(No Model.) 2 Sheets—Sheet 1.

C. C. KRITZER.

AUTOMATIC ELECTRICAL CUT-OUT.

No. 546,233. Patented Sept. 10, 1895.

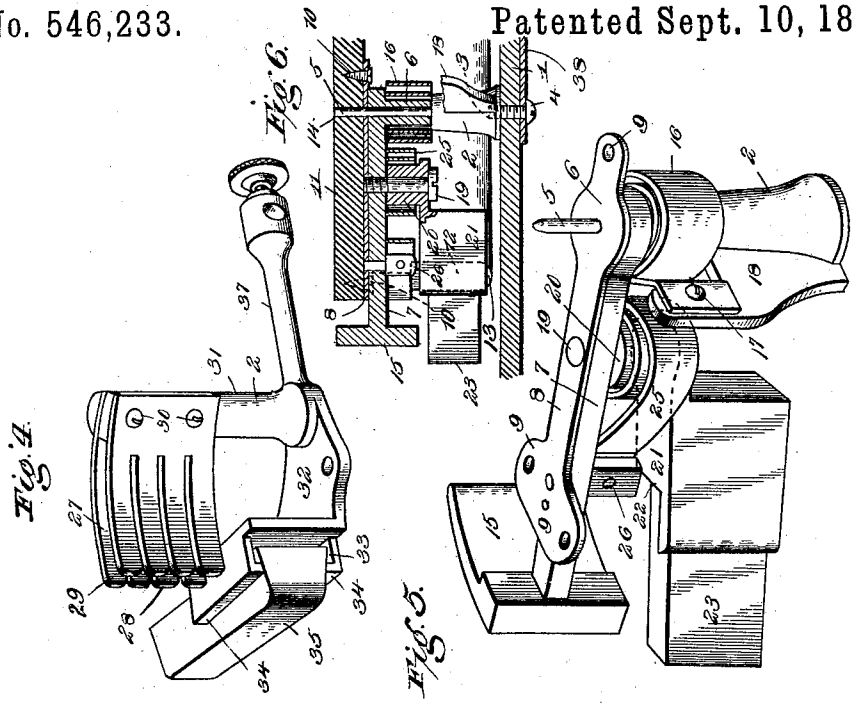


Fig. 4.

Fig. 6.

Fig. 5.

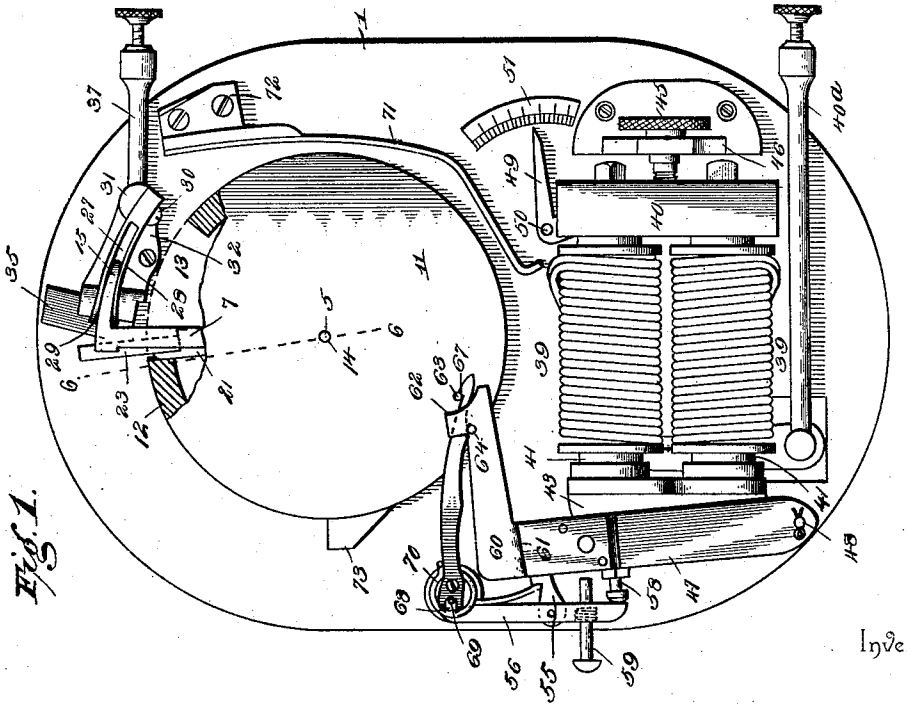


Fig. 1.

