

(No Model.)

2 Sheets—Sheet 2.

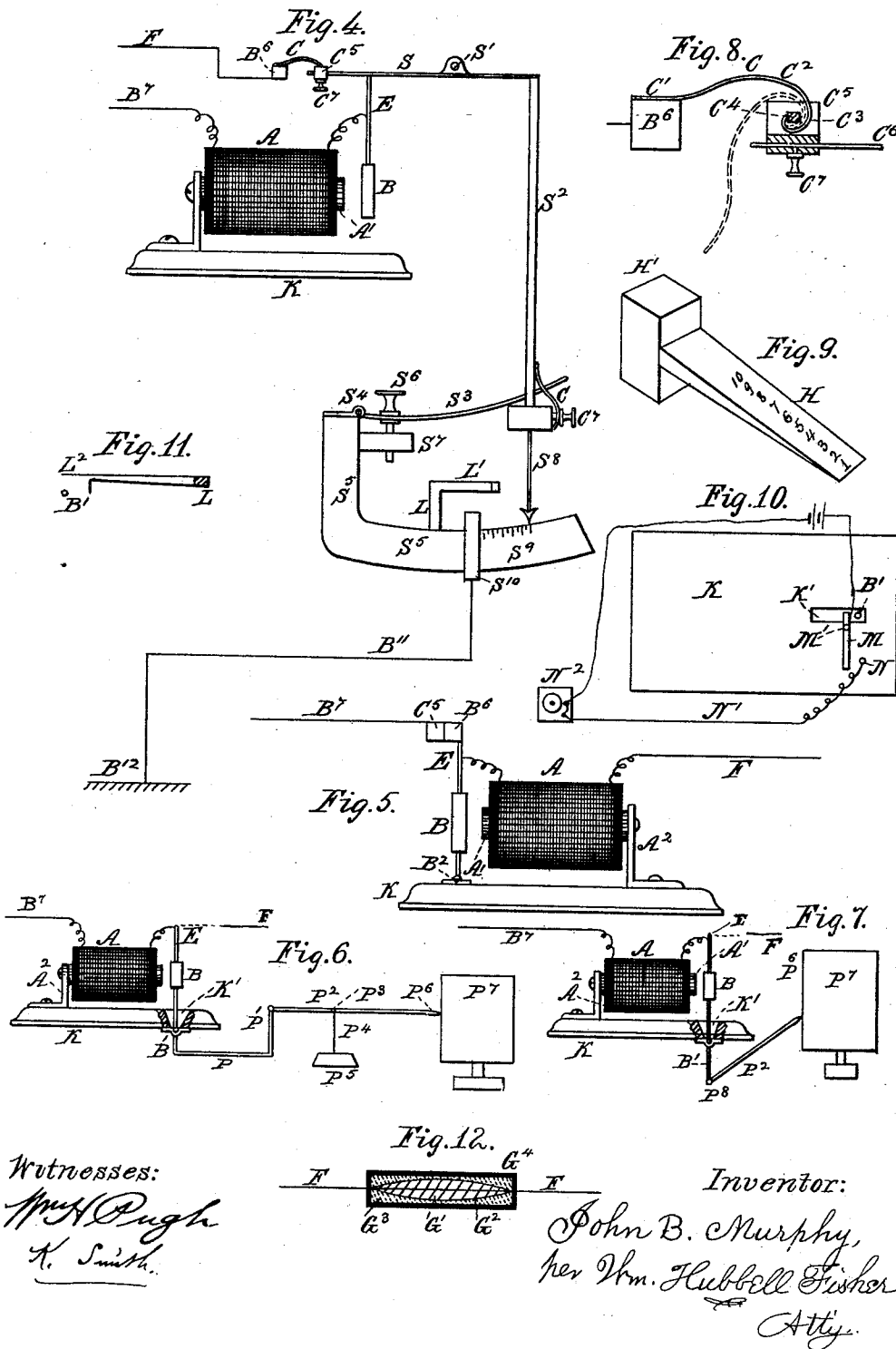
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CUT-OUT.

No. 468,101.

Patented Feb. 2, 1892.



UNITED STATES PATENT OFFICE.

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CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 468,101, dated February 2, 1892.

Application filed June 14, 1890. Serial No. 355,514. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. MURPHY, a citizen of the United States, and a resident of the city of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Mechanism for Breaking the Electrical Current or Currents when the Latter Become of a Greater Intensity than Desired, of which the following is a specification.

