(No Model.) 2 Sheets—Sheet 1.

J. B. MURPHY, Dec'd.

M. J. MURPHY, Administratrix.

CUT-OUT.

No. 468,101. Patented Feb. 2, 1892.

Fig. 1.

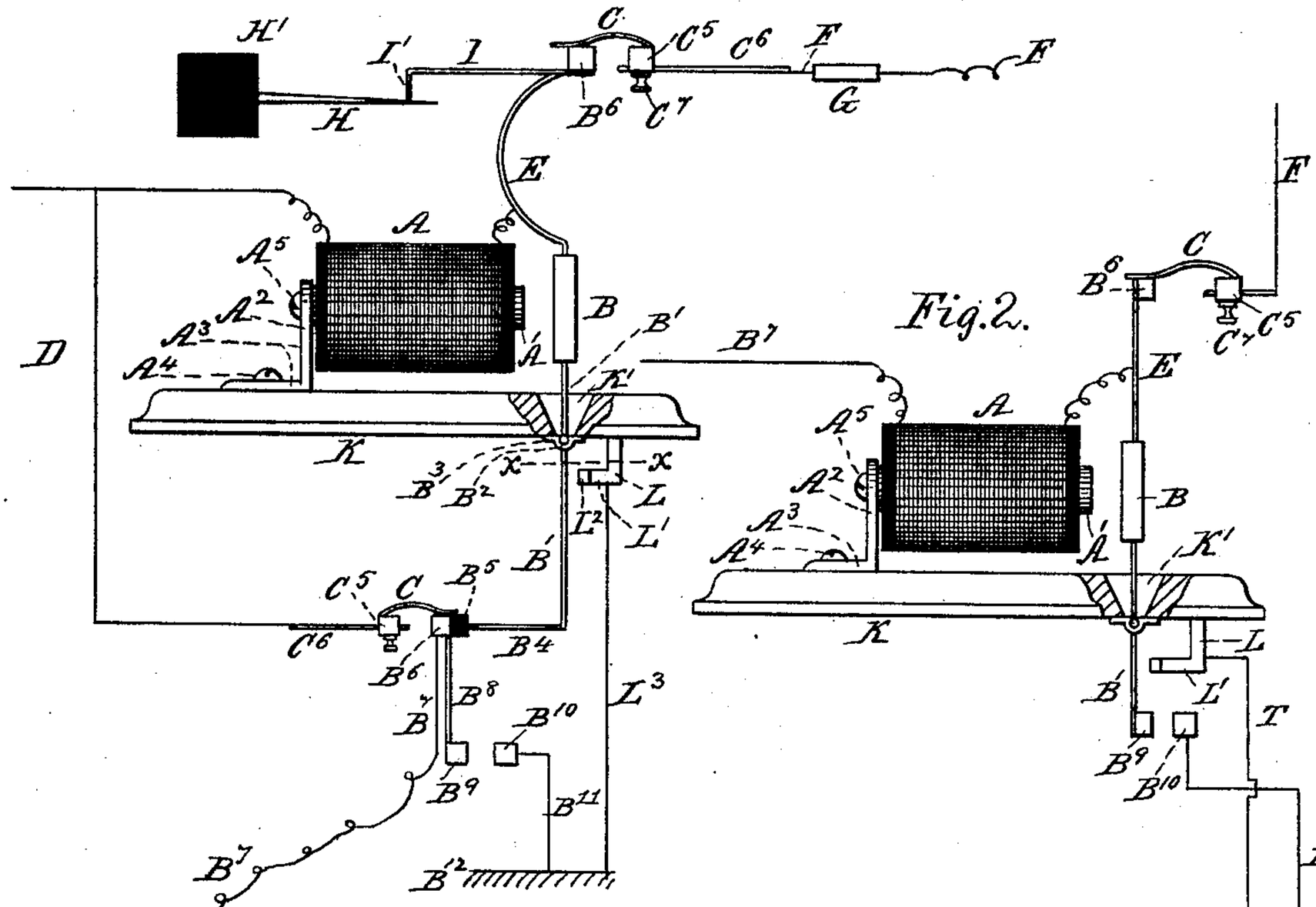
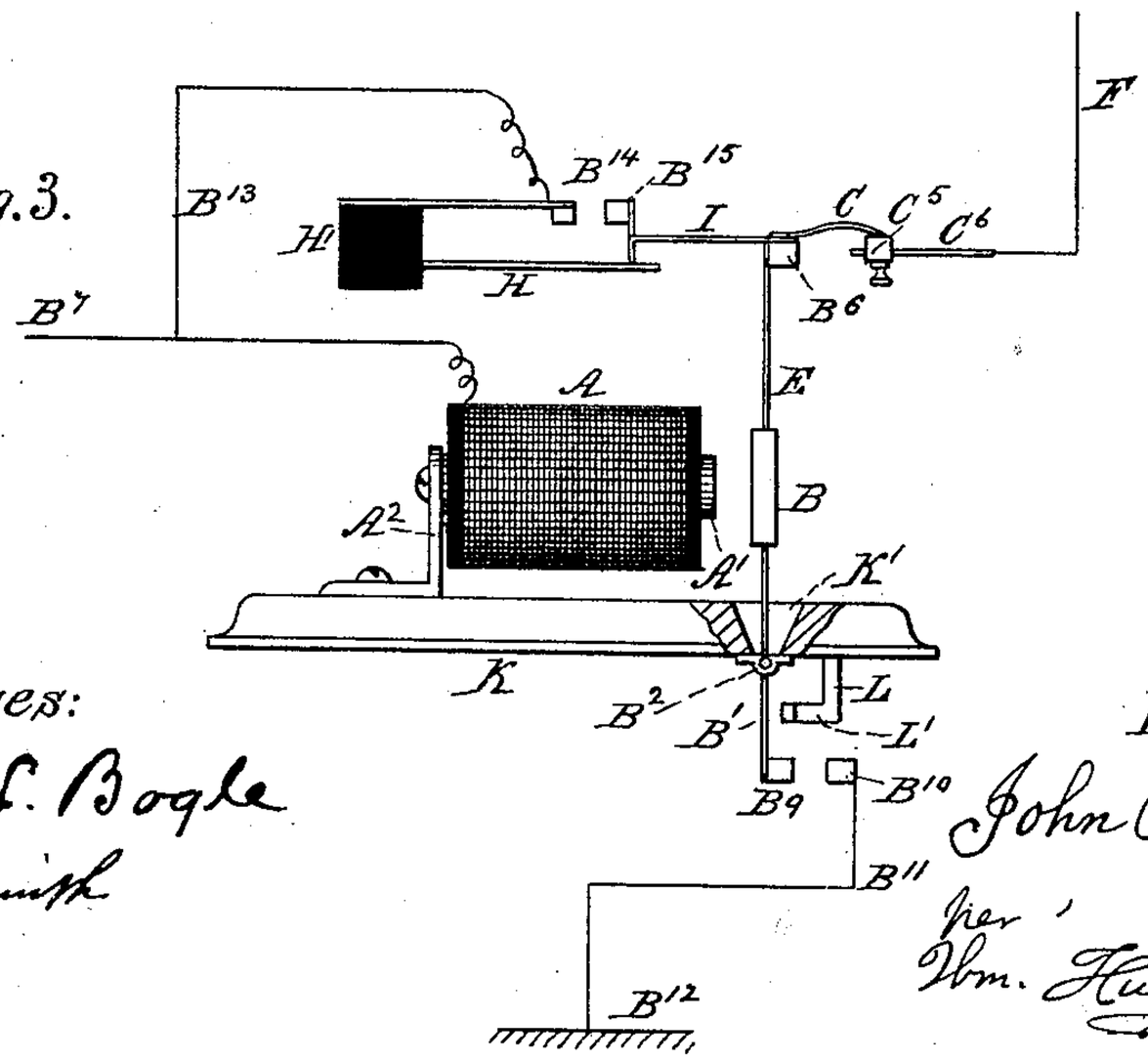


