W. SCHWIEDER.

ELECTRIC CONTROLLER.

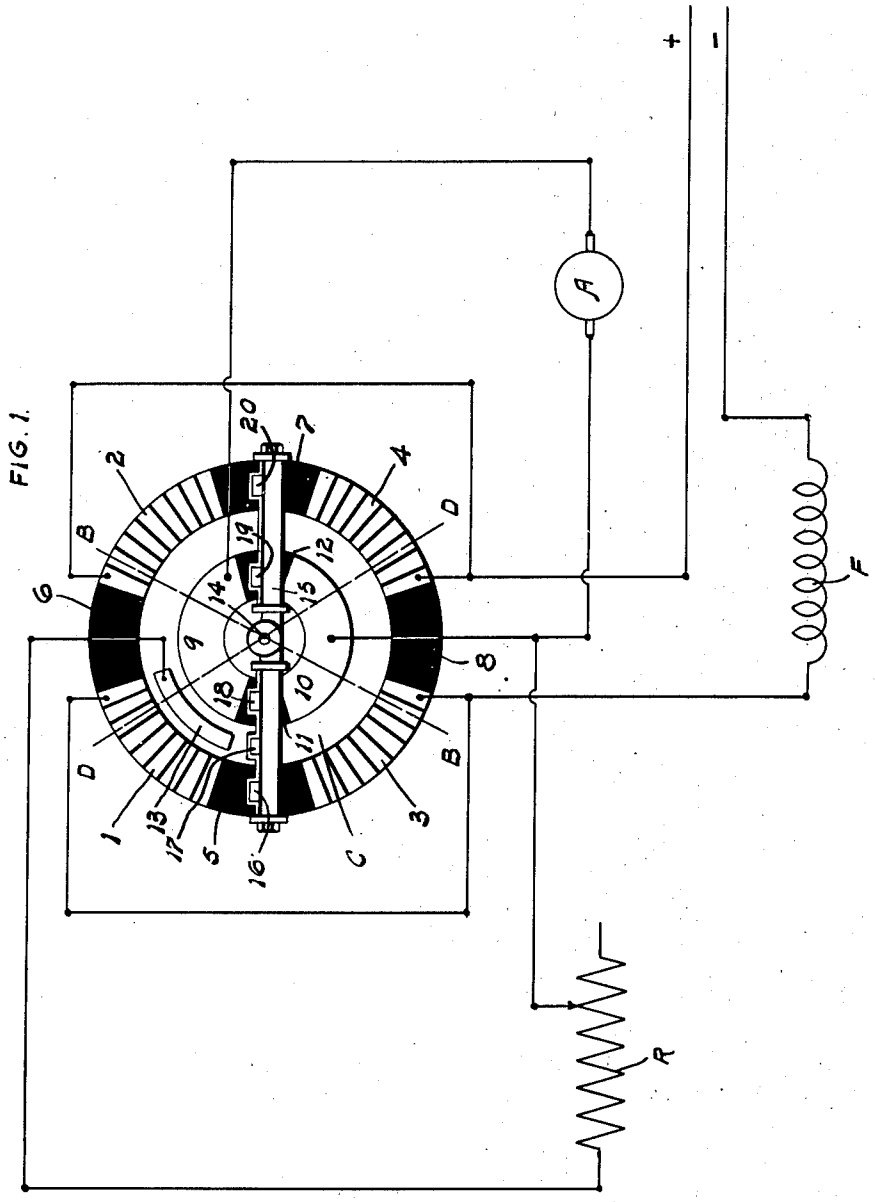
APPLICATION FILED MAR. 27, 1911.

1,027,072.

