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F. H. OBERSCHMIDT

CONTROLLER FOR ELECTRIC MOTORS

Filed Sept. 28, 1922

Fig. 1.

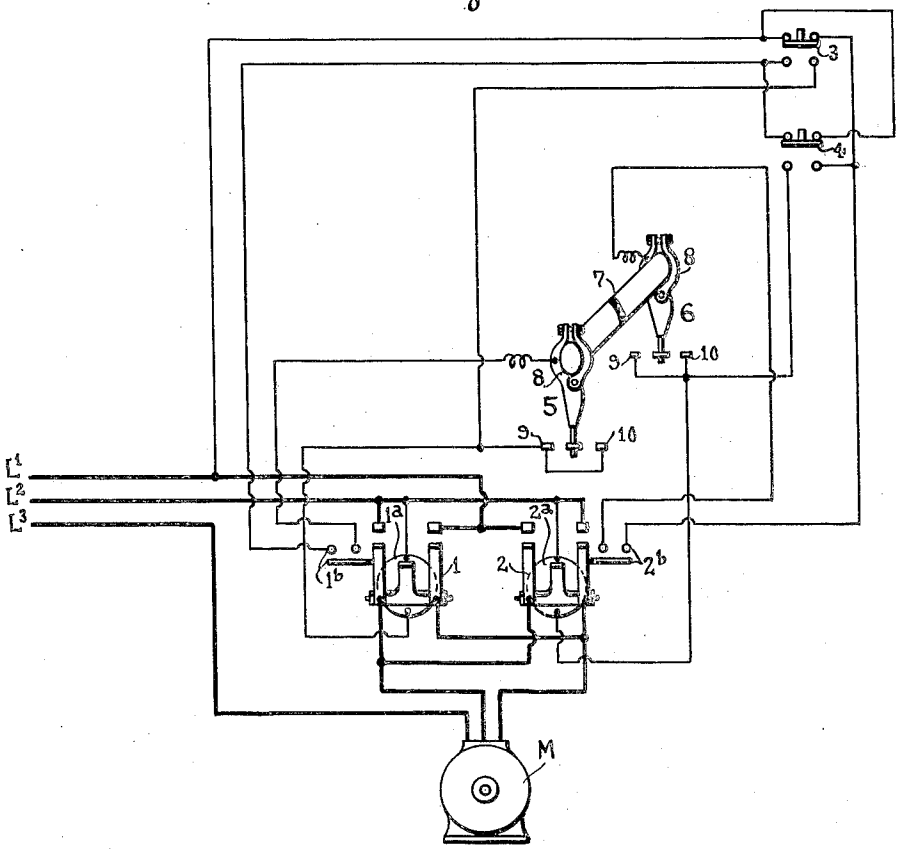
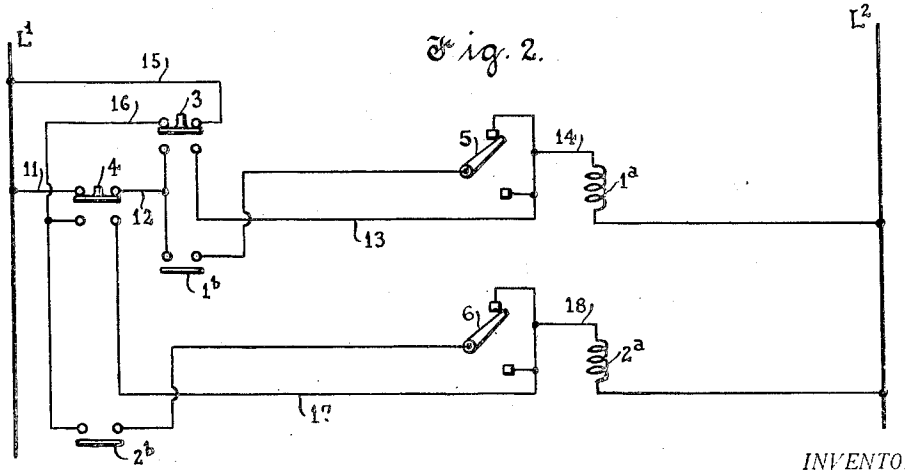


Fig. 2.



