No. 777,637. PATENTED DEC. 13, 1904.

C. H. KEENEY & C. A. RHINE.

RHEOSTAT.

APPLICATION FILED FEB. 29, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

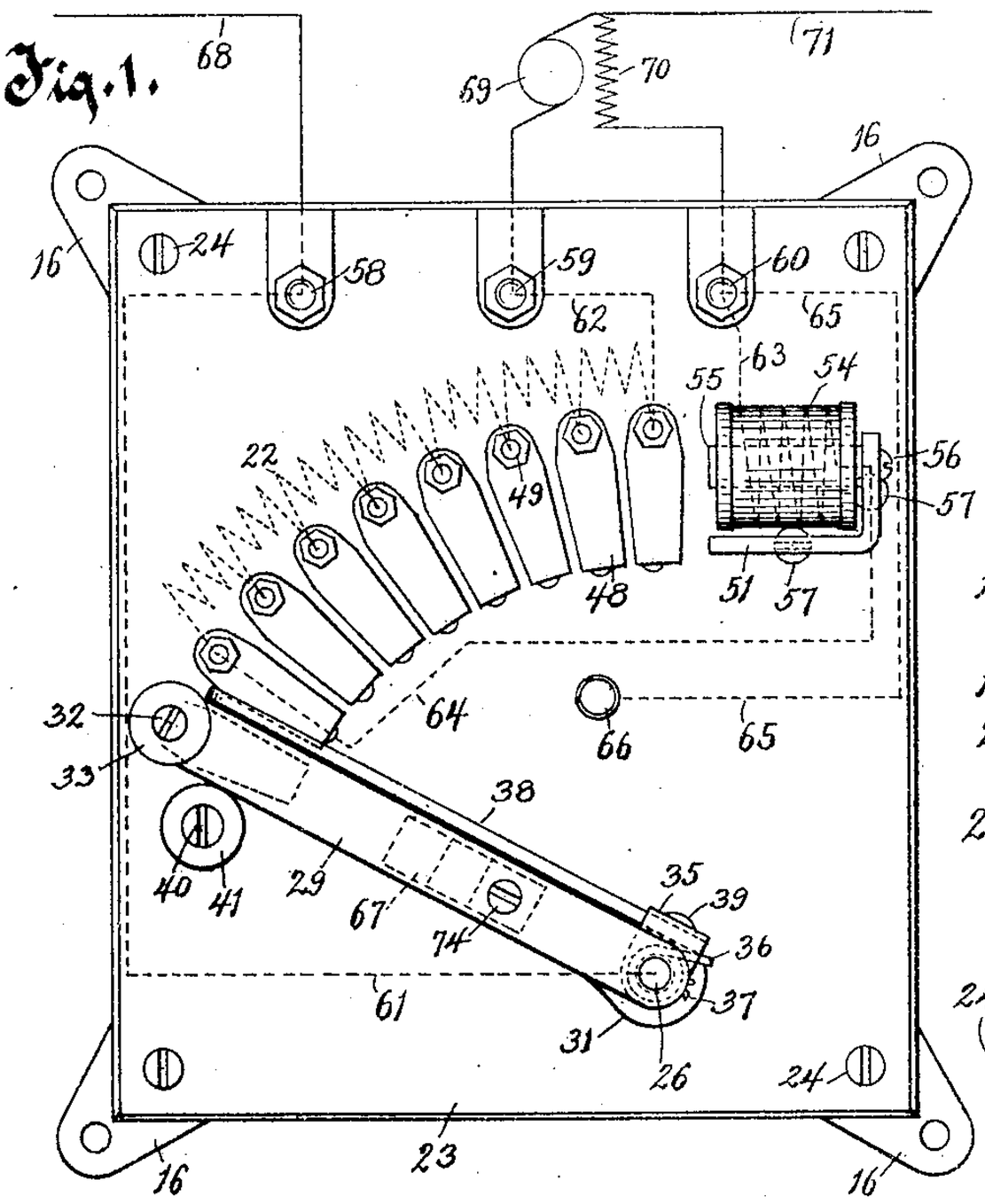


Fig. 2.