The several features of my invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings, making a part of this specification, and to which reference is hereby made, Figure 1 is a side elevation of mechanism for breaking the circuit, illustrating certain features of my invention. Fig. 2 is a side elevation of mechanism illustrating other features of my invention. Fig. 3 is a side elevation of mechanism illustrating other features of my invention. Fig. 4 is a side elevation of certain features of my invention for graduating the resistance offered to the breaking of the current and also for measuring the intensity of said current. Fig. 5 illustrates an arrangement of the parts of my invention whereby the current may be broken at that side of the magnet which is farthest from the exchange. Fig. 6 is an elevation illustrating one description of mechanism for recording the force of the electric current. Fig. 7 is an elevation showing another description of mechanism for recording the force of the electric current. In Figs. 1, 2, 3, 6, and 7 the foundation is broken away at and in the neighborhood of the armature-rod B' in order to show a slot in the foundation. Fig. 8 is a side elevation illustrating, upon an enlarged scale, one novel form of spring-contact employed in connection with mechanism for breaking the current. Fig. 9 indicates a spring-incline employed both as a means for increasing the resistance to the breaking of the current and also for ascertaining the power of the current. Fig. 10 is a view of the bottom of the foundation or supporting piece shown in Figs. 1, 2, 3, 4, 5, 6, and 7 and showing a mode in which electrical contact is made for ringing a bell for notify-

ing the operator when the electric current is so great as to cut off the communication with the exchange or other point where the electrical current is legitimately operated and is diverted to the ground or other desired locality or object. Fig. 11 is a section taken at the plane of the dotted line *xx* of Fig. 1 and showing that face of the section which faces toward the top of said figure. This view shows in plan the preferred form of spring-latch for holding the armature in position after it has been drawn to the magnet. Fig. 12 is a vertical central longitudinal section of a fusible protector of the desired description, illustrating one feature of my invention, the contact-wire passing through said fusible protector being shown by solid lines. The magnet is to be wound with wire of a suitable size. It is provided with a core A'.

The magnet is supported in any preferred manner. One mode of supporting it is shown in the accompanying figures and consists of the vertical standard A², having a foot A³ at right angles to the standard, the said foot bolted, as shown, or otherwise secured at right angles to the foundation or basal support K. To this support the end of the electro-magnet, preferably the end of the core, as shown, is bolted at A³ to the vertical supporting-standard A². Opposite the front end of the core A' of the magnet and at a suitable distance therefrom is an armature B. This armature is pivotally supported.

In Figs. 1, 2, 3, 6, and 7 the armature is pivoted as follows: A rod B' or extension of the armature B supports the latter. Lower down at or near the base of the foundation K a pivot B² at right angles to the vertical rod B' and rigidly connected thereto rests in a journal or pivot bearing B³. In Fig. 1 the rod B' extends below the pivot B³ and is rigidly attached to a rod B⁴. This rod B⁴ is in turn connected to the block of non-conducting material B⁵. The latter is in turn connected to the contact-block B⁶. To this contact-block is attached a wire B⁷. This wire B⁷ conducts the electrical current from the line-wire B⁷ to the street or other source of electrical supply. There is also connected to this contact-block a rod or piece B⁸, which connects the contact-block B⁶ with the contact-block B⁹. Opposite

to this contact-block B⁹ and at a short distance therefrom is another contact-block B¹⁰, connected to the wire B¹¹, which latter connects with the ground B¹². In contact with the block B⁶ is the free end of a spring C. The plate C may be by gravity and by elastic propulsion, or either, impelled downward. I prefer to use elastic propulsion, and I prefer to make the spring and plate C in one, as hereinafter described. The piece or plate C is made of elastic or any spring metal, and its rear end is attached to the supporting-block C⁵ in a manner now to be described. The spring C consists of the flat end portion C' in contact with the adjacent flat side of the contact-block B⁶ and of the portion C², which terminates in the curved portion C³, which passes round and is rigidly connected to a stationary bar or support C⁴. When the free end C⁶ lies upon the contact-block B⁶, the elastic spring is strained, so that the spring C presses hard down upon the contact-block B⁶. When the block B⁶ is slid horizontally away from the spring, as soon as the said block is altogether removed from said spring the free end C' will drop down into the position shown by dotted lines in Fig. 8. This change in position of the spring C insures an absolute breaking of the contact between the contact-block B⁶ and the block C⁵, to which the spring is permanently attached. When the spring C leaves the block B⁶, its elasticity causes it to spring away from the block B⁶, and thus quickly and rapidly removes itself so far out of contact with said block B⁶ that the current cannot be induced to leap or jump from block B⁶ to the spring C. The block C⁵ is adjustable upon the rod or plate C⁶, and in the present instance it slides, as shown in Fig. 8. The plate C⁶ passes through an aperture in the block C⁵. To set the block C⁵ at any desired point upon the plate C⁶, a set-screw C⁷ is provided, which is screwed through the lower side of the block C⁵ and bears up against the under side of the plate C⁶.