Fig. 2.

Fig. 3.



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K. Smith

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(No Model.) 2 Sheets—Sheet 2.

J. B. MURPHY, Dec'd.

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Fig. 4.

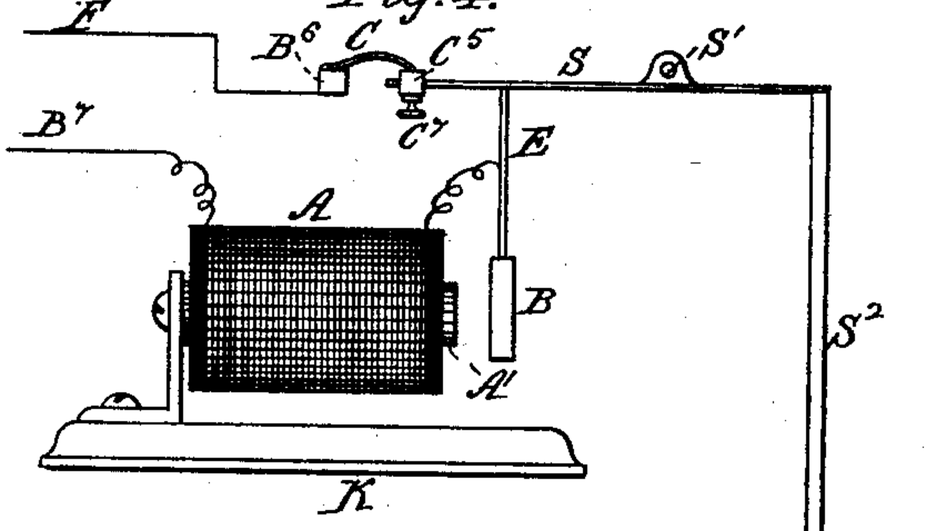
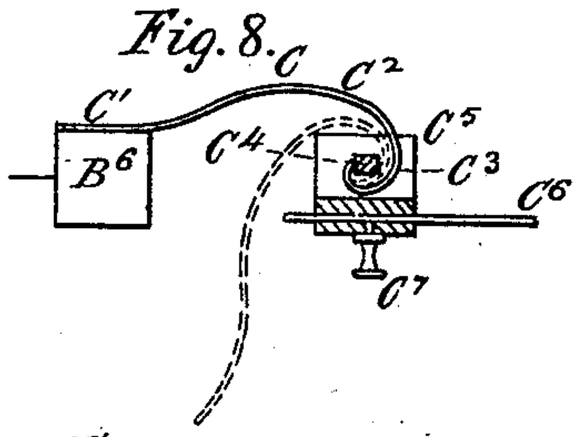


Fig. 8.



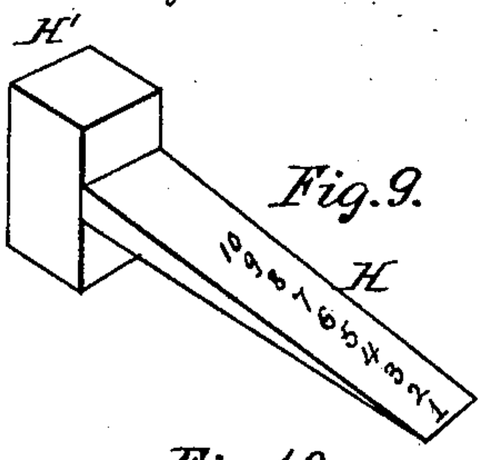
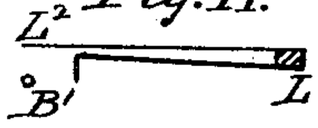


Fig. 9.

Fig. 11.



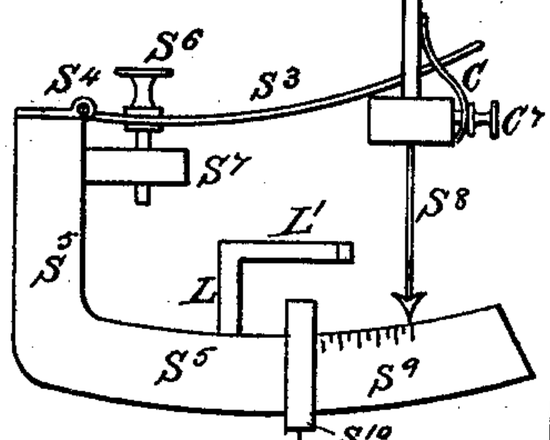
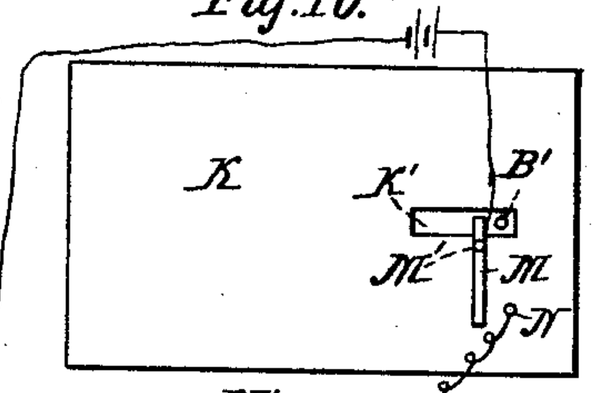


Fig. 10.