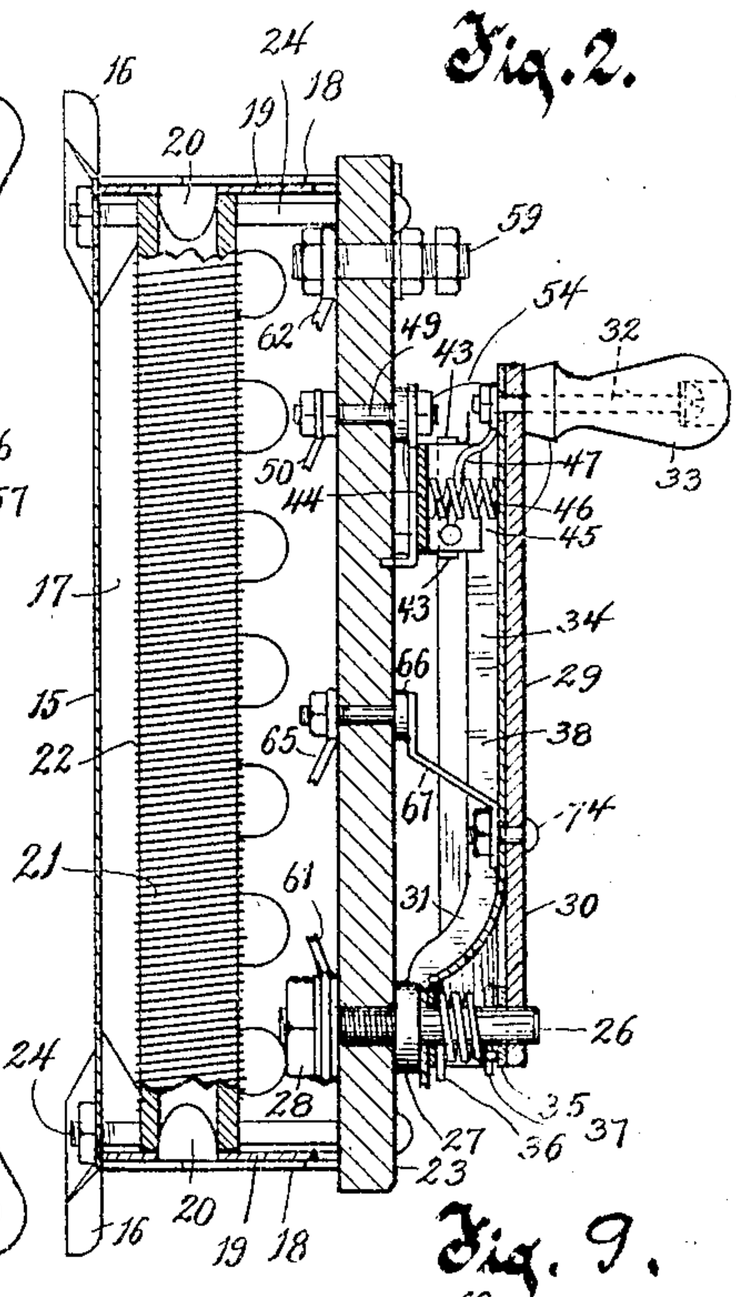


Fig. 3.

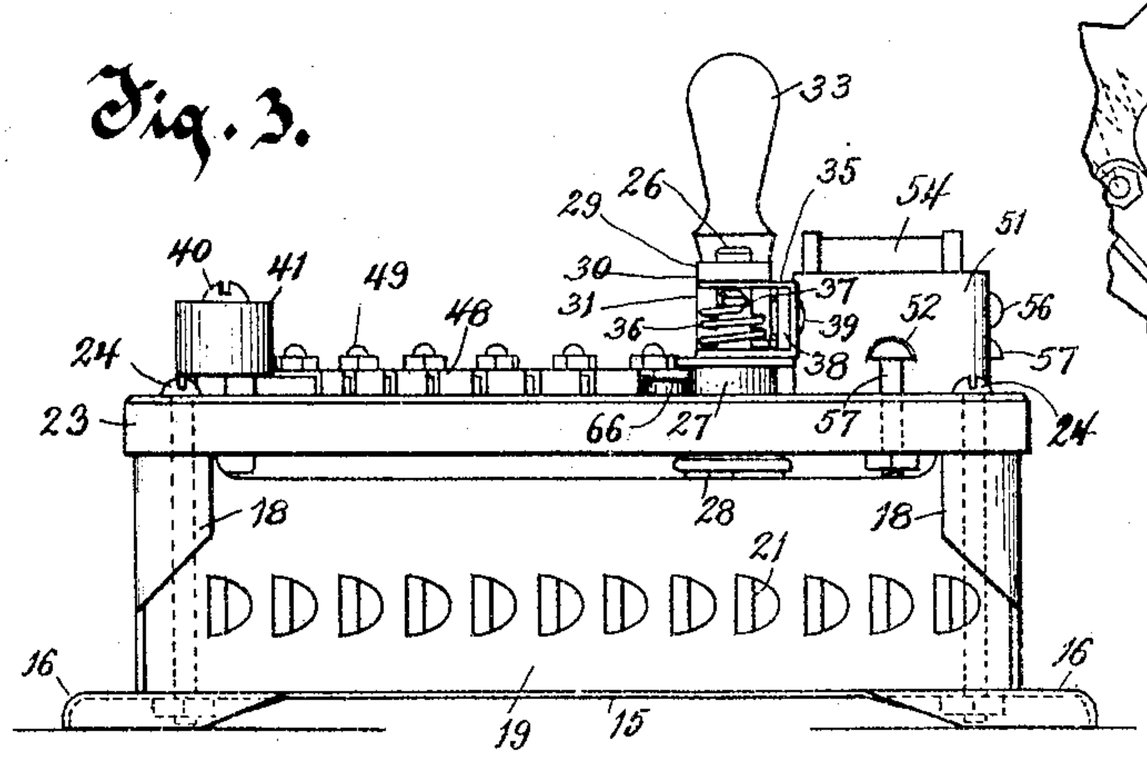


Fig. 9.