The object of making the block C⁵ adjustable upon the plate or rod C⁶ is to regulate the distance that the free end C' of the spring shall lap over on the contact-block B⁶, where the spring lies upon the block B⁶ for a longer distance, as shown in Fig. 8, and the withdrawal of the block B⁶ will require a longer movement of the block B⁶ to separate it out of contact with the plate C⁶, where, by the backward adjustment of the block B⁶ on the plate C⁶, only a part of the end C' of the spring extends part way on the block C⁵. To that end of the plate C⁶ which is opposite to where the adjustable block C⁵ is connected there is attached one end of a wire D. The other end of this wire is connected to one of the wires of the magnet A. The other end of the wire of the magnet A is attached to the upper rod E, the upper rod E constituting an extension of the armature B. To the upper end of this rod E is secured the contact-block C⁵. Upon the flat side of this block rests the

free end of the spring C, such as has been already described, and shown in Fig. 8. The fixed end of this spring is connected to the contact-block C⁵, as already described, the block C⁵ being adjustable upon the plate or rod C⁶ and fixed in the desired position upon said rod or plate C⁶ by the set-screw C⁷, as hereinbefore described. That end of the rod or plate C⁶ which is opposite to where the rod C⁵ is connected to the wire F extends to and is connected with the exchange. The enlarged end of the tapering spring II, such as shown in Fig. 9, is fixed to the block or piece of non-conducting material II'. Upon the upper side of this bears the foot or flanged end I' of the index-finger I. That end of the index-finger I which is opposite to where the flange I' is located is connected to the upper portion of the rod E of the armature. The upper side of the spring II is graduated into divisions, each bearing a suitable number.

On the wire F between the rod or plate C⁶ and the exchange is located a fusible protector. This fusible protector is preferably of the kind shown in Fig. 12 and is as follows: The contact-wire F', located coinciding with the longitudinal axis of the protector, is composed of a fusible alloy. This alloy is to be so mixed as that it shall melt at any desired temperature from 120° to 300° Fahrenheit. One end of this alloy G' is connected to that end of the wire F which is next to the rod or plate C⁶, and the other end of the alloy is connected to that end of the wire F which conducts the electric current to the exchange. Around this fusible alloy wire G' and in close contact therewith is a suitable flux G², as borax. This flux is surrounded by a porous layer of a suitable substance, such as asbestos G³ or other equivalent porous material which will not conduct heat and is a non-conductor of electricity.

In order to allow the oscillation of the armature B, a recess or slot K' is formed in the foundation K.

For the purpose of preventing the armature B, after it has been drawn to the magnet A, from leaving the magnet and so re-establishing the circuit before such circuit has been re-established by human agency I provide a suitable device. One form of such device is as follows: L is a shank secured to the bottom of the foundation-piece K. This shank L carries the horizontally-extended arm L', and the free end of this arm L' is provided with a catch L², inclined or tapering toward its free end. The arm L' is made of an elastic material, so that as the portion B' of the armature is advanced toward and impinges against the inclined portion of the free end of the latch the said arm L' will yield and allow the said extension or rod B' to pass the hook of the latch. The latch L² then being returned to its first position, the hook of the latch will prevent the rod from being swung back again to its first position.