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FREDERICK H. OBERSCHMIDT, OF CLEVELAND, OHIO, ASSIGNOR TO THE CUTLER-HAMMER MFG. CO., OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

CONTROLLER FOR ELECTRIC MOTORS.

Application filed September 28, 1922. Serial No. 591,081.

To all whom it may concern:

Be it known that I, FREDERICK H. OBERSCHMIDT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Controllers for Electric Motors, 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 controllers for electric motors.

In practice there are numerous instances where electric motors are employed to drive machinery, such as tire machinery, requiring frequent reversals and quick stopping at will or incidental to reversals and the present invention has among its objects to provide a simple, convenient and reliable controller whereby such machinery may be so controlled.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates a preferred embodiment of the invention and the same will now be described it being understood that the embodiment illustrated is susceptible of various modifications falling within the scope of the appended claims.

In the drawing,

Figure 1 is a diagrammatic view of the controller and its controlled motor; and

Fig. 2 is a simplified diagrammatic view of the controller alone.

Referring to Fig. 1 the same illustrates a controller for a squirrel cage motor M, said controller including electromagnetic switches 1 and 2 to control the continuity of the motor circuit and to effect reversals of said motor under the control of push button switches 3 and 4. The switches 1 and 2 are respectively provided with operating windings 1^a and 2^a and with auxiliary contacts 1^b and 2^b respectively to complete maintaining circuits for said windings.

The push button switches 3 and 4 are respectively provided with two sets of stationary contacts to be bridged alternatively. The switches 3 and 4 when depressed respectively provide for energization of switches 1 and 2 through the down contacts of the former switches. On the other hand the up contacts of switches 3 and 4 are included in the maintaining circuits of switches 2 and 1 respectively whereby depression of switch 3 tends to de-energize switch 2 whereas depression of switch 4 tends to de-energize switch 1 as will be apparent from the simplified diagram Fig. 2.

Further the controller includes switches 5 and 6 to be also included in the maintaining circuits of switches 1 and 2 respectively. Switches 5 and 6 comprise contact arms oscillatably mounted on a shaft 7 but frictionally engaged therewith by clamps 8 or other preferred means whereby each of said arms may be oscillated by said shaft for engagement with stationary contacts 9 and 10 selectively, said contacts serving as stops for said arms to arrest the same independently of said shaft. The shaft 7 may comprise an extension of the motor shaft or a separate shaft operatively connected to the motor or to a reversing part of the driven machine whereby the arms of switches 5 and 6 will be engaged with their stationary contacts alternately upon successive reversals of the motor and driven machine.

The reversing switches 1 and 2 are employed to plug the motor M for stopping and the switches 5 and 6 are provided to maintain such switches energized when so employed until the motor is brought to rest. As aforestated the switches 5 and 6 are in circuit with the windings of switches 1 and 2 respectively and as will be understood both switches 5 and 6 are closed throughout operation of the motor in either direction and function to maintain the plugging switch energized until the motor is brought to a standstill and then tends to rotate in a reverse direction whereupon the switches 5 and 6 are immediately shifted to de-energize the plugging switch 1 or 2 as the case may be.

Referring now to Fig. 2 which shows in simplified form the same circuit connections as Fig. 1 depression of push button switch 3 completes the circuit of winding 1^a of switch 1, said circuit extending from line L′ by conductor 11 through upper contacts of switch 4 by conductor 12 through lower contacts of switch 3 by conductors 13 and 14 through winding 1^a to line L^2. On the other hand depression of switch 4 completes the circuit of winding 2^a of switch 2, said circuit extending from line L′ by conductor 15 through the upper contacts of switch 3 by conductor 16 through the lower contacts of

switch 4 by conductors 17 and 18 through winding 2^a to line L^2. Thus operation of the push button switches 3 and 4 selectively provides for energization of switches 1 and 2 selectively as aforestated.

Switch 1 upon closing engages its auxiliary contacts 1^b and immediately upon starting of the motor switch 5 closes whereupon the lower contacts of push button switch 3 are shunted by a circuit extending through contacts 1^b and switch 5 in series so that switch 3 may be released. Accordingly assuming energization of switch 1 for plugging following energization and de-energization of switch 2 it will be observed that switch 1 will be maintained energized until the torque of the motor is reversed whereupon the arm of switch 5 will be shifted to momentarily interrupt circuit for de-energization of switch 1. Thereupon assuming switch 2 to be open the motor is rendered idle. On the other hand assuming retention of switch 3 until after reclosure of switch 5 the switch 1 will be maintained energized for continued reverse operation of the motor. More specifically the switch 1 will be maintained energized until push button switch 4 is depressed to interrupt the circuit including contacts 1^b and switch 5.