Witnesses
John C. Shaw.
S. P. Hollingsworth.

Inventor
Chas. C. Kritzer,
By his Attorneys.
C. A. Snow & Co.

(No Model.) 2 Sheets—Sheet 2.

C. C. KRITZER.

AUTOMATIC ELECTRICAL CUT-OUT.

No. 546,233. Patented Sept. 10, 1895.

Fig. 3.

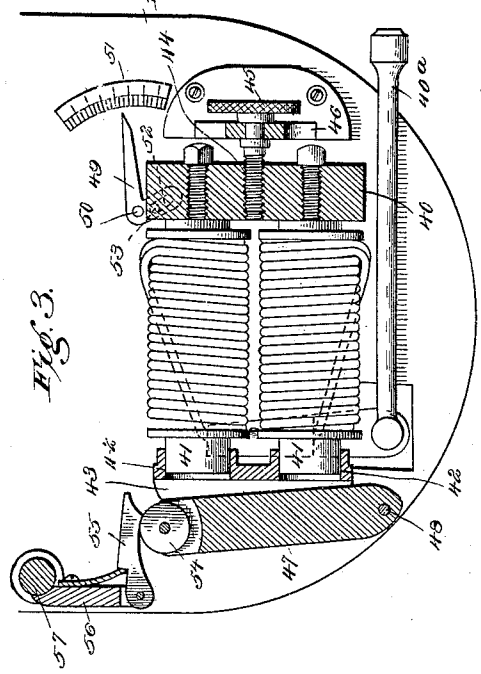


Fig. 7.

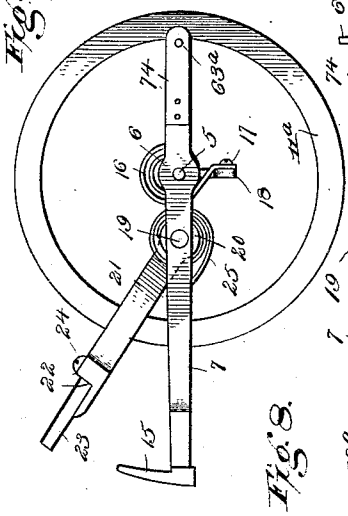


Fig. 8.

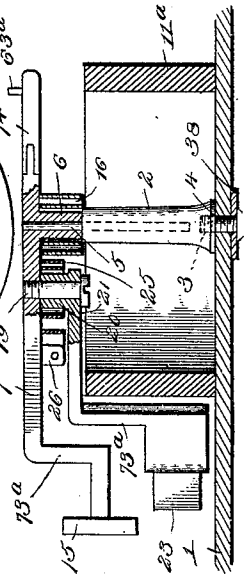
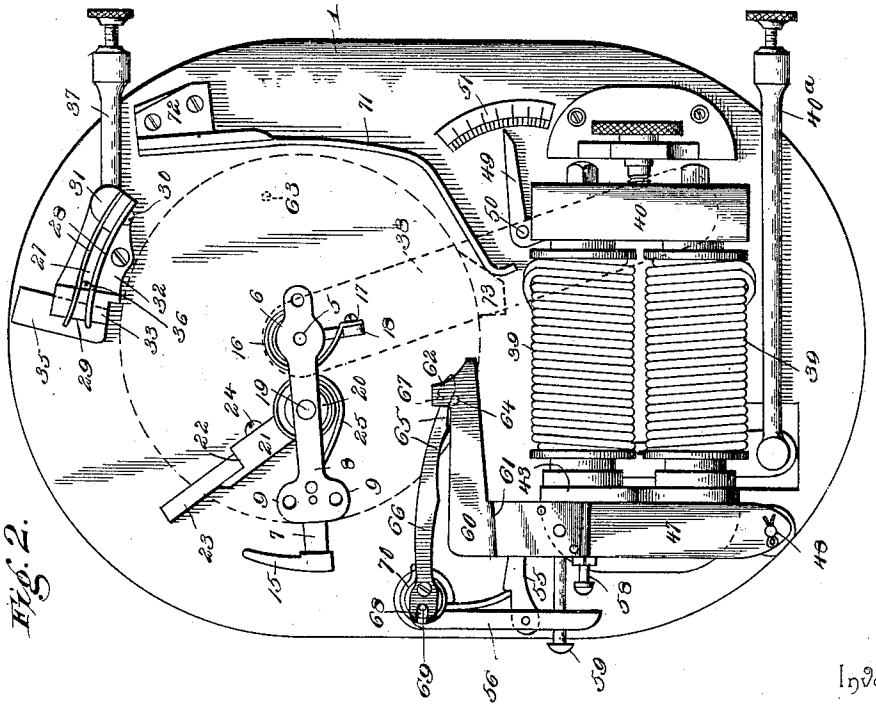