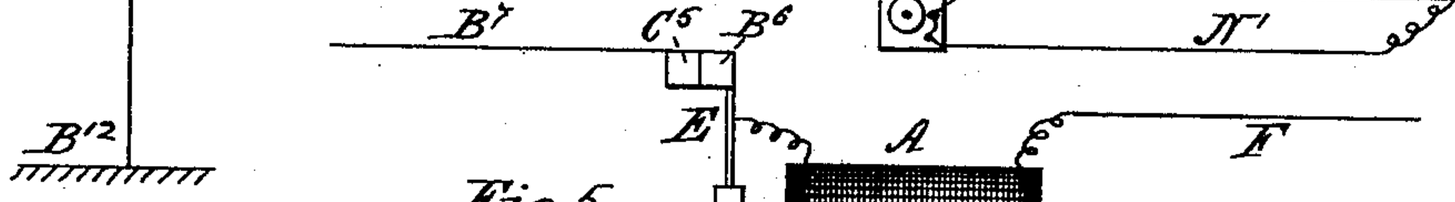


Fig. 5.

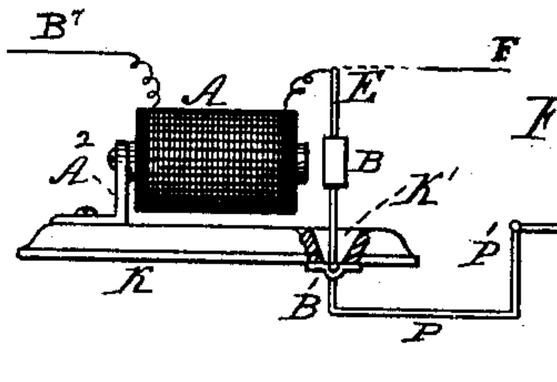


Fig. 6.

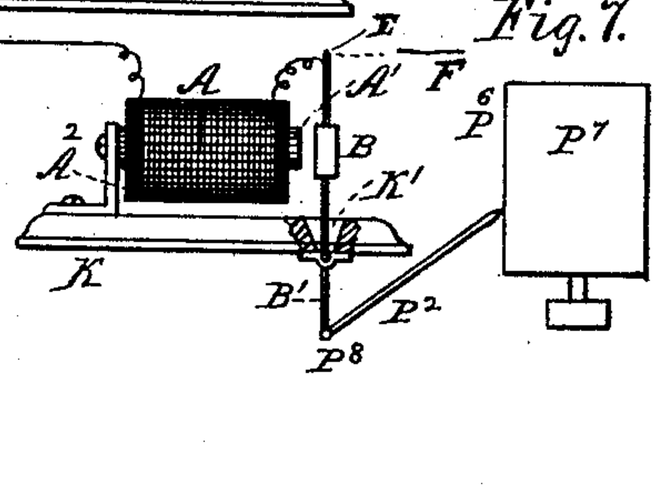
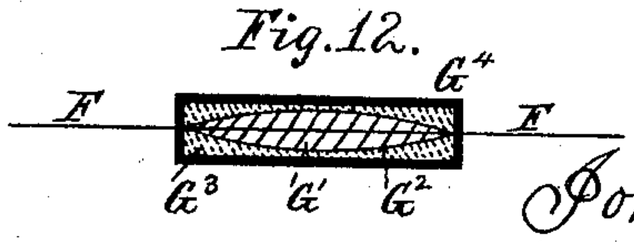


Fig. 7.

Fig. 12.



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Inventor:

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UNITED STATES PATENT OFFICE.

JOHN B. MURPHY, OF CINCINNATI, OHIO; MARY J. MURPHY, ADMINISTRATRIX OF SAID JOHN B. MURPHY, DECEASED.