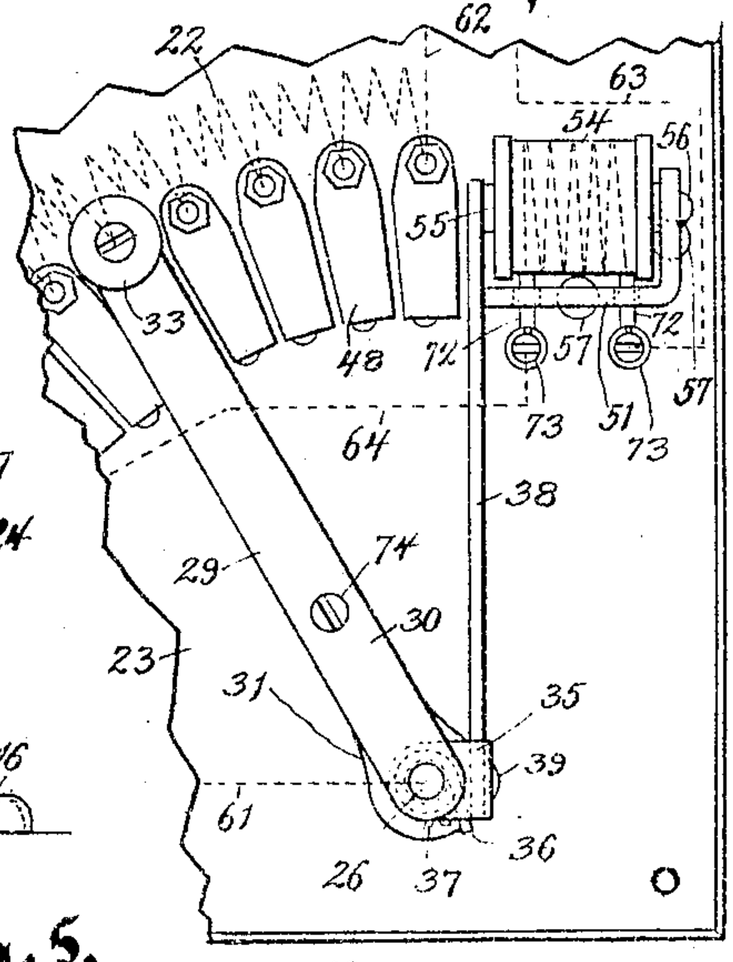


Fig. 4.

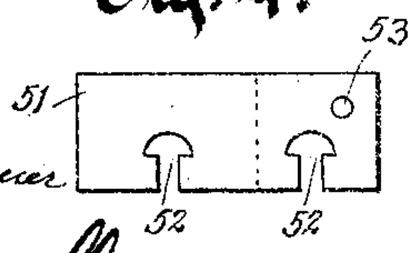
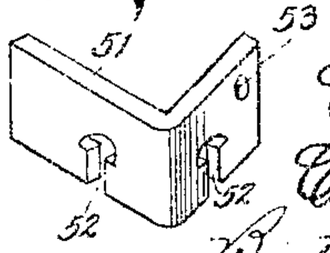


Fig. 5.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

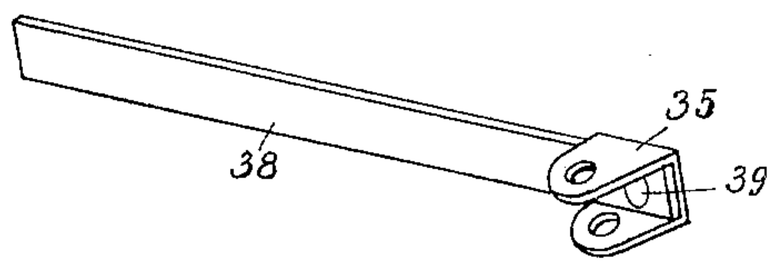


Fig. 7.

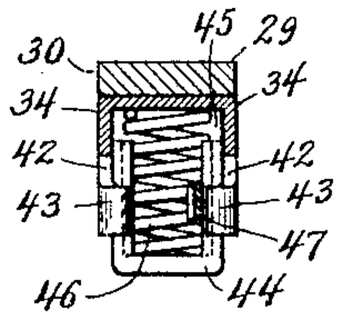
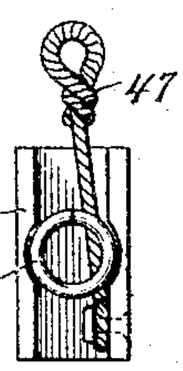


Fig. 8.



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No. 777,637. Patented December 13, 1904.

UNITED STATES PATENT OFFICE.

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RHEOSTAT.