Fig. 2.



Inventor

Chas. C. Kritzer,

By his Attorneys.

Wilnesses

John C. Shaw.

D. B. Wolhaupter.

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

CHARLES C. KRITZER, OF GRAND RAPIDS, ASSIGNOR TO THE AUTOMATIC CIRCUIT BREAKER COMPANY, OF NEWAYGO, MICHIGAN.

AUTOMATIC ELECTRICAL CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 546,233, dated September 10, 1895.

Application filed October 31, 1894. Serial No. 527,573. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. KRITZER, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented a new and useful Automatic Electrical Cut-Out, of which the following is a specification.

This invention relates to automatic electrical cut-outs for electric-motor, electric-lighting, or other circuits on which currents of high electromotor force in great quantity are employed.

To this end the main and primary object of the present invention is to construct a compactly-arranged cut-out occupying the smallest amount of space practicable for controlling electric currents of great strength, while at the same time providing a cut-out that will sharply and positively respond to any excess of current beyond the limit of safety and will instantly break the circuit to cut out the motors or other translating devices in connection with which the instrument is employed without producing any secondary or false arcs, as are produced in most cut-outs now in use.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a plan view of an automatic cut-out constructed in accordance with this invention, showing the several parts of the instrument locked in a position to close the circuit therethrough. Fig. 2 is a similar view with the revolving insulator-drum shown in dotted lines and the switch bar and arm in a position as carried away from the fixed or stationary contact to provide for breaking the circuit. Fig. 3 is a horizontal sectional view of the magnet devices of the instrument. Fig. 4 is a detail in perspective of the fixed or stationary socket contact and adjacent fixed contact-blocks. Fig. 5 is a similar view of the swinging switch-bar and switch-arm carried thereby. Fig. 6 is a detail sectional view on the line 6 6 of Fig. 1. Fig. 7 is a detail plan view showing a modification without the revolving insulator-drum. Fig. 8 is a transverse sectional view of the construction shown in Fig. 7.

Referring to the accompanying drawings, 1 designates a suitable base providing for the support of the several working parts of the cut-out and adapted to be attached to a wall or other convenient point of attachment, according to the use of the cut-out, whether in connection with street-railway, electric-lighting, or other service. The said base 1 has removably supported at one side thereof the pivot-post 2, that is provided at its inner end with a threaded opening 3 to receive the securing-screw 4, passed through the base 1, to secure the post 2 thereon. The said stationary pivot-post 2 is provided with an outer reduced spindle portion 5, on which loosely turns the bearing-collar 6, at the inner end of a swinging switch-bar 7, that is supported for a circularly-swinging movement on the spindle of the pivot-post 2. The said circularly-swinging switch-bar 7 has fitted to its upper side an attachment-plate 8, provided at its opposite ends with the perforated screw-flanges 9, adapted to receive suitable securing-screws 10 for fastening the said switch-bar to the inner side of a revolving hollow cylindrical insulator-drum 11.

The hollow cylindrical insulator-drum 11 is made of porcelain or other suitable insulating material and is adapted to work directly over the base 1 and to inclose therein the switch connections of the cut-out; and the said revolving hollow drum 11 is provided in the peripheral flange 12 thereof with an enlarged opening or slot 13, that accommodates the outer end of the switch-bar 7, that projects beyond the peripheral flange or rim of said drum.