Having thus fully described the function

of the mechanism as shown in Fig. 1, I will now proceed to describe its operation. The spring C is adjustable upon the block B⁶, which latter is connected to the wire B⁷, so that the movement of the armature B of a proper distance will cause the block B⁶ to be withdrawn from the free end of the spring C. Likewise the upper spring C is adjustable upon that block C⁵ which is in direct connection with the extension E of the armature. This last-named adjustment is made with reference to the index-finger I I' and the spring-index H. From the construction of the apparatus it will be evident that as the armature B approaches the magnet A the index-finger I I', having a tendency to move downward as well as toward the non-conducting block H', will bear harder and harder upon the spring H as the armature B approaches the magnet A. This increase of pressure will also be still further augmented by the upward inclination toward the block H' of the spring-index H. If the end C' of the spring C is set far over the block C⁵, as shown in Fig. 1, the index-finger I will have to move a longer distance upon the spring-index H before the block C⁵ is moved out of contact with the spring C. When the spring C has been moved farther to the right, so that the free end C' of the spring C rests upon the block B⁶, as shown in Fig. 8, then obviously a less movement of the armature B toward the magnet will suffice to withdraw the block C⁵ from contact with the spring C. Hence when the spring C has been adjusted far to the left, as shown in Fig. 1, a much greater degree of electrical force must be present in the current passing through wire B⁷ and through the magnet and thence to the exchange to cause the armature to move the spring-contact C out of contact with the block B⁶ than when the upper spring C is set farther to the right. After the lower spring C and the upper spring C have been properly set the desired amount of current for the operation of the telephone or other device to be operated by said current is passed through the contact-wire B⁷ to the exchange. This current passes through the wire B⁷, thence through the adjacent contact-block B⁶, thence through the adjacent contact spring C, thence through the block C⁵, thence through the rod or plate C⁶, thence through the wire D, thence through the magnet A, thence through the upper portion of the extension E of the armature, thence through the upper contact-block C⁵, thence through the upper spring-contact C, thence through the block or piece C⁵, thence through the rod or plate C⁶, thence through the wire F, through the fusible protector G', and thence through the remaining portion of the wire F to the exchange. The electrical current passing through said circuit will often be suddenly and enormously increased in power. This sudden increase of current may arise from a large number of different causes. Among these causes may be mentioned a

thunder-storm coming in contact with the exposed portion of the wire B⁷. So, also, a wire carrying a powerful electric current and crossing the wire B⁷ may, by the sagging of one or the other of the wires, as the case may be, bring the wire B⁷ and the other wires into electrical contact. So, also, the close juxtaposition of two wires—viz., the wire B⁷ and another wire carrying a powerful current—may cause the electric current on B⁷ to be enormously increased in power. Whenever for any reason the electric current in passing over wire B⁷ is greatly increased beyond its normal power, the electro-magnet A, being rendered more highly attractive, will overcome the resistance of the spring-contact C and the index-finger I and will draw the armature B toward itself. As soon as the armature B moves toward the core A' of the magnet it will move the upper contact-block B⁶ from under the upper spring C and the lower contact-block B⁶ from under its adjacent spring-contact C. Each spring C as soon as it leaves its adjacent contact-block B⁶ will rapidly move down and far away from the said contact-block B⁶ and assume the position shown in dotted lines in Fig. 8. At the same time that the springs C C are thrown out of contact with their respective adjacent contact-blocks B⁶, or within an inappreciable moment of time following, the armature B has caused the contact-block B⁶ to come into contact with the contact-block B¹⁰. A too-powerful electric current going over wire B⁷ is thus instantly diverted from the exchange and passes into the ground. In this way the exchange or equivalent device to which the line F conducts the electric current is protected from the dangerous and injurious effects of the too-powerful current. As a further protection against this too-powerful current flowing from wire B⁷ reaching the exchange, the fusible protector C' is present. As the too-powerful current passes through the alloy wire G', it heats the same, and, in connection with the flux G², said wire is instantly melted, and, passing in small particles into the interstices of the asbestos G³, its continuity is entirely destroyed. The exterior of this fusible protector is preferably composed of a fabric G⁴, preferably of some water-proof material. One desired description of material for this purpose is greased paper forming an envelope or covering, which prevents the ingress of moisture to the protector and at the same time is easily destroyed. In this way the electrical communication between the exchange and the wire B⁷ is cut off. When the armature B has reached the core A', the extension B' below the foundation K has passed the head L² of the latch and is thereby securely locked thereto. Hence the armature B cannot thereafter leave the magnet A or move the block B⁹ until the operator intentionally releases the latch L'.