Patented May 21, 1912.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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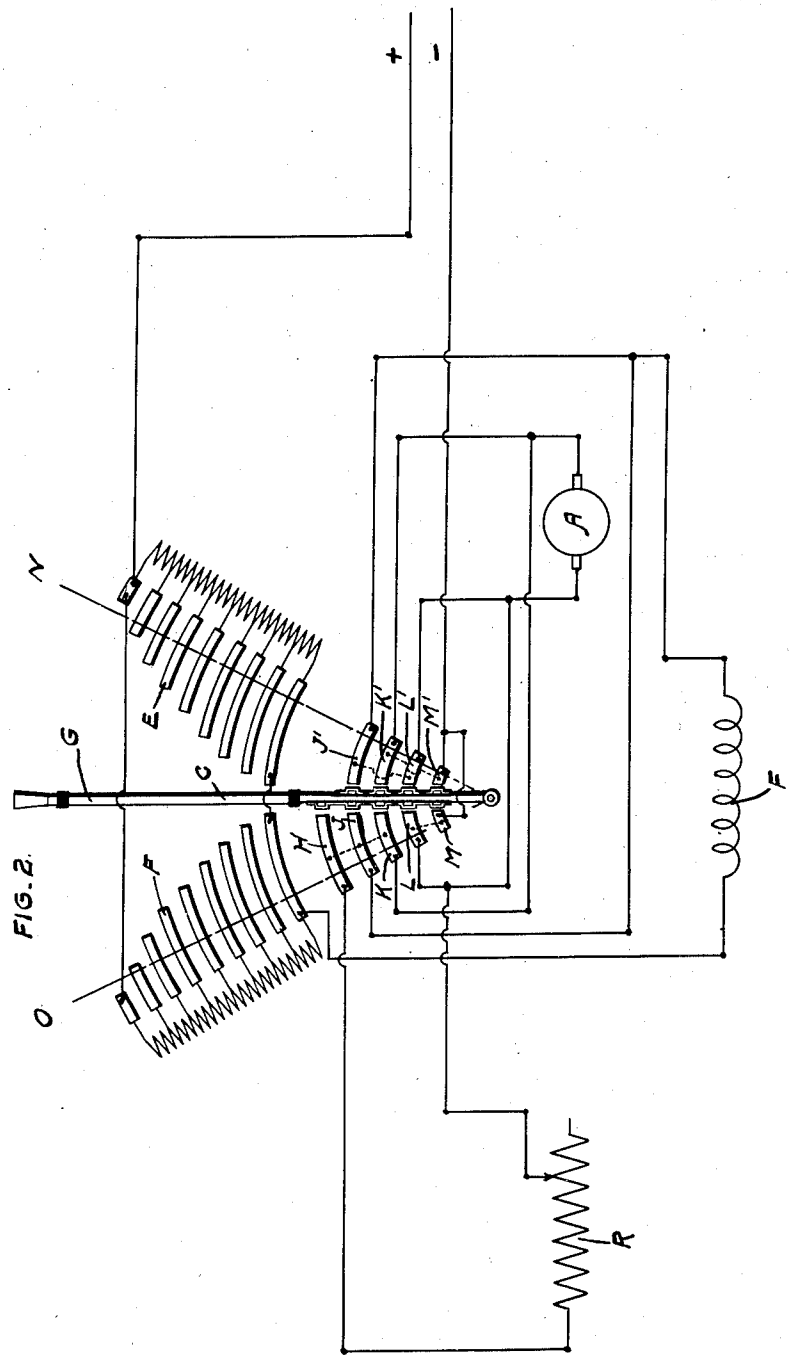

FIG. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM SCHWIEDER, OF GRANITE CITY, ILLINOIS, ASSIGNOR TO COMMONWEALTH STEEL COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION OF NEW JERSEY.

ELECTRIC CONTROLLER.

1,027,072. Specification of Letters Patent. Patented May 21, 1912.

Application filed March 27, 1911. Serial No. 617,091.

To all whom it may concern:

Be it known that I, WILLIAM SCHWIEDER, a citizen of the United States, residing at Granite City, county of St. Clair, and State of Illinois, have invented a certain new and useful Improvement in Electric Controllers, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings forming part of this specification.

My invention relates to electric controllers, and is especially adapted for use in connection with electric motors, which are to be employed in hoisting material as on cranes, derricks and similar devices.