The revolving hollow cylindrical insulator-drum 11 is provided in its outer side with a central bearing opening 14, that turns on the outer extremity of the spindle of the pivot-post 2, so that the said insulator-drum rotates or revolves on the spindle of the pivot-post, together with the switch-bar 7, as the latter swings in its circular movement. The said circularly-swinging switch-bar 7 preferably consists of a bar of brass or other suitable good metallic conductor, and is provided at its outer end, beyond the rim of the drum 11,

with a slightly curved and tapered enlarged contact-plug 15, and the inner pivoted end of the said switch-bar 7, or, more properly speaking, the bearing-collar 6 thereof, has connected thereto one end of a coiled actuating-spring 16, that is arranged on the side-projected portion of the collar 6 and is connected at its other end, as at 17, to an attaching-web 18, formed integrally at one side of the pivot-post 2. The influence of the spring 16 is to normally turn the switch-bar 7 and the attached insulator-drum in one direction, and said switch-bar 7 has connected to one side thereof, intermediate of its ends, a pivot-screw 19, on which is pivotally mounted the bearing-collar 20, formed at the inner end of a supplemental switch-arm 21, working at one side of the bar 7 and provided with an integral squared socket 22, that is adapted to removably receive therein one end of the movable carbon contact-block 23, preferably held removably in said socket by means of a securing-screw 24, threaded in one side of the socket of said supplemental switch-arm.

The bearing-collar 20 of the switch-arm 21 has connected thereto one end of a coiled spring 25, the other end of which is attached to an attaching-lug 26, projected from one side of the switch-bar 7, and the said spring 25 serves to normally hold the movable contact-block 23 at one side of and out of alignment with the contact-lug 15 of the switch-bar 7, as may be clearly seen in Figs. 2 and 7 of the drawings; and it will be noted at this point that either of the springs 25 or 16 is sufficiently strong in itself to revolve the drum 11 and the switch-bar carrying the same, and the weight of the switch connections arranged inside of the drum is also sufficient to turn the drum with said switch connections to break the circuit; but the springs employed insure the positive positioning of the plug 15 and block 23, and also insure the necessary quick action for the instrument in breaking the circuit.

The pivot-post 2 forms one of the poles of the herein-described cut-out or switch apparatus, and when the circuit is closed the same is complete through the separate contacts carried by the switch-bar and said pivot-post, and with the parts of the instrument set for closing the circuit the enlarged contact-plug 15 is adapted to fit within a fixed metallic socket-contact 27, which consists of a pair of spaced longitudinally-slitted copper plates 28, that are slightly flared at one end, as at 29, to provide for guiding the plug 15 therebetween, and said plates have a sufficient spring to freely admit the said plug, and at the same time insure a perfect mechanical contact therewith, and the connected ends of said plates 28 are secured by means of the screws 30, to one side of an offstanding supporting-post 31, projected from one side of an attachment-plate 32, secured on the base 1, adjacent to the drum 11. The said attachment-plate 32 is further provided at a point at one side of the socket-contact 27 with a right-angularly disposed U-shaped clamp-plate portion 33, having inturned flanges 34 at one edge of the parallel sides thereof to embrace a fixed carbon contact-block 35, that is preferably dovetailed and removably retained within the clamp-plate 33 by means of a screw 36, mounted in one side of said plate 33 and working against one side of the said stationary carbon contact-block 35.

With the contact-plug 15 within the socket-contact 27 the movable carbon contact-block 23, carried with the switch-arm 7, will at the same time be held in contact with the fixed contact-block 35, and thereby complete a double contact for closing the circuit through the instrument, and while the contacts 23 and 35, which are of a much greater resistance than the contacts 15 and 27, carry a portion of the current the said contacts 15 and 27 will carry the major portion of the current and will practically form the main circuit-closing parts of the instrument. The contacts 23 and 35 and the contacts 15 and 27 are connected in the circuit on which the instrument is employed by means of a binding-post connection 37, with the attachment-plate 32. Said binding-post connection 37 is adapted to have one of the circuit-wires connected therewith, and the current that traverses the switch-bar 7 and switch-arm 21 to the pivot-post 2 is carried through a circuit-plate 38 to a pair of electromagnets 39, that are supported on the base 1 below the drum 11. The circuit-plate 38 is connected at one end to the screw-fastening for the post 2 and at its other end to one of the coil-terminals of the magnets 39, the other coil-terminal of which has connected therewith a binding-post connection 40^a, with which is connected one of the circuit-wires to provide for the completion of the circuit.