Suitable means for audibly indicating the fact that the armature B has approached the

magnet A and cut off the electric current, as
 aforementioned, between the wires B⁷ and the
 wire F may be employed. One description
 of such means is as follows: Upon the under
 5 side of the foundation K is a lever M, pivotally
 fulcrumed at M' to the foundation K. One end of this lever extends across the slot
 K' near the extension B'. N is a contact located
 upon the lower side of the foundation
 10 K and connected to the wire N', in turn connected
 to the alarm-bell N², duly circuited in
 any of the well-known modes. The contact
 N is within reach of the lever M when the
 15 latter is swung toward it. When the armature
 B is drawn toward the magnet A and cuts
 off the electrical communication between the
 wire B⁷ and the wire F, the extension B', moving
 in the slot K', moves the lever with it and
 20 forces the other end of the lever M against
 the contact N. This lever M will thus be
 brought into contact with the block N, and
 the alarm-bell N² will then be rung, thereby
 notifying the operator that the aforementioned
 25 electrical communication between the wire
 B⁷ and the wire F is cut off. Suitable means
 may also be employed to record the intensity
 of the current which causes the armature B
 to break the electrical communication between
 30 the wire B⁷ and the wire F and for recording
 the time in which said breaking of the
 communication occurred. One description
 of such means is shown in Fig. 6 and is
 as follows: To the extension B' below the
 35 foundation K is rigidly connected a straight
 arm P, having an upright arm P' rigidly connected
 thereto. This arm P' has in turn another
 long arm or finger P² rigidly connected to it.
 This finger P² is pivoted at P³ upon the
 40 supporting-rod P⁴, in turn supported by
 the suitable foundation P⁵. The free end of
 this finger P² bears against the cylinder P⁷.
 This cylinder P⁷ is caused to revolve by clock-
 work. The point P⁶ may be provided with a
 45 pen filled with ink, the cylinder P⁷ being covered
 with paper. The point P⁶ of the lever
 P² may be simply a point and the cylinder P⁷
 be coated with a suitable coating. A very
 cheap and advantageous coating is lamp-
 50 black. The cylinder may be coated with
 lamp-black in a few moments. The point
 P⁶ will then, upon the cutting off of the current
 by the armature B approaching magnet A, mark
 upon the cylinder P⁷ a line indicating the
 55 breaking of the circuit aforementioned, and the
 time when the said break occurred can be easily
 computed. A still simpler form of such a device
 for recording the break of the electric current
 is shown in Fig. 7, where the extension B' of the
 60 armature is rigidly connected at P⁸ to the finger
 P², having an index end P⁶. The latter bears
 upon the rotating sleeve P⁷. When the armature
 B approaches the magnet A and breaks the
 circuit, as aforementioned, the point P⁶ of
 65 the finger P² will register on the revolving
 cylinder P⁷ the time when the said break
 occurred. To enable this operation to be ef-

fectuated, the peripheral surface of the cylinder
 should by proper marks be subdivided, the
 spaces between the main marks representing
 70 hours and the sub-spaces representing minutes.
 The cylinder is rotated by clock-work or other
 suitable mechanism at such a rate and in such a
 position that at a certain hour and minute the
 75 space representing that time will be in such a
 position that should the finger P² be then operated
 it will receive the mark made by the said finger.
 When the finger is operated, that space on the
 80 cylinder in which the mark made by the registering-
 finger P² is found will then indicate the time
 when the circuit was broken.

Another description of device for adjusting
 the amount of resistance that the armature B
 shall experience when drawn toward the mag-
 85 net A and for recording the amount of said
 resistance the armature B shall encounter when
 the said armature B shall be able to break the
 circuit is shown in Fig. 4 and is substantially
 90 as follows: The upper end of the extension B
 is rigidly connected to an arm S, pivotally swung
 and supported at S'. That end of the rod S which
 is opposite to where the extension E is attached is
 95 rigidly connected to the vertical arm S². Upon the
 lower end of this arm is attached a sliding block
 C⁵, adjusted upon said arm S² by a set-screw
 C⁷. A bar C, preferably elastic, is connected
 to the said block C⁵, preferably in the manner
 100 hereinbefore described, and bears upon the side
 of the rod S². Upon the top of the block C⁵
 rests a spring S³, pivotally connected at S⁴ to a
 stationary right-angled cylinder S⁵. On the lower
 105 horizontal part of this scale S⁵ is marked a set
 of divisions indicating the different degrees of
 resistance at which the device is adjusted to make
 the armature B move toward the magnet A. A
 set-screw S⁶ passes through the spring S³ and
 110 is screwed into the stationary arm S⁷. The
 tightening of the set-screw S⁶ increases the
 pressure of the spring upon the block C⁵ and
 also increases the inclination of the spring in
 115 relation to the block C⁵. The lower end of the
 arm S² is provided with an index arrow or pointer
 S⁸, the point of which is in proximity to the
 index-dial on the scale. When a too-powerful
 current passes through the line B⁷ and through
 120 the magnet A, the armature will be drawn toward
 the magnet. When the power of this current be-
 comes such that it is a dangerous one for the
 purposes for which it is used, the spring S³ is
 125 so set by a proper adjustment that the armature
 B shall overcome the resistance of the spring S³.
 The armature will move the lower portion of the
 rod or bar S² toward the left and thereby force
 the block C⁵ and contact-spring S³ away from
 130 and out of contact with the bar B⁶. The latch
 L L' being in contact with the ground-wire B¹¹,
 the electrical current will thereby be shunted or
 diverted from the exchange into the ground B¹².