SPECIFICATION forming part of Letters Patent No. 777,637, dated December 13, 1904.

Application filed February 29, 1904. Serial No. 195,805. (No model.)

To all whom it may concern:

Be it known that we, CHARLES H. KEENEY and CHARLES A. RHINE, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Rheostats, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

This invention relates to certain new and useful improvements in rheostats, and broadly has for its object to provide novel features of construction, arrangement, and operation applicable to motor-starters and speed-controllers.

A particular object of this invention is to provide a novel means for automatically opening a switch controlling a motor when the current supplied to the motor or a part thereof ceases entirely or is reduced to less than normal.

Another object of this invention is to accomplish such an operation by an actuating means for the switch-lever which is independent of said switch-lever and is controlled by a magnet in the motor-circuit.

Another object of this invention is to prevent a resistance-controlling lever of a motor-starter being left in an intermediate position, while permitting it to stand in its extreme or "on" position.

A further object of this invention is to provide a resistance-controlling lever of a motor-starter and an independent spring-actuated means to stand in the path of the controlling-lever when being moved to its on position, such spring-actuating means serving to return the controlling-lever to its original position if released at an intermediate position, and a magnet to hold the spring-actuating means when the operating-lever reaches its extreme or on position, and a means for short-circuiting the magnet to release the spring-actuating means when the controlling-lever is moved out of its on position.

With the above and other objects in view the invention consists in the parts and their equivalents, as hereinafter set forth.

Referring to the accompanying drawings, in which like characters of reference indicate the same parts in the several views, Figure 1 is a front elevation of a motor-starter embodying the principles of our invention with the circuit shown in diagram, the switch-lever being in its "off" position. Fig. 2 is a vertical sectional view thereof with the switch-lever in its on position. Fig. 3 is an end elevation of the motor-starter with the switch-lever shown in its on position. Fig. 4 is a detail view of the blank from which the magnet-frame is formed. Fig. 5 is a perspective view of the magnet-frame. Fig. 6 is a perspective view of the armature or return lever for the switch-lever. Fig. 7 is an end elevation of the contact-shoe with its guide partly in section. Fig. 8 is a plan view of the contact-shoe removed, and Fig. 9 is a fragmentary view of the invention as modified to constitute a speed-controller.

In the drawings, 15 represents the central portion of a box-body with projecting rounded corner extensions to be embossed or shaped into flanged feet 16, as shown in Figs. 2 and 3. Perforated side plates 17 are formed integral with the central portion 15 and are bounded at their ends by the inclined cuts forming the feet 16 and have corner-flaps 18 at their ends extending beyond the length of the central portion 15. Said side plates are adapted to be bent up along the sides of the central portion 15, and the corner-flaps 18 thereof are to be bent inwardly at right angles along the dotted lines to constitute corner-flanges. Sheet-metal end plates 19, having approximately semicircular tongues 20 struck up therefrom at regular intervals, are placed within the box against the corner-flaps 18 to constitute the ends of the box, and a series of flattened tubes or bars 21, formed of asbestos or any other suitable non-conducting and heat-resisting material, with resistance-wire 22 wound thereon, are mounted upon the end plates 19 by having the tongues 20 of both end plates 19 entering the slits in the ends thereof, as shown in Fig. 2. The tongues 20, as here shown, are arranged in a straight line and are parallel and extend transverse of the end plates, so that the bars 21 stand ap-

proximately in the same plane, with their flat sides adjacent.

The series of resistance-bars 21, mounted between the end plates 19, prevent said end plates moving inwardly and the bent-over corner-flaps 18 prevent said end plates moving outwardly, so with the exception of the front no other means for holding the end plates in position is necessary, and the series of resistance-bars are mounted in the box by merely connecting the end plates with the slits thereof in the manner stated and then dropping them into place within the corner-flaps 18.

A front 23 for the box, preferably a slab of slate or other insulating material, is held in place upon the box by bolts 24 passing through the corners of said front and through the corners of the central portion 15 of the box.

A pivot-post 26, consisting of a headless bolt with threads approximately half its length and the remainder smooth or unthreaded, is rigidly mounted in an opening through the front 23 by means of a round nut 27, threaded to approximately its middle portion and located on the outside of the front 23, and a squared nut 28, threaded on the inner end of said pivot-post, with suitable washers between it and the inner side of the front 23, the nuts 27 and 28 serving to firmly clamp the front 23 between them, so that the post 26 is immovable.

A switch-lever 29 is formed of a metal bar 30, with a sheet-metal brace 31 bolted to its under side by a bolt 32 at the end, which serves to connect the operating-handle 33 to said switch-lever, and by a bolt 74 at its intermediate portion. The sheet-metal brace 31 has depending side flanges 34 and at its lower end is bent away from the bar 30 and then flattened and bent to stand in a plane parallel to the plane of the bar 30, and said flattened end of the brace and the lower end of the bar 30 have registering openings therethrough fitting upon the pivot-post 26 to give the switch a double bearing on the pivot-post, and thereby prevent its rocking toward or away from the front.