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 notifying 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 $x\,x$ 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 A^2, having a foot A^3 at right angles to the standard, the said foot bolted, as shown, or otherwise secured at A^4 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 A^5 to the vertical supporting-standard A^2. 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 B^2 at right angles to the vertical rod B′ and rigidly connected thereto rests in a journal or pivot bearing B^3. In Fig. 1 the rod B′ extends below the pivot B^3 and is rigidly attached to a rod B^4. This rod B^4 is in turn connected to the block of non-conducting material B^5. The latter is in turn connected to the contact-block B^6. To this contact-block is attached a wire B^7. This wire B^7 conducts the electrical current from the line-wire B^7 to the street or other source of electrical supply. There is also connected to this contact-block a rod or piece B^8, which connects the contact-block B^6 with the contact-block B^9. Opposite

to this contact-block B^9 and at a short distance therefrom is another contact-block B^{10}, connected to the wire B^{11}, which latter connects with the ground B^{12}. In contact with the block B^6 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 C^5 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 B^6 and of the portion C^2, which terminates in the curved portion C^3, which passes round and is rigidly connected to a stationary bar or support C^4. When the free end C^6 lies upon the contact-block B^6, the elastic spring is strained, so that the spring C presses hard down upon the contact-block B^6. When the block B^6 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 B^6 and the block C^5, to which the spring is permanently attached. When the spring C leaves the block B^6, its elasticity causes it to spring away from the block B^6, and thus quickly and rapidly removes itself so far out of contact with said block B^6 that the current cannot be induced to leap or jump from block B^6 to the spring C. The block C^5 is adjustable upon the rod or plate C^6, and in the present instance it slides, as shown in Fig. 8. The plate C^6 passes through an aperture in the block C^5. To set the block C^5 at any desired point upon the plate C^6, a set-screw C^7 is provided, which is screwed through the lower side of the block C^5 and bears up against the under side of the plate C^6.

The object of making the block C^5 adjustable upon the plate or rod C^6 is to regulate the distance that the free end C′ of the spring shall lap over on the contact-block B^6, where the spring lies upon the block B^6 for a longer distance, as shown in Fig. 8, and the withdrawal of the block B^6 will require a longer movement of the block B^6 to separate it out of contact with the plate C^6, where, by the backward adjustment of the block B^6 on the plate C^6, only a part of the end C′ of the spring extends part way on the block C^5. To that end of the plate C^6 which is opposite to where the adjustable block C^5 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 C^5. 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 C^5, as already described, the block C^5 being adjustable upon the plate or rod C^6 and fixed in the desired position upon said rod or plate C^6 by the set-screw C^7, as hereinbefore described. That end of the rod or plate C^6 which is opposite to where the rod C^5 is connected to the wire F extends to and is connected with the exchange. The enlarged end of the tapering spring H, such as shown in Fig. 9, is fixed to the block or piece of non-conducting material H′. 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 H is graduated into divisions, each bearing a suitable number.