The electromagnets are connected at one end by an adjusting-bar 40, and the opposite exposed core ends 41 of the magnet are adapted to move in the slide-openings 42 of an offstanding combined guide and supporting-bracket 43, attached to the base 1 at one end of said magnets. The adjusting-bar 40, carrying the electromagnets, is provided with a central threaded screw-opening 44 to receive the inner threaded end of the adjusting thumb-screw 45, that is supported to work in a bracket-plate 46, arranged on the base 1, directly opposite the bracket 43. By manipulating the screw 45 the exposed core ends of the magnets may be adjusted at variable distances from the swinging armature 47, pivotally supported at one end, as at 48, on the base 1, at one side of the bracket 43. This adjustment of the magnets to and from the armature provides means for positively setting the instrument to operate when the strength of the current increases beyond a predetermined safety limit, and in order to provide for accurately setting the magnets an L-shaped pointed lever 49 is pivotally mounted at its angle, as at 50, at one side of the

adjusting-bar 40, and one end of said lever 49 plays adjacent to a curved scale-plate 51, that indicates the ampèrage of the current adapted to be carried by the magnets, and the other arm of said lever is provided with a slot 52, receiving a pin 53, projected from the adjusting-bar 40, so that as the said bar is adjusted by the thumb-screw one end of the lever 49 will be moved to work at one side of the said scale-plate, as will be obvious.

The swinging armature 47 has mounted in its unpivoted end a roller 54, against which normally presses the spring-actuated retaining-pawl 55, that serves to hold the armature firm and steady in its unattracted position, and the said retaining-pawl 55 is pivotally connected to a bracket-arm 56, projected from one side and an intermediate point of a supporting-post 57, attached to the said base 1. The said bracket-arm 56 is also adapted to form a stop, against which engages a stop-screw 58, fitted in one side of the armature 47, to limit the outward movement thereof, and loosely mounted in the said arm 56 is a spring-actuated push-button 59, that is adapted to be moved in against the armature by the operator, when so desired, to provide for breaking the circuit manually at any time it may be necessary.

The swinging armature 47 has attached to the swinging end thereof an L-shaped armature-lever 60, that is provided with an offset 61 at its angle to provide for disposing one arm of the lever beyond the outer side of the armature. The said armature-lever 60 is provided at its unattached end with a curved contact-edge 62, that is adapted to be engaged by the catch-pin 63, projected from the outer side of the drum 11 near its periphery and adjacent to the curved edge 62. The said lever 60 is provided with an inwardly-disposed lifting-pin 64, that is adapted to ride against the double inclined lower edge 65 of the lock-lever 66, that is provided at one end with a catch-shoulder 67 to engage with the catch-pin 63 of the drum 11. The said lock-lever 66 is pivotally supported at the end opposite the catch-shoulder 67 thereof on the outer end of the supporting-post 57, and at one side of its pivot the pivoted end of the lever 66 is provided with a notch 68, loosely engaging over a stop-pin 69 on the outer end of the post 57 to provide for limiting the movement or swing of said lever 66, and a spring 70, coiled on the post 57 and connected to the lever 66, provides for normally depressing the same.