In Fig. 2 the resistant index-spring H and

index-finger I' are omitted, as are also the lower contact-spring C and its connections. The electrical connection between the contact-block B⁶ and the wire B⁷ is made directly through the armature B E. As the armature B approaches the magnet A it throws the upper contact-block C⁵, with its adjacent spring C, out of contact with block B⁶ and brings contact B⁹ against contact B¹⁰, thereby diverting the current passing through wire B⁷ into the ground B¹². There is also an additional ground-wire T connected to the latch L, so that when the extension B' passes the head of the latch L and comes into contact with the spring portion L' of the latch the latter shall act as a conductor to carry the electricity into the ground in cases where by accident or for any reason the contact B⁹ fails to touch B¹⁰ and approach sufficiently close to the latter to properly conduct the electrical current through the wire B¹¹ to the ground.

In Fig. 3 the branch wire B¹³ is connected to the wire B⁷. The former is in turn connected to the contact B¹⁴, supported on the non-conducting block H' or other suitable support. The index-finger I carries a contact B¹⁵, so located that when the armature B moves the finger I along the spring-index H the contact B¹⁵ approaches contact B¹⁴ and touches the latter. In this way as the armature B is drawn toward the magnet A by the too powerful current the current between the spring C and block B⁶ is broken and the contact between the parts B¹⁴ and B¹⁵ is accomplished, and the current passing through wire B⁷ is thereby diverted from the exchange and part of the current passes through the magnet A and part passes through the branch wire B¹³, thence through the block B¹⁴, and block B¹⁵, and index-finger I, and armature E B B', contact B⁹ B¹⁰, and ground-wire B¹¹ to the ground B¹².

In Fig. 5 is shown a mode of breaking the contact between the wire B⁷ and the wire F. These means consist of a stationary contact C⁵. To the upper end of the armature is connected a contact B⁶. One end of the wire which passes through the magnet is connected to the armature E B. The lower end of the armature is pivoted at B² to the foundation K. When the current through B⁷ becomes too powerful, the increased attraction of the magnet A draws the armature B toward it and separates the contact B⁶ from the stationary contact C⁵, thereby breaking the current passing to the exchange.

This description of device is not as desirable as those others of my invention hereinbefore described, whereby the electrical current is not only cut off from the wire F, but also is conducted to the ground or other suitable locality where it can do no harm. The danger from any accident which might occur from the wire B⁷ having a too powerful current not conducted to the ground is in the cases where it is thus conducted to the ground obviated by diverting it into the ground.

What I claim as new and of my invention, and desire to secure by Letters Patent, is—

1. The contact-current uniting and breaking device consisting of the contact B⁶, spring C, having contact end portion C' adapted to rest on contact B⁶ and having its upper end curved around and fixed to the stationary piece C⁴, the spring being formed, as described, to bear upon the contact B⁶ and when drawn away therefrom to assume a position nearly at right angles to its first position, the free end of the spring being not only out of connection with the opposite pole, but also far below the line of contact with said pole and out of position for recontact to be made therewith until directly lifted by hand and placed upon the contact-piece B⁶, substantially as and for the purposes specified.

2. The elastic spring C², curved and connected to piece C⁴, the bed or supporting part of the latter being adjustable on the connecting rod or plate C³, and screw C⁷ for securing the said bed in position on the plate, and contact B⁶, upon which the free end portion of the spring C is adapted to rest, substantially as and for the purposes specified.