A U-shaped yoke 35 has its perforated ears pivotally mounted upon the pivot-post 26 between the end of the brace 31 and the lower end of the bar 30, and a coil-spring 36 has its upper end hooked around a cotter-pin 37, which passes through a transverse opening of the pivot-post 26, and its inner end bears with considerable pressure upon the lower ear of the yoke 35 and extends outwardly to engage the end of the armature-lever 38, which is riveted or otherwise secured at 39 to the connecting portion of the yoke 35, between the ears thereof. The tension of the spring 36 gives the armature-lever 38 a tendency to swing on the pivot-post 26 to the left, as shown in the drawings, and as said armature-lever 38 swings in the same plane as the flanged brace 31, forming part of the switch-lever, said switch-lever is pressed upon thereby and given a tendency to move in the same direction, which movement is limited by the engagement of the switch-lever with a fixed stop 40, mounted on the front 23 and preferably having a rubber sleeve 41 to cushion the blow of the switch-lever therewith.

Near the outer end of the brace 31 the flanges thereof are widened to form depending ears 42, which have end lugs 43 bent inwardly to form between them a pocket in which is slidably mounted a spring-pressed contact-shoe 44. The contact-shoe is formed of a piece of quite heavy sheet metal bent to form a U shape in cross-section, and at its central portion its upwardly-bent edges are drilled to provide a seat 45 for a coil-spring 46, which loosely fits within said seat and bears upon the top surface of the lower portion of the shoe 44 at one end and upon the under side of the brace 31 at the other end, so as to give said shoe a spring tendency to move out of its guide or pocket formed by the ears 42, embracing its sides, and the inturned lugs 43, embracing its ends. While the particular mounting for the spring 46 as above described is preferred, any other mounting may be substituted. In order to make a practical electrical connection between the contact-shoe 44 and the other parts of the switch-lever 29, the said shoe has riveted or otherwise secured to one of its sides near the inner end thereof a flexible connecting-wire 47, preferably formed of a number of twisted strands of wire, and the other end of said flexible connecting-wire 47 is engaged by the nut of bolt 32, before mentioned as connecting parts of the switch-lever. Thus the contact-shoe is free to make its sliding movements in the pocket provided therefor on the switch-lever without relying upon the frictional contact therewith for its electrical connection with the switch-lever; but such connection is amply provided for by the flexible connecting-wire 47, which does not interfere with the movements of the contact-shoe.

A series of contact-segments 48 of any desirable construction are arranged in arc formation upon the front 23 in the path of the contact-shoe 44 during the swinging movement of the switch-lever 29, such segments being preferably secured in their positions by bolts 49 passing through openings in the front 23, and lead-wires 50 connect the segments 48 to the resistance-wire 22 on the bars 21 in the usual manner.

A magnet-frame 51 is formed from a blank of quite heavy strap metal of the shape shown in Fig. 4, with the shouldered slots 52 formed in its lower edge and the perforation 53 near one end. Said blank is bent at right angles, as shown in Fig. 5, and a magnet-coil 54, having one end of its winding grounded on the core 55 thereof, has its core connected with the magnet-frame 51 by a screw 56 passing through the perforation 53 and threading into

said core. A pair of bolts 57 are passed through openings in the front 23 and have their shanks extending up through and having a snug fit with the slots 52 in the lower edge of the magnet-frame 51, with their heads engaging the shoulders of said slots. When the bolts 57 are tightened, the magnet-frame 51 is rigidly held upon the front 23 against movement in any direction, a vertical movement being prevented by the bolt 57 in the slot of the vertical arm thereof and a horizontal movement being prevented by the bolt 57 in the slot of the horizontal arm and an oblique movement being prevented by both bolts 57. The location of the magnet 54 is such that the core and frame thereof are engaged by the armature-lever 38 when the switch-lever 29 is moved to the position to have its contact-shoe 44 in engagement with the last segment 48.

At the upper edge of the front 23 are arranged three binding-posts 58, 59, and 60, the first having electrical connection with the pivot-post 26 by a wire 61, the second, 59, to the last segment 48 of the series by a wire 62, and the last, 60, by a wire 63 to the winding of magnet 54, the other terminal of said magnet-winding grounding with the magnet-frame 51, as before described, and through one of the bolts 57 and the wire 64 having electrical connection with the first segment of the series. The second segment from the left-hand end of the arc formation is here considered the first segment of the series, inasmuch as the end segment is dead and the next segment is the one with which current is first established.

A wire 65 connects the last binding-post, 60, with a contact-button 66, mounted on the front 23 between the segments and the pivot-post and in a position to be engaged or swept over by a spring-brush 67, carried by the lever-arm 29 and secured by bolt 74, such contact taking place when the contact-shoe 44 is but partially on the last segment 48 and being broken when the brush 67 is fully on said last segment.