On the wire F between the rod or plate C^6 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 C^6, 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 G^2, as borax. This flux is surrounded by a porous layer of a suitable substance, such as asbestus G^3 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 L^2, 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 L^2 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 B^6, which latter is connected to the wire B^7, so that the movement of the armature B of a proper distance will cause the block B^6 to be withdrawn from the free end of the spring C. Likewise the upper spring C is adjustable upon that block C^5 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 C^5, as shown in Fig. 1, the index-finger I will have to move a longer distance upon the spring-index H before the block C^5 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 B^6, as shown in Fig. 8, then obviously a less movement of the armature B toward the magnet will suffice to withdraw the block C^5 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 B^7 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 B^6 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 B^7 to the exchange. This current passes through the wire B^7, thence through the adjacent contact-block B^6, thence through the adjacent contact spring C, thence through the block C^5, thence through the rod or plate C^6, 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 C^5, thence through the upper spring-contact C, thence through the block or piece C^5, thence through the rod or plate C^6, 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 B^7. So, also, a wire carrying a powerful electric current and crossing the wire B^7 may, by the sagging of one or the other of the wires, as the case may be, bring the wire B^7 and the other wires into electrical contact. So, also, the close juxtaposition of two wires—viz., the wire B^7 and another wire carrying a powerful current—may cause the electric current on B^7 to be enormously increased in power. Whenever for any reason the electric current in passing over wire B^7 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 B^6 from under the upper spring C and the lower contact-block B^6 from under its adjacent spring-contact C. Each spring C as soon as it leaves its adjacent contact-block B^6 will rapidly move down and far away from the said contact-block B^6 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 B^6, or within an inappreciable moment of time following, the armature B has caused the contact-block B^6 to come into contact with the contact-block B^{10}. A too-powerful electric current going over wire B^7 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 B^7 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 G^2, said wire is instantly melted, and, passing in small particles into the interstices of the asbestus G^3, its continuity is entirely destroyed. The exterior of this fusible protector is preferably composed of a fabric G^4, 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 B^7 is cut off. When the armature B has reached the core A′, the extension B′ below the foundation K has passed the head L^2 of the latch and is thereby securely locked thereto. Hence the armature B cannot thereafter leave the magnet A or move the block B^9 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 B^7 and the wire F may be employed. One description of such means is as follows: Upon the under 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 K and connected to the wire N′, in turn connected to the alarm-bell N^2, duly circuited in any of the well-known modes. The contact N is within reach of the lever M when the latter is swung toward it. When the armature B is drawn toward the magnet A and cuts off the electrical communication between the wire B^7 and the wire F, the extension B′, moving in the slot K′, moves the lever with it and 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 N^2 will then be rung, thereby notifying the operator that the aforenamed electrical communication between the wire B^7 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 the wire B^7 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 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 P^2 rigidly connected to it. This finger P^2 is pivoted at P^3 upon the supporting-rod P^4, in turn supported by the suitable foundation P^5. The free end of this finger P^2 bears against the cylinder P^7. This cylinder P^7 is caused to revolve by clockwork. The point P^6 may be provided with a pen filled with ink, the cylinder P^7 being covered with paper. The point P^6 of the lever P^2 may be simply a point and the cylinder P^7 be coated with a suitable coating. A very cheap and advantageous coating is lamp-black. The cylinder may be coated with lamp-black in a few moments. The point P^6 will then, upon the cutting off of the current by the armature B approaching magnet A, mark upon the cylinder P^7 a line indicating the 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 armature is rigidly connected at P^8 to the finger P^2, having an index end P^6. The latter bears upon the rotating sleeve P^7. When the armature B approaches the magnet A and breaks the circuit, as aforementioned, the point P^6 of the finger P^2 will register on the revolving cylinder P^7 the time when the said break occurred. To enable this operation to be effectuated, the peripheral surface of the cylinder should by proper marks be subdivided, the spaces between the main marks representing 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 space representing that time will be in such a position that should the finger P^2 be then operated it will receive the mark made by the said finger. When the finger is operated, that space on the cylinder in which the mark made by the registering-finger P^2 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 magnet 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 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 rigidly connected to the vertical arm S^2. Upon the lower end of this arm is attached a sliding block C^5, adjusted upon said arm S^2 by a set-screw C^7. A bar C, preferably elastic, is connected to the said block C^5, preferably in the manner hereinbefore described, and bears upon the side of the rod S^2. Upon the top of the block C^5 rests a spring S^3, pivotally connected at S^4 to a stationary right-angled cylinder S^5. On the lower horizontal part of this scale S^5 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 S^6 passes through the spring S^3 and is screwed into the stationary arm S^7. The tightening of the set-screw S^6 increases the pressure of the spring upon the block C^5 and also increases the inclination of the spring in relation to the block C^5. The lower end of the arm S^2 is provided with an index arrow or pointer S^8, the point of which is in proximity to the index-dial on the scale. When a too-powerful current passes through the line B^7 and through the magnet A, the armature will be drawn toward the magnet. When the power of this current becomes such that it is a dangerous one for the purposes for which it is used, the spring S^3 is so set by a proper adjustment that the armature B shall overcome the resistance of the spring S^3. The armature will move the lower portion of the rod or bar S^2 toward the left and thereby force the block C^5 and contact-spring S away from and out of contact with the bar B^6. The latch L L′ being in contact with the ground-wire B^{11}, the electrical current will thereby be shunted or diverted from the exchange into the ground B^{12}.

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 B^6 and the wire B^7 is made directly through the armature B E. As the armature B approaches the magnet A it throws the upper contact-block C^5, with its adjacent spring C, out of contact with block B^6 and brings contact B^9 against contact B^{10}, thereby diverting the current passing through wire B^7 into the ground B^{12}. 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 B^9 fails to touch B^{10} and approach sufficiently close to the latter to properly conduct the electrical current through the wire B^{11} to the ground.