3. The graduated incline H, and the index-finger I, bearing thereon, and armature B, attached to said index-finger, and electric magnet A, substantially as and for the purposes specified.

4. The graduated spring-incline H, and the index-finger I, bearing thereon, and armature B B', pivoted at B² and being connected above to finger I, substantially as and for the purpose specified.

5. The magnet A, armature B, having extension B', pivoted at B², and extension E, connected to the rod-finger I, and contact B⁶, and incline H, upon which said finger bears, and the adjustable spring-contact C, bearing at its free end on contact B⁶, substantially as and for the purposes specified.

6. The magnet A, armature B, having extension B', pivoted at B², and extension E, connected to the rod-finger I, and contact B⁶, and incline H, upon which said finger bears, and the adjustable spring-contact C, bearing at its free end on contact B⁶, the normal electrical supply current passing through the magnet and thence through the extension E, contact C, and line F, substantially as and for the purposes specified.

7. The magnet A, armature B, carrying the block B⁶, index-finger I, and the index inclined plate H, over which the index-finger I passes, and contact-block B⁶, carried by the armature simultaneously with the movement of the index-finger, and spring C, and connecting-piece C⁵ in the electrical circuit and upon which the spring C is adjustable to and from the block B⁶, substantially as and for the purposes specified.

8. The magnet A, armature B, carrying the block B⁶, index-finger I, and the index inclined plate H, over which the index-finger I

passes, and contact-block B⁶, carried by the armature simultaneously with the movement of the index-finger, and spring C, and connecting-piece C⁶ in the electrical circuit and upon which the spring C is adjustable to and from the block B⁶, and the latch L L², adapted to hold an extension of the armature when the latter is in contact with the magnet and the block B⁶ is out of contact with the spring C, substantially as and for the purposes specified.

9. The magnet A, armature B, carrying the block B⁶, index-finger I, provided with flange I', and the index inclined plate H, over which the index-finger I, having flange I', passes, and contact-block B⁶, carried by the armature simultaneously with the movement of the index-finger, and spring C, and connecting piece C⁶ in the electrical circuit and upon which the spring C is adjustable to and from the block B⁶, substantially as and for the purposes specified.

10. The magnet A, armature B, having upper extension E in contact with the spring-contact C, the latter being in contact with the line F, and extension B', pivoted at B² and carrying swinging contact B⁹ and permanent contact B¹⁰, connected to shunting-wire B¹¹, and latch L for locking the armature in position after said armature has approached the magnet, a ground-wire L⁴ being connected to the latch, substantially as and for the purposes specified.

11. The fusible protector consisting of the alloy wire G', flux G², and porous material G³, compacted, substantially as and for the purposes specified.

12. The fusible protector consisting of the alloy wire G', flux G², and porous material G³,

compacted, and water-proof envelope G⁴, substantially as and for the purposes specified.

13. The magnet A, armature B, having extension E, carrying contact B⁶, and finger I, engaging graduated spring-incline H, spring-contact C, adjustable on rod C⁶ and touching contact B⁶, the rod C⁶, connected to wire F, and the fusible protector located between and connected to adjacent ends of the wire F, the armature B, having extension B', pivoted at B² and carrying the non-conducting block B⁵, supporting contact B⁶, connected to the electrical supply wire B⁷, and the rod B⁸, carrying contact B⁹, contact B¹⁰, opposite to B⁹ and connected to ground-wire B¹¹, spring-contact C, at one end resting on the last-named contact B⁶ and at the other end fixed to the block C⁵, adjustable on the rod C⁶, the latter connected to wire D, connected to one end of the wire of the magnet A, the other end of the wire of the magnet being connected to the extension E, and latch L for locking the armature in position after it has approached the magnet, substantially as and for the purposes specified.

14. In a device for breaking the circuit, the magnet A, reciprocating armature B, rotatable cylinder P⁷, lever connected to the armature and pivoted at B², and the index-arm, finger P², pivoted at P⁸ to the lever B', the longitudinal axis of the finger being in a plane substantially parallel to the plane passing through the axis of the recording-cylinder, and the recording-cylinder P⁷, substantially as and for the purposes specified.

JOHN B. MURPHY.

Attest:

CHAS. L. BOGLE,
K. SMITH.