The device when connected up as a starter or speed-controller for a shunt-wound motor has the binding-post 58 connected with one of the line-wires, 68, the binding-post 59 connected with the armature 69 of the motor, and the binding-post 60 with the field 70 of said motor, the other terminals of the armature 69 and field 70 of course being connected with the other line-wire, 71. From the foregoing it is clear that no current passes so long as the contact-shoe of the switch-lever 29 is on the dead segment; but as soon as said lever is moved so that its contact-shoe 44 comes into engagement with the first segment of the series current passes from line-wire 68 through the binding-post 58 and wire 61 to the switch-lever and through its contact-shoe 44 to the first segment, where it divides and one branch passes through the series of resistance units 22 between the successive segments, through the wire 62 and binding-post 59, to the armature 69 and line-wire 71, while the other branch thereof passes from the first segment through wire 64 and magnet-spool 54 and by way of wire 63 and binding-post 60 to the field 70 of the motor and then to the line-wire 71. The current passing through the armature and field of the motor starts the operation thereof, and the resistance in series with the armature protects it from injury due to an excess of current before its counter electromotive force becomes established, and the magnet 54 is energized by the current passing to the field of the motor. As the switch-lever travels to the right the resistance 22 is cut out of the armature-circuit step by step and transferred to the field-circuit until on reaching the final segment the current is sent to the armature direct without passing through a protective resistance, and momentarily the field-circuit contains all of the resistance 22; but as soon as the armature-lever 38 contacts with the core or frame of magnet 54 the resistance 22 becomes short-circuited, the current for the field 70 passing direct from the armature-lever 38 through the core or frame of the magnet 54, through the winding thereof, and by way of wire 63 and binding-post 60 to the field 70. In this position of the parts the armature-lever 38 is held against the tendency of its spring by the magnet 54, and consequently the switch-lever 29 is enabled to remain on the final segment undisturbed.

In the operation of moving the lever-arm to its on position it is very important that it should not be left on any intermediate segment, inasmuch as the carrying capacity of the resistance-wire 22 is not sufficient in the ordinary motor-starter to carry the current passing to the armature for any length of time and would burn out if the lever should be left in such position. This, however, is impossible with the construction as here shown and described, inasmuch as the armature-lever 38 not being restrained by its magnet 54 until the switch-lever reaches its final position would exert its spring tendency upon the switch-lever when said switch-lever is released by the operator to forcibly return it to its original position against the stop 40, and so shut off the current entirely.

As before mentioned, the influence of the magnet 54 is sufficient to hold the armature-lever 38 when said lever has been brought in close relation therewith by the movement of the switch-lever 29 to the final segment, and so permit the lever-arm to remain on the final segment; but should the current passing through said magnet 54 to the field 70 for any reason cease or diminish to an abnormal extent, such as by the breaking of the field-circuit or by the reduction of the impressed electromotive force, the magnetism of said magnet 54 is reduced so that it becomes un-

able to restrain the armature-lever against the action of its spring 36, and therefore said armature-lever is forcibly drawn to the left by its spring and carries with it the switch-lever 29 back to its original position to break the circuit entirely.

When the motor has been started by moving the switch-lever to the final segment, as above described, and the armature-lever 38 is being held by the magnet 54, it is clear that a careless operator might through accident or mistake retract the switch-lever 29 and leave it standing upon one of the intermediate segments, and thus pass the armature-current through one or more of the resistance-coils 22, which would result in the burning out of the said coils, as before mentioned. In order to prevent this possibility, the contact-button 66 is so located that before the contact-shoe 44 leaves the last segment entirely the brush 67 will engage with said button 66 and so short-circuit the magnet 54, the current passing from the brush 67 to the button 66 and through the wire 65 to the binding-post 60 in preference to passing through the windings of the magnet 54. Consequently the armature-lever 38 is released by the magnet 54 and with a strong hammer-blow will return the switch-lever 29 to its original position before the current of the armature-circuit has had a chance to affect the resistance-coils.

The switch-lever 29 has the natural tendency to remain wherever placed, due to the frictional contact of the spring-pressed contact-shoe 44 with the segments and also to the pressure of the spring 36, which tightly forces the flattened end of the brace 31 against the stationary round clamp-nut 27, so that of itself the switch-lever is immovable and its position is only changed by the movements given to it by the operator or by the armature-lever when said armature-lever is not held by the magnet 54.

The construction of the armature-lever 38 is such that it is not liable to become loose in its mountings, for the ears of the yoke 35 tightly embrace the riveted end thereof, so that even though the rivet were not sufficient to prevent a pivotal movement of the armature-lever in the yoke the angularly-bent ears of the yoke would prevent such movement.

The magnet-frame 51 serves the double purpose of a support for the spool 54 and also as a means for completing the magnetic circuit with the core and armature-lever, and the novel manner in which it is secured to the front 23, while being most simple, is very efficient and constitutes an important feature of this invention. In this connection it is obvious that the slots 52 are not limited to the particular shape, as shown, in which they conform to the shape of the bolt-head, though this is at present preferred, but they may have any other shape so long as engaging shoulders are provided with which the bolt-head may clamp.