When the drum 11 is turned to carry the plug 15 into the socket-contact 27 and the block 23 against the block 35 to close the circuit, the pin 63 will be carried against the edge 62 of the lever 60, thereby moving the armature away from the core ends of the magnets and at the same time causing the pin 64 to ride on the inclined edge 65 of the lever 66 to lift the catch-shoulder of the said lever into engagement with the pin 63, as illustrated in Fig. 1 of the drawings, and with this position of the lever 66 and the lever 60 the said lever 66 is absolutely prevented from disengaging the pin 63 on account of the pin 64 lying directly against the under edge of the said lever 66, at one side of the ridge of the double inclined lower edge 60. Upon an increase in the current strength beyond the safety limit the magnets will attract the armature 47 and move the lever 60 in a direction that will allow the lever 66 to disengage the pin 63, and upon this releasement the springs 16 and 25 will sharply revolve the drum and break the contacts. In this movement of the parts the plug 15 will pass entirely out of contact with the socket-contact 27 before the movable carbon contact 23 breaks the contact with the fixed carbon contact 35, as may be seen from the position of the parts 15 and 23 in Fig. 2 of the drawings. This manner of breaking the contact relieves the metallic contacts of any fusing thereof, as must necessarily occur when the circuit is entirely broken thereby, and the quick action of the springs to sharply break the contact prevents the production of false or secondary arcs as the contacts 23 and 35 separate.

When the drum 11 revolves in a direction to break the contact, the shock incident to the sharp revolution of said drum is broken by means of a curved recoil-spring 71, that is arranged at one side of the rim or periphery of the drum and is secured fast at one end, as at 72, to the base 1. The said spring 71 is engaged by a beveled strike-block 73, attached to the rim or peripheral flange of the said drum, so as to ride against the spring 70 to ease up the revolving drum 11 and to stop the same before any of the parts of the instrument are strained.

It will be understood that the drum 11 serves as an insulating-wall between the two poles of the cut-out—that is, the post 2 and the fixed or stationary contacts—and when the contacts are broken the said drum positively prevents any short-circuiting of the current by jumping across the comparatively narrow space between these two poles of the instrument, and in this connection it is to be noted that the instrument is susceptible to a slight modification, as shown in Figs. 7 and 8 of the drawings, in which figures of the drawings the outer closed side of the drum 11 is omitted from the construction and a stationary circular insulator bridge-wall 11^a employed as a substitute for the revolving drum. The circular insulator bridge-wall 11^a corresponds to the peripheral rim or flange of the drum 11, as described, but is attached stationary to the base 1, while the switch-bar 7 and switch-arm 21 have a circularly-swinging movement over the outer edge of said wall, in the same manner as already described; but in this modification the said bar 7 and arm 21 are provided with the angular offsets 73^a, that project over the wall 11^a to dispose the contacts 15 and 23 outside of the wall, so that the latter will lie between the post 2 and the fixed

or stationary contacts 27 and 35 to prevent any short-circuiting, as already described. In this modification the switch-bar 7 is provided at one side of its pivot with an insulator arm extension 74, from which is projected a catch-pin 63ª, that subserves the same function and operates in the same manner as the pin 63, carried by the drum 11.

Other changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In an automatic cut out, the combination of a fixed contact having a circuit connection therewith, a suitably arranged stationary pivot post having a circuit connection therewith, an automatically released circularly swinging switch bar pivotally mounted on said post and having a contact to engage the fixed contact, and a circular insulator wall encircling the stationary post and interposed between the fixed contact and said stationary pivot post to obviate a short circuiting of the current between these parts when the contacts are broken, substantially as set forth.

2. In an automatic cut-out, the combination of a fixed contact, a stationary pivot post, a revolving insulator drum supported to rotate on said post adjacent to the fixed contact, the flange or rim of said drum lying between the fixed contact and pivot post, a switch bar arranged within and carried by said drum, said switch bar having at one end outside of the drum a contact adapted to contact with said fixed contact, means for automatically swinging the switch bar and turning the drum connected therewith, and magnet controlled means for locking the drum against rotation, substantially as set forth.

3. In an automatic cut-out, the combination of a fixed contact having a circuit connection, a stationary pivot post having a circuit connection, a spring actuated circularly swinging switch bar pivotally supported on said post and having at its outer end a contact adapted to contact with said fixed contact, a revolving hollow insulator drum loosely mounted on said pivot post over the switch bar and attached to the latter, and magnet controlled means for locking the drum against rotation when the contacts are engaged to close the circuit, substantially as set forth.

4. In an automatic cut-out, the combination of separate adjacent fixed contacts having a common circuit connection, a revolving hollow insulator drum supported for rotation adjacent to the fixed contacts, a circularly swinging switch bar fitted within the drum and provided at its outer end outside of the drum with a contact adapted to engage one of the fixed contacts, a supplemental contact connected to the switch bar and normally projected therefrom beyond the rim of the drum out of alignment with the switch bar and adapted to engage the other fixed contact, and a magnet controlled lock for said switch bar to maintain the connection between the contacts, substantially as set forth.