Such depression of switch 4 to de-energize switch 1 also energizes switch 2 as aforedescribed and if switch 4 is then released switch 2 will bring the motor to rest after which it will be de-energized by switch 6 in the same manner that switch 1 is de-energized by switch 5. If on the other hand switch 4 is held depressed until switch 6 is reclosed the motor will continue to operate in a reverse direction pending depression of switch 3 either to stop the motor or again reverse the latter. The maintaining circuit of switch 2 as will be apparent extends through the upper contacts of switch 3, contacts 2^b and switch 6 in series whereby the control of winding 2^a is in all respects similar to the control of winding 1^a.

Manifestly if it be desired to stop the motor when operating in either direction without plugging said motor this may be accomplished by depressing the proper push button switch to its intermediate position out of contact with all stationary contacts. The depressed switch then merely de-energizes the reversing switch last closed thus permitting the motor to drift until it comes to rest.

It will thus be apparent that the very simple apparatus described affords very flexible and convenient control starting, reversing and stopping requiring use of only two push button switches. Moreover inasmuch as plugging effects quick stopping of the motor the push button switches only require retention in their depressed positions for very brief periods to effect reversals of the motor.

The power circuits for the motor are shown in heavy lines, Fig. 1, and being well known and obvious will not be described herein. As will be apparent other types of motors may be substitued for that illustrated and the power connections may be varied as desired. Also as will be apparent provision may be made for affording speed control of the motor if desired.

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

1. In a motor controller in combination manually operable contacts and means controlled thereby to establish reversing circuit connections for the controlled motor for plugging and running in either direction, said means including means operable automatically to arrest the motor following plugging, and said contacts when operated to effect plugging being releasable to permit operation of said arresting means and being restrainable in plugging relation to render said arresting means ineffective.

2. In a motor controller in combination means to establish reversing circuit connections for the controlled motor for plugging and running in either direction, said means including means tending to arrest the motor following plugging thereof and selectively operable switches controlling said means to effect reversals at will, each of said switches being operable to render the second mentioned means effective or ineffective at will.

3. In a motor controller in combination means to establish reversing circuit connections for the controlled motor for plugging and running in either direction, said means including means tending to arrest the motor following plugging thereof and selectively operable switches controlling said means to effect reversals at will either subject to or independent of the influence of said stopping means, said switches being of the push button type.

4. In a motor controller in combination means to establish reversing circuit connections for the controlled motor for plugging and running in either direction, said means including means tending to arrest the motor following plugging thereof and selectively operable switches controlling said means to effect reversals at will either subject to or independent of the influence of said stopping means, said switches being of the push button type, and being also selectively operable to stop the motor at will independently of the aforesaid stopping means.

5. In a motor controller in combination electro-responsive reversing switches for the controlled motor to effect plugging and reverse operations thereof, means associated with said switches to de-energize each following plugging thereby and push button operated switches to be depressed to energize said reversing switches respectively and to be maintained depressed temporarily to

defeat the aforementioned action of said means.

6. In a motor controller in combination electro-responsive reversing switches for the controlled motor to effect plugging and reverse operations thereof, means associated with said switches to de-energize each following plugging thereby push button operated switches to be depressed to energize said reversing switches respectively and circuit connections whereby each of said push button switches when depressed to energize its respective reversing switch further de-energizes the other of said reversing switches and whereby the aforementioned action of said means may be defeated by maintaining the selected push button switch depressed for a given period.

7. In a motor controller in combination electro-responsive reversing switches, push button operated switches to be depressed selectively to energize said reversing switches selectively, circuit connections whereby each reversing switch upon responding completes for itself a maintaining circuit independent of the push button switch operated to energize the same but dependent upon given positioning of the other push button switch and other switches respectively connected in said maintaining circuits, the latter switches being shiftable by the motor upon reversals thereof to first open and then reclose such maintaining circuits.

In witness whereof, I have hereunto subscribed my name.

FREDERICK H. OBERSCHMIDT.