected therein, automatic means in series with said winding to vary the flow of current therethrough, within a definite time after closure of said load circuit and a shunt around said winding and said means.

12. In combination, a load circuit, an overload protective device therefor having a

winding connected therein, automatic means in series with said winding to vary the flow of current therethrough, and a shunt around said winding and said means, said means operating automatically upon closure of said load circuit and having means retarding its operation to give a definite time element.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

ARTHUR SIMON.

Witnesses:
F. H. HUBBARD,
H. WATSON.