5. In an automatic cut-out, the combination of separate adjacent fixed contacts having a common circuit connection, a revolving hollow insulator drum supported for rotation adjacent to the fixed contact and provided with a slotted rim, a spring actuated circularly moving switch bar fitted within said drum and provided at its outer end beyond the drum with a contact to engage one of the fixed contacts, a supplemental spring projected contact connected with said switch bar and projected beyond the rim of the drum normally at an angle to the switch bar to engage the other of said fixed contacts, and a magnet controlled lock for the switch bar to hold the contacts together, substantially as set forth.

6. In an automatic cut-out, the combination with adjacent fixed metallic and carbon contacts; of a suitably arranged stationary pivot post having a reduced spindle, a circularly swinging switch bar pivotally mounted at one end on said spindle and provided at its other end with an enlarged contact plug adapted to contact with the fixed metallic contact, an actuating spring connected at one end to the switch bar and at its other end to the pivot post to provide for moving the switch bar normally in one direction, a supplemental switch arm pivotally connected to one side of the switch bar and provided with an integral squared socket, a carbon contact block fitted in said socket and adapted to contact with the fixed carbon contact, a spring connected with the pivoted end of the supplemental switch arm and to said switch bar to provide for normally disposing said switch arm at an angle to the switch bar, and a magnet controlled lock for the switch bar to hold the contacts together, substantially as set forth.

7. In an automatic cut-out, the combination of a base, a metallic attachment plate fitted to said base and provided with a binding post connection, an offstanding supporting post, and a right angularly disposed U-shaped clamp plate portion having inturned flanges, a fixed carbon contact block removably fitted in said U-shaped clamp plate portion, a metallic socket-contact fitted to said offstanding supporting post at one side of the U-shaped clamp plate portion and consisting of a pair of spaced longitudinally slitted metal plates, a suitably arranged stationary pivot post having a circuit connection therewith, a spring actuated circularly swinging switch bar pivotally mounted on said pivot post and having at its moving end a curved and tapered contact plug adapted to fit in said metallic socket-contact, a spring projected supplemental switch arm attached to the switch bar and carrying a carbon contact block adapted to contact with the fixed carbon contact block,

a revolving insulator drum mounted to turn on the pivot post and carried by the switch bar, and a magnet controlled lock for the switch bar to hold the contacts together, substantially as set forth.

8. In an automatic cut-out, the combination of a fixed contact having a circuit connection therewith, a suitably arranged stationary pivot post having a circuit connection therewith, a circularly swinging switch bar mounted on said pivot post and provided at its outer end with a contact, a revolving insulator drum mounted to turn on the pivot post and connected with the switch bar to turn therewith, said drum being provided on its rim with a beveled strike block, a curved recoil spring arranged in a fixed position at one side of the rim of the drum and adapted to be engaged by said strike block, means for turning the drum and switch bar in one direction, and a magnet controlled lock for the switch bar to hold the contacts together, substantially as set forth.

9. In an automatic cut-out, the combination of the base, a fixed contact arranged on the base, a circularly swinging switch bar having a contact adapted to engage the fixed contact, an insulator drum attached to and carried by the switch bar and provided on its outer side with a projected catch pin, a suitably arranged supporting post, a normally spring depressed lock lever pivotally secured at one end on said post and provided at its pivoted end with a notch, said lock lever being provided at its unpivoted end with a catch shoulder adapted to engage said catch pin and with a double inclined lower edge, a stop pin arranged on the outer end of the supporting post to engage in the notch of the lock lever, a pair of electro magnets included in a circuit with said contacts, the swinging armature arranged at one end of the magnets, and an L-shaped armature lever attached at one end to the swinging end of the armature and provided at its other end with a curved contact edge adapted to be engaged by said catch pin of the drum, and an inwardly disposed lifting pin adjacent to said curved edge and adapted to ride against the double inclined lower edge of the lock lever, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHAS. C. KRITZER.

Witnesses:

E. S. FULLER,

SUSIE M. WENDELL.