It is obvious that the construction heretofore described is equally applicable to motor-starters and speed-controllers, the button 66 and wire 65 being omitted in the latter case, for in a motor-controller the carrying capacity of the resistance-coils 22 is sufficient to carry the current in all events, and then it is desired that the lever-arm 29 should be permitted to stand upon any of the segments indefinitely. In the operation of this construction for such purpose the switch-lever may be thrown to the right, as before described, until the armature-lever 38 is engaged by the magnet 54, and then it is returned to the segment corresponding with the speed at which it is desired that the motor should run. The armature-lever being retained by the magnet 54 as long as the current passing therethrough is normal, the switch-lever remains undisturbed upon the desired segment; but when the current through the magnet 54 becomes abnormally weak the armature-lever 38 is released thereby and engages and returns the switch-lever 26 to its normal position, as before. Fig. 9 illustrates this adaptation of the device to the use of a motor-controller, showing the button 66 omitted and showing a slightly-different connection for the terminals of the magnet 54. In this type of machine it is desirable that the magnet core and frame should be insulated from the circuit instead of as with the form previously described in order that the controller-arm may not be moved to the dead segment with the armature-lever still in engagement with the magnet 54, and so keeping the current passing through the motor. As shown in Fig. 9, the terminals of the magnet 54 are inclosed in protective insulating-sleeves 72 and pass beneath the magnet-frame 51, preferably through notches formed in their under edge. The terminal wires of the magnet connect with the binding-posts 73, extending through the front 23, and one of them connects with the wire 63 while the other connects with wire 64. Thus the core and magnet-frame are insulated from the circuit, and the current ceases entirely when the lever-arm 29 is swung to the dead segment, and consequently the magnet becomes deënergized to permit the armature-lever 38 to return to its original position.

The magnet 54 may have its core and frame insulated from its winding in the motor-starter construction, (shown in Fig. 1,) just as in the speed-controller above described, without affecting the operation thereof, except that the resistance-coils 22 are not short-circuited when the armature-lever is in contact with the magnet-core.

The contact-button 66 is not necessarily lim

ited to the location shown, but may be placed wherever convenient for the operation for which it is intended and may take any desirable form, which is also true of the brush 67, the form here shown being convenient for the purpose of illustration.

It is obvious that the spring-actuating means for the controller-lever is not limited to the form of a lever, but other mechanical constructions may be employed for this purpose, and it is to be distinctly understood that the employment of the terms "lever" or "spring-actuated lever" for this part in the specification and claims are not to be strictly construed as limited to a pivoted body, but that such terms as herein used are intended to include all substitutes by which the results may be accomplished. This is true notwithstanding the fact that some of the following claims avoid the use of the term "lever" for this part, while others contain it.

What we claim as our invention is—

1. In a switch, a lever having a tendency to move, a magnetic means capable of retaining said lever against its tendency to move, and a switch adapted in its operation to move the lever into active relation with the magnetic means and to close the circuit through the magnetic means.

2. In a switch, a spring-actuated lever, a magnetic means capable of retaining said lever, and a switch adapted in its operation to close the circuit through the magnetic means and to move the spring-actuated lever into active relation with the magnetic means and to be returned to its initial position by said spring-actuated lever when the latter is released by the magnetic means.

3. In a rheostat, a spring-actuated lever, a magnetic means capable of retaining said lever, and a resistance-controlling switch adapted in its movements to carry the lever into active relation with the magnetic means and also adapted to be returned thereby when the magnetic means releases the lever.

4. In a rheostat, a spring-actuated lever, a magnetic retaining means therefor, and a switch movable independently of the spring-actuated lever and capable of moving said lever into active relation with its magnetic retaining means and in opposition to its spring tendency, such spring-actuated lever being adapted when released by the magnetic retaining means to return the switch to its original position.

5. In a rheostat, a spring-actuated lever, a magnetic retaining means therefor, a switch actuated by the lever, and means for short-circuiting the magnetic retaining means controlled by the movements of the switch.

6. In a rheostat, a spring-actuated lever, a magnetic retaining means therefor, a switch actuated by the lever, and a means for deënergizing the magnetic retaining means controlled by the movements of the switch while the lever is retained by said magnetic retaining means.

7. In a rheostat, a spring-actuated lever, a magnetic retaining means therefor, a switch adapted in its operation to move the lever into active relation with its magnetic retaining means, and means controlled by the movements of the switch when the lever is retained by the magnetic retaining means for short-circuiting the magnetic retaining means to release the spring-actuated lever and permit it to return the switch to its initial position.

8. In a shunt-wound electric motor, the combination, with the field-circuit, of a magnet in the said circuit, a hand-switch adapted to open and close the armature-circuit, an independent armature adapted to be moved by the hand-switch to the magnet, said switch arranged to be left in its closed position, and said armature held by the magnetism of said magnet, and means for causing the armature to automatically retract the said switch to its initial position when the magnet is deëngerized by the cessation of the current through the field-circuit, substantially as described.