It has been the experience of crane operators that when the electric motor is reversed to lower the load, and especially when the load approaches the capacity of the crane, that the motor is likely to race and be converted into a generator, in which case the load is not under control, and damage to the parts of the crane often results.

It is the object of my invention to provide a simple means in the form of a resistance to be thrown in shunt with the armature of the motor at the time that the current in the armature is reversed to lower the load. This resistance acts immediately as a choke upon any current generated by the motor if it has any tendency to act as a generator.

Figure 1 is a diagrammatic view of my improved controlling device. Fig. 2 is a diagrammatic view of the same form of control as used with an ordinary rotary controller mechanism.

Referring to the drawings, in Fig. 1, C represents generally the controller, A the armature, F the field of the motor and R the resistance which is variable. The motor is of the series type in which the current passing through the armature also passes through the field.

The control is provided with four segments designated 1, 2, 3 and 4, each segment being provided with a series of steps being insulated from each other, and connected through the usual resistance coils. These segments are insulated from each other by means of blocks of insulating material as at 5, 6, 7 and 8.

When the circle of the outer segments of the controller 1, 2, 3 and 4 is mounted a pair of segments 9 and 10 which are insulated from each other through blocks 11 and 12. Intermediate the segment 1 and block 9 is a sectional contact piece 13.

Pivoted at the point 14 in the center of the segments is the contact arm 15 provided with three brushes 16, 17 and 18 on one side of the pivot point 14, and two brushes 19 and 20 on the opposite side. Brushes 16 and 20 are positioned to pass over the outer series of segments 1, 2, 3 and 4, and brushes 18 and 19 are positioned to pass over the inner segments 9 and 10, and brush 17 is positioned to pass over the contact block 13. The contact arm 15 is provided with insulation material about the pivot 14, so that the arm on either side of the pivot acts as separate conductors.

The positive lead from the line is connected with one of the steps of the segment 4 and also with an oppositely arranged step of the segment 2. The negative lead is connected to one side of the field of the motor and the opposite side of the field is connected to one of the steps of the segment 3, and also of an opposite step of the segment 1. The armature is connected on one side to the segment 9, and on the other side to the segment 10. The resistance R which is variable is connected to the lead from the armature to the segment 10 and is also connected to the contact block 13.

With the contact arm 15 in the position shown in Fig. 1 there is no current going through the circuit, but if this arm is moved into the dotted line position B—B the current passing from the positive lead goes through the segments 2 and the contact arm 15 to the segment 9, thence out to the armature brush through the armature to the segment 10, thence through the contact arm 15 to the segment 3 out through the field and to the negative lead of the line. This is the arrangement when the motor is acting to raise the load, and of course, the amount of current passing through the circuit is controlled by means of the position of the contact arm 15.

If the contact arm 15 be moved into dotted line position D—D the current flows from the positive lead to the segments 4 through the contact arm 15 to the segment 10 out through the armature in the opposite direction to the current flow in the arrangement formerly described back to the seg-

ment 9, thence to the segment 1 through the field and back to the negative lead from the line. The current also flows from the segment 9 through the contact arm 15 to the contact block 13, thence through the resistance R and back to the lead to the armature. By this means the resistance R, the amount of which may be controlled, is thrown directly across as a shunt to the armature. This arrangement is to be used when the load is being lowered, and the armature is rotated in an opposite direction to that when the load is raised. If, therefore, the load is great enough to cause the armature to race during the lowering thereof, the current produced in the armature, which then acts as a generator and flowing in an opposite direction to the line current, will be shunted directly on the resistance R and choked, and the effect due to the racing of the armature overcome.

Referring to Fig. 2 I have shown a similar electric circuit as above described, but have illustrated it as used in connection with the ordinary rotary electric controller.

A indicates the armature, F the field, R the variable resistance and C generally the controller of the system. The controller for the purpose of clear illustration has been diagrammatically shown, although it is applicant's purpose to make use of the well known form of rotary controller, simply modifying the contact segments applied thereto for the purpose of his invention.