In Fig. 3 the branch wire B^{13} is connected to the wire B^7. The former is in turn connected to the contact B^{14}, supported on the non-conducting block H′ or other suitable support. The index-finger I carries a contact B^{15}, so located that when the armature B moves the finger I along the spring-index H the contact B^{15} approaches contact B^{14} 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 B^6 is broken and the contact between the parts B^{14} and B^{15} is accomplished, and the current passing through wire B^7 is thereby diverted from the exchange and part of the current passes through the magnet A and part passes through the branch wire B^{13}, thence through the block B^{14}, and block B^{15}, and index-finger I, and armature E B B′, contact B^9 B^{10}, and ground-wire B^{11} to the ground B^{12}.

In Fig. 5 is shown a mode of breaking the contact between the wire B^7 and the wire F. These means consist of a stationary contact C^5. To the upper end of the armature is connected a contact B^6. 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 B^2 to the foundation K. When the current through B^7 becomes too powerful, the increased attraction of the magnet A draws the armature B toward it and separates the contact B^6 from the stationary contact C^5, 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 B^7 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 B^6, spring C, having contact end portion C′ adapted to rest on contact B^6 and having its upper end curved around and fixed to the stationary piece C^4, the spring being formed, as described, to bear upon the contact B^6 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 B^6, substantially as and for the purposes specified.

2. The elastic spring C^2, curved and connected to piece C^4, the bed or supporting part of the latter being adjustable on the connecting rod or plate C^6, and screw C^7 for securing the said bed in position on the plate, and contact B^6, 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 B^2 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 B^2, and extension E, connected to the rod-finger I, and contact B^6, and incline H, upon which said finger bears, and the adjustable spring-contact C, bearing at its free end on contact B^6, substantially as and for the purposes specified.

6. The magnet A, armature B, having extension B′, pivoted at B^2, and extension E, connected to the rod-finger I, and contact B^6, and incline H, upon which said finger bears, and the adjustable spring-contact C, bearing at its free end on contact B^6, 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 B^6, index-finger I, and the index inclined plate H, over which the index-finger I passes, and contact-block B^6, carried by the armature simultaneously with the movement of the index-finger, and spring C, and connecting-piece C^6 in the electrical circuit and upon which the spring C is adjustable to and from the block B^6, substantially as and for the purposes specified.

8. The magnet A, armature B, carrying the block B^6, index-finger I, and the index inclined plate H, over which the index-finger I

passes, and contact-block B^6, carried by the armature simultaneously with the movement of the index-finger, and spring C, and connecting-piece C^6 in the electrical circuit and upon which the spring C is adjustable to and from the block B^6, and the latch L L^2, adapted to hold an extension of the armature when the latter is in contact with the magnet and the block B^6 is out of contact with the spring C, substantially as and for the purposes specified.

9. The magnet A, armature B, carrying the block B^6, 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 B^6, carried by the armature simultaneously with the movement of the index-finger, and spring C, and connecting piece C^6 in the electrical circuit and upon which the spring C is adjustable to and from the block B^6, 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 B^2 and carrying swinging contact B^9 and permanent contact B^{10}, connected to shunting-wire B^{11}, and latch L for locking the armature in position after said armature has approached the magnet, a ground-wire L^4 being connected to the latch, substantially as and for the purposes specified.

11. The fusible protector consisting of the alloy wire G′, flux G^2, and porous material G^3, compacted, substantially as and for the purposes specified.

12. The fusible protector consisting of the alloy wire G′, flux G^2, and porous material G^3, compacted, and water-proof envelope G^4, substantially as and for the purposes specified.

13. The magnet A, armature B, having extension E, carrying contact B^6, and finger I, engaging graduated spring-incline H, spring-contact C, adjustable on rod C^6 and touching contact B^6, the rod C^6, 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 B^2 and carrying the non-conducting block B^5, supporting contact B^6, connected to the electrical supply wire B^7, and the rod B^8, carrying-contact B^9, contact B^{10}, opposite to B^9 and connected to ground-wire B^{11}, spring-contact C, at one end resting on the last-named contact B^6 and at the other end fixed to the block C^5, adjustable on the rod C^6, 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 P^7, lever connected to the armature and pivoted at B^2, and the index-arm, finger P^2, pivoted at P^8 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 P^7, substantially as and for the purposes specified.

JOHN B. MURPHY.

Attest:
CHAS. L. BOGLE,
K. SMITH.