9. In a rheostat, a spring-actuated lever, a magnetic retaining means therefor, a switch adapted in its operation to move the lever into active relation with its magnetic retaining means, and a contact-button adapted to be engaged by the switch to short-circuit the magnetic retaining means.

10. In a rheostat, a spring-actuated lever, a magnetic retaining means therefor, a series of resistance units having contact-points, a switch to engage the contact-points in its movements and adapted to move the lever into active relation with its magnetic retaining means, a connection with the switch for a line-wire, a connection with the last contact-point for the armature of a shunt-wound motor, a connection with the first contact-point for the field of such shunt-wound motor and including the winding of the magnetic retaining means, and a contact-button adapted to be engaged by the switch and having connection with the last-named connection between the magnetic retaining means and the field of the motor whereby the magnetic retaining means is short-circuited by the contact of the switch with the contact-button to release the spring-actuated lever and permit it to return the switch to its initial position.

11. In a switch, an arm having parallel flanges, a U-shaped sheet-metal shoe slidably mounted between the flanges, and a spring bearing on the shoe.

12. In a switch, an arm having depending flanges, a U-shaped shoe slidable between the flanges, a seat formed in the open portion of the shoe, and a spring in said seat bearing on the arm.

13. In a switch, an arm having projecting

flanges, a U-shaped contact-shoe slidable between the flanges, lugs on the flanges to confine the shoe between the flanges, and a spring bearing on the shoe and adapted to force it away from the arm.

14. In a switch, a contact-shoe formed of a piece of sheet metal bent to a U shape in cross-section, the upwardly-extending sides thereof having a spring-seat therein.

15. In a switch, a contact-shoe formed of a piece of sheet metal bent to a U shape in cross-section, the upwardly-extending sides thereof having a spring-seat drilled therein.

16. In a switch, a contact-shoe formed of a U-shaped piece of metal, the upwardly-extending sides thereof having a spring-seat formed therein.

17. In a switch, a contact-shoe formed of a piece of sheet metal bent to form a U shape in cross-section, the side members thereof having opposite grooves on their inner surfaces to form a spring-seat, and a coil-spring mounted in said spring-seat.

18. In a switch, an arm having parallel guide-flanges, a U-shaped shoe slidably mounted between said flanges, a spring seated between the shoe and the arm, and a flexible conductor connecting the shoe with the arm.

19. In a switch, an arm having parallel projecting side flanges, inwardly-extending lugs on the ends of said side flanges forming with the flanges a pocket on the under side of the arm, a contact-shoe slidable in said pocket and comprising a U-shaped piece of metal having a spring-seat formed between its upwardly-extending side members, a coil-spring mounted in said spring-seat and bearing on the arm, and a flexible conductor connecting the contact-shoe with the arm.

20. A magnet-frame formed of an angular piece of metal having shouldered slots in its edge adapted to be engaged by a headed clamping means, and means for securing a magnet thereto.

21. A magnet-frame comprising a strip of metal bent at an angle and having a shouldered slot in the lower edge of each of its arms adapted to be engaged by headed clamping means, and means for securing a magnet-spool to one of said arms.

22. A magnet-frame comprising an angularly-bent strip of metal, having vertical slots cut through its lower edges, said slots terminating in enlargements forming opposite shoulders in the slots, bolts having their shanks extending through the slots with their heads bearing on the shoulders and adapted to clamp both members of the angular frame to a support, and a magnet-spool having its core connected with one of the members of the frame, the other of said frame members serving as a pole-piece for the magnet.

23. In a rheostat, a resistance-controlling lever mounted on a pivot-post, an armature-lever also mounted on the pivot-post and comprising a bar with a yoke secured to its end, the arms of said yoke tightly embracing the bar and having perforations to receive the pivot-post, a coil-spring surrounding the pivot-post with one end engaged with said pivot-post and the other end engaging the armature-lever and pressing it toward the resistance-controlling lever, and a magnet for retaining the armature-lever when the latter is brought into active relation therewith.

24. In a switch, a member having a tendency to move, a magnetic means capable of retaining said member against its tendency to move, and a switch adapted in its operation to move the member into active relation with the magnetic means and to be returned to its initial position thereby when the member is released.

25. In a switch, a spring-actuated member, a magnetic means capable of retaining said member, and a switch adapted in its operation to move the spring-actuated member into active relation with the magnetic means and to be returned to its initial position by said spring-actuated member when the latter is released by the magnetic means.

26. In a rheostat, a spring-actuated member, a magnetic means capable of retaining said member and a resistance-controlling switch adapted in its movements to carry the member into active relation with the magnetic means and also adapted to be returned thereby when the magnetic means releases the member.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES H. KEENEY.
CHARLES A. RHINE.

Witnesses:
ANNA F. SCHMIDTBAUER,
R. S. C. CALDWELL.