Segments E and F of varying lengths on opposite sides of the contact arm G are connected through resistance coils in the ordinary manner. The lower and upper segments of E and F are cross connected respectively. On either side of the contact arm G are arranged opposite segments J, J', K, K', L, L', M and M'. There is an additional segment H on the same side of contact arm C, as the segment F. On the contact arm are brushes arranged so that segments H, J and K can be connected, and also L and M on one side of the contact arm as illustrated in the dotted line in Fig. 2. On the opposite side the brushes are arranged to connect segments J' and L' respectively and K' and M'. Segments M and M' are also cross connected. As illustrated in this figure the positive lead from the line is connected to the upper end of the segments E. The field is connected on one side to the lower of the segments F and on the other side to segment J'. The resistance is connected on one side to the segment H, and on the opposite side to segment L. The armature is connected on one side to the segment L and on the other side to the segment K'. The lead from the segment L to the armature is also connected to the segment L', and the lead from the armature to the segment K' is also connected to segment K. Proper insulation is provided to disconnect the upper part of the contact rod C from the lower, upon which the brushes acting in conjunction with the segments H, J, K, L, M, J', K', L' and M' are mounted.

It should be noted also that the arrangement of brushes for connecting H, J and K is insulated from the arrangement of brushes connecting L and M. Also that the brushes connecting J' and L' are disconnected and insulated from the brushes connecting K' and M'.

With the contact arm G in the position shown in Fig. 2 the circuit is disconnected. If the arm be positioned in the dotted line position N, the current passes from the positive lead to the resistance segments E, thence from the bottom segment E to the bottom segment F through the field, back to the segment J', and then to segment L' through the armature back to the segment K' to the segment M', and back through to the negative lead of the line, which is the ordinary arrangement when the motor is acting to raise the load. If now the contact arm G be moved to the dotted line position O the current passes from the positive lead through the upper segment E over to the segments F then through the field to segment J where the current is divided, part of it going to segment H and the other part to segment K. That part going to segment K goes to the armature brush and passes a current through the armature in an opposite direction to that of the arrangement formerly described, thence to segment L, back to segment M and to the negative lead of the line.

The portion of the current which passes from the segment J to segment H goes through the variable resistance R and back to the segment L, thus forming a shunt across the armature. The action of the circuit is the same as in the arrangement described in connection with Fig. 1, and that is as the current is reversed in the armature to lower the load, the resistance R is thrown in shunt across the armature, and any tendency to race on the part of the armature and thereby generate a current, is prevented by the choking action of the resistance.

With the arrangement shown in Fig. 2 it is only necessary to use on the ordinary rotary controller, three additional and insulated segmental castings to form the connected segments H, J, and K in one member, L, M, M' and K' in another, and J' and L' in a third, which segments are to coöperate with the usual brushes.

I am aware that minor changes in the form and construction of my improved device may be made and substituted for those herein shown and described without depart-

ing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. In a circuit controlling system, a series motor comprising an armature and field, a controller having two sets of segments, electrical connections between the armature and one set of segments, an additional contact segment, a variable resistance connected to said additional segment, and to one of the armature connections, and a contact arm for the controller, adapted to pass over and electrically connect the segments to reverse the current in the armature, and simultaneously throw in the variable resistance as a shunt on the armature.

2. The combination with a series motor comprising an armature and field, of a controller for the motor, which controller comprises two sets of segments, one arranged within the other, the inner set of segments being electrically connected to the armature of the motor, a contact segment between the inner and outer sets of segments, a variable resistance connected to said contact segment and also connected to one of the armature connections, an arm fulcrumed within the inner set of segments and adapted to swing over the faces of all of the segments and brushes carried by said arm adapted to contact with the various segments so as to reverse the current in the armature and simultaneously throw in the variable resistance as a shunt on the armature.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this 18th day of March, 1911.

WILLIAM SCHWIEDER.

Witnesses:

HAL C. BELLVILLE,

C. T. WESTLAKE.