(No Model.)

P. G. WILLIAMS & A. W. ROOVERS.

COIN OPERATED INDUCTION COIL.

No. 386,860. Patented July 31, 1888.

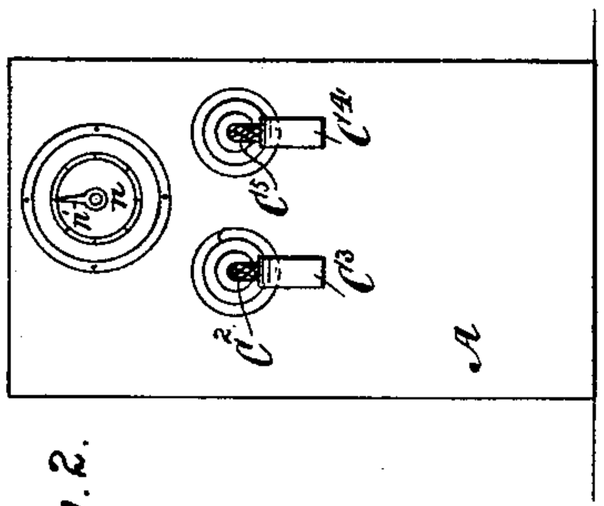

Fig. 2.

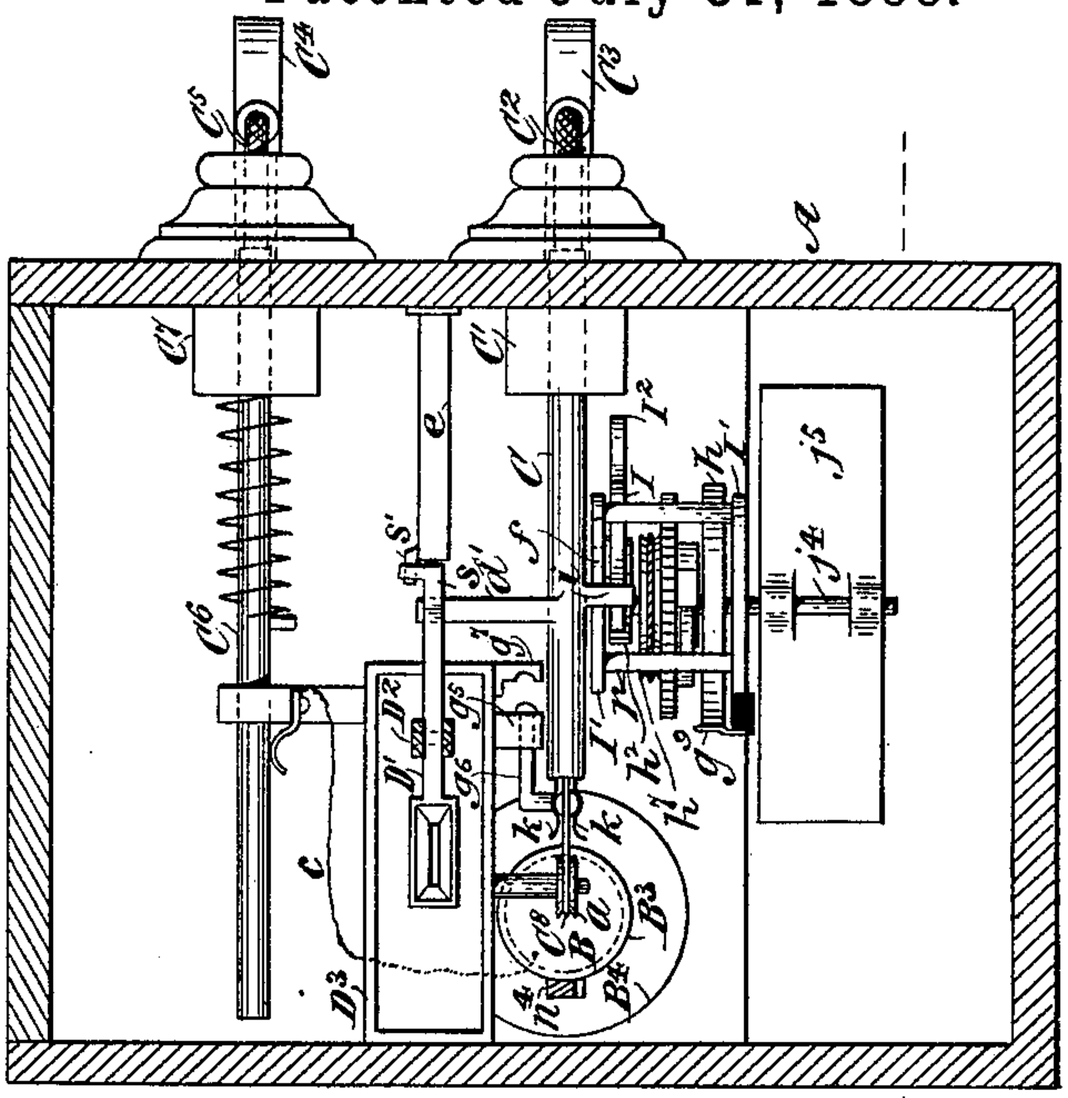

Fig. 3.

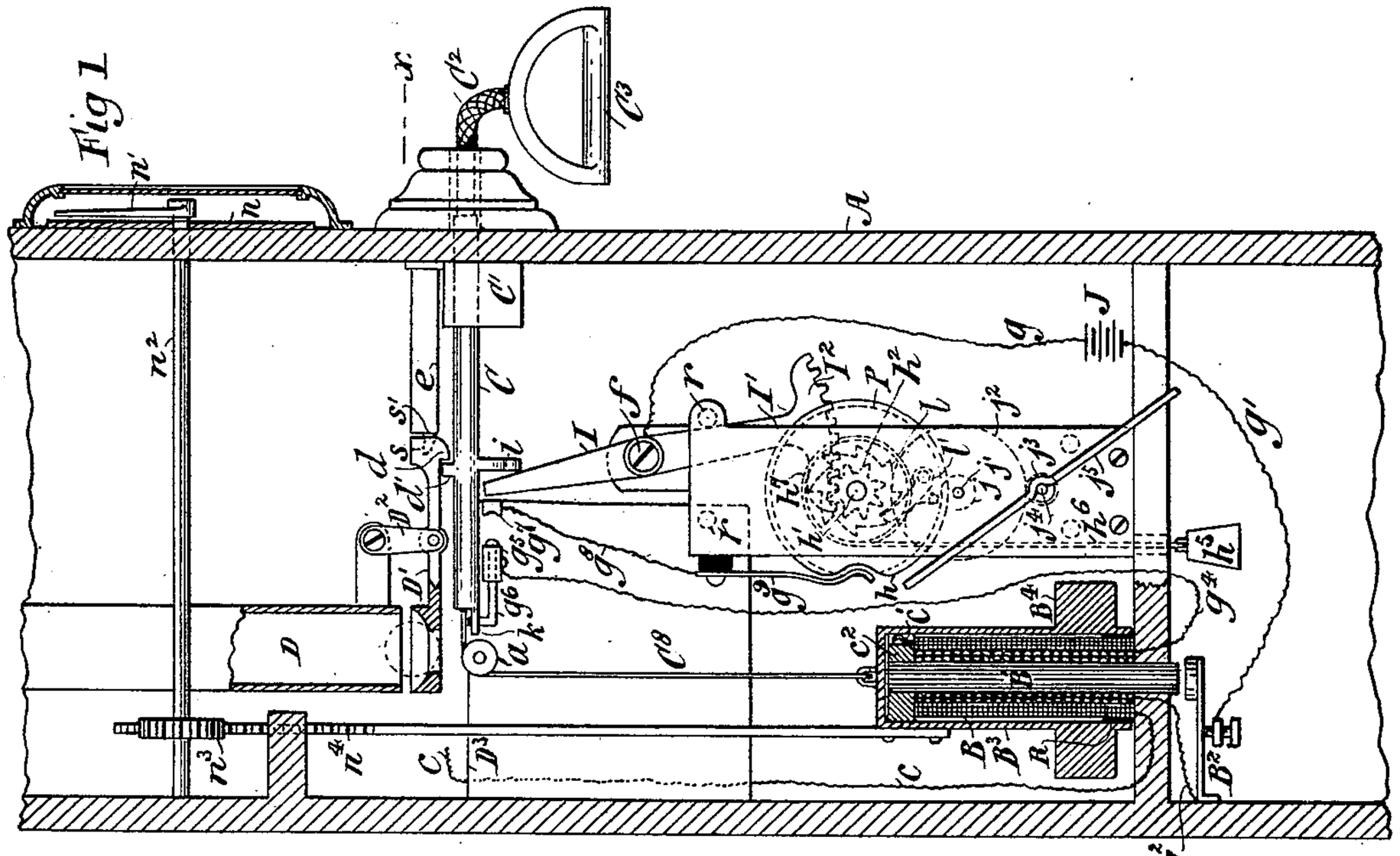

Fig 1

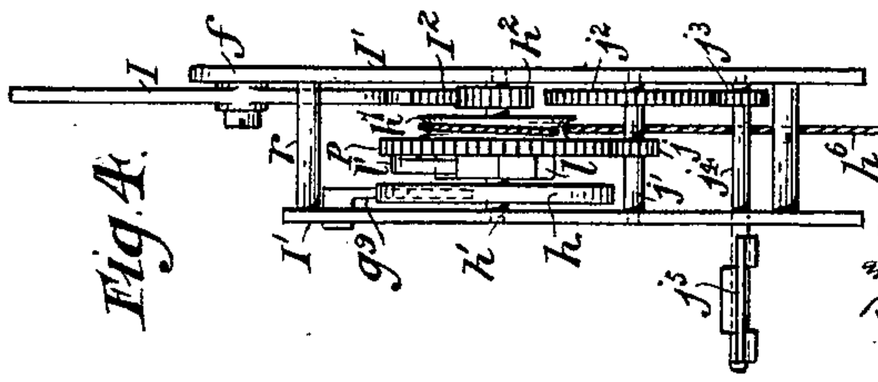

Fig. 4.

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UNITED STATES PATENT OFFICE.

PERCY G. WILLIAMS AND ALFRED W. ROOVERS, OF BROOKLYN, NEW YORK; SAID ROOVERS ASSIGNOR TO SAID WILLIAMS.

COIN-OPERATED INDUCTION-COIL.

SPECIFICATION forming part of Letters Patent No. 386,860, dated July 31, 1888.

Application filed January 5, 1888. Serial No. 259,858. (No model.)

To all whom it may concern:

Be it known that we, PERCY G. WILLIAMS and ALFRED W. ROOVERS, both of the city of Brooklyn, county of Kings, and State of New York, have invented a certain new and useful Improvement in Coin-Operated Induction-Coils, of which the following is a specification.

Our improvement relates to that class of machines in which an induction-coil becomes energized by the closing of an electrical circuit through the intervention of a coin of a certain weight and size, in order that a current of electricity may be transmitted to a person grasping certain electrodes in electrical circuit with the induction-coil.

We will describe in detail a machine embodying our improvement, and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of an apparatus embodying our improvement and portions of a case in which the same is contained, one side of the case being removed and other parts being broken away. Fig. 2 is a front elevation of the case of the machine, showing certain electrodes and a dial or indicator. Fig. 3 is a transverse section thereof taken on the plane of the dotted line *x x*, Fig. 1. Fig. 4 is a side view showing in detail certain mechanisms employed in the machine.

Similar letters of reference designate corresponding parts in all the figures.

A designates the box or case. It may be made of wood and of any desired size or shape. As shown, it is rectangular.

B designates an induction-coil. It may be of the usual or any desired construction. As shown, it is arranged vertically, its lower end being supported upon a block of insulating material—which may be of wood—and comprises a cross-piece extending between the side walls of the case A. The core B′ of the induction-coil extends at its lower end through a suitable aperture in said block of insulating material, and is preferably friction-tight therein. A vibrator, B^2, of ordinary construction is mounted upon a suitable support adjacent to the lower end of the core B′, and is operated when circuit is closed on the primary coil of the induction-coil. Surrounding the induction-coil, and in contact with the secondary coil thereof, is a longitudinally-movable shell, B^3, of brass or other metal. This shell is moved in one direction by means of a metallic chain or cord, C^8, attached to the upper end thereof and extending upwardly over an insulated pulley, *a*, mounted on a pin or stud extending from the side of the case or a suitable support secured thereto. Beyond the pulley the chain is attached to a longitudinally-movable rod, C. This rod may be moved to and fro through a slideway, C′, secured to a suitable support extending from the case. To the other end of the rod is secured, by any suitable means, a flexible conductor, C^2. This conductor will preferably be made of wire or chain covered with a suitable covering of textile material. The conductor extends through a suitable aperture in the side of the case, and its outer end has connected with it a metallic pull piece or handle, C^3, constituting an electrode. It will be readily seen that when this electrode is grasped and the conductor C^2 is drawn outwardly or downwardly, the shell B^3 will be moved upwardly. The farther the shell is moved upwardly, of course the fewer will be the number of coils of the secondary with which the shell is in contact, and consequently the greater will be the strength of the induced current when the circuit is closed on the secondary. The downward movement of the shell B^3 is assisted by means of a weight, B^4. (Here shown as of annular form and surrounding and secured to said shell near the lower end thereof.) Of course a spring may be used instead of the weight, if desired. This weight or spring has another function, which will presently be described.

C^1 designates another electrode, similar in form to electrode C^3. It is shown as arranged side by side with the electrode C^3, and as connected with a flexible conductor, C^5, similar to the conductor C^2. The conductor C^5 is connected to a metal sliding rod, C^6, similar to the sliding rod C, adapted to slide through a slideway, C^7. Extending from the rod C^6 is a suitable electrical conductor, *c*, which conductor is in electrical connection at its other end with the secondary of the induction-coil by means of a contact-piece, *c′*, secured upon a block of insulating material, c^2, arranged at the upper end of the induction-coil and sur-

rounding the core thereof. This contact-piece is of spring metal and is in contact with the shell B^3. A circuit for the induced current is formed when a person grasps the electrodes C^3 C^4 and elevates the shell B^3. The circuit then comprises the secondary coil of the induction-coil, the chain or cord C^8, the rod C, the conductor C^2, the person grasping the electrodes C^3 C^4, the electrode C^4, the conductor C^5, the rod C^6, and the wire C. Although we have shown and described the electrode C^4 and rod C^6 as capable of being drawn outwardly, such is not necessary, as the same may occupy a fixed position.

The induction-coil of this machine cannot be energized until a coin of a certain weight and size has been passed through a slit or opening in the case, which coin operates to release the rod C from a stop, so that it may be drawn outwardly, thereby permitting the operation of certain mechanism, whereby the primary circuit is closed. A coin of suitable weight and size having been passed through the slit or opening in the case, (not shown in the drawings,) passes through a chute, D, and out at the open lower end thereof, lodging in a cavity formed in a lever, D'. The lever D' is fulcrumed upon a swinging arm, D^2, which latter is pivotally connected to a suitable support extending from the box or case. The weight of the coin is sufficient to overbalance the lever and cause it to rock downwardly. When the lever has rocked sufficiently far, the coin will fall out of the cavity in the lever and be deposited in a receptacle, D^3, arranged conveniently to receive it. When the coin has fallen out of the lever, the latter will be returned to its normal position by the operation of a counterbalance-weight, *s*, on the lever. A suitably arranged spring may, however, be used for this purpose. A too-extended downward movement of the lever in this direction is prevented by a stop, *s'*, consisting of a pin or stud extending from an abutment, *e*. The end of the lever opposite the cavity is provided with a detent, *d*. (Here shown as a tooth.) When the lever occupies a normal position—as, for instance, that shown in Fig. 1—the detent *d* is in engagement with a pin or projection, *d'*, on the rod C. The detent therefore prevents the outward longitudinal movement of the rod C. When, however, the lever D' is rocked on its fulcrum by a coin, the detent is moved away from the pin or projection *d'*, and the rod C may consequently be withdrawn.

In order to prevent injury to the lever D' by a sudden or accidental pull upon the electrode C^3, the lever is fulcrumed upon the swinging arm D^2, as described, and a stop is also provided to prevent longitudinal movement of the lever in the direction of outward movement of the rod C. This stop consists, as shown, of an abutment, *e*, preferably of metal, arranged in the line of movement of the lever and in front of the detent thereon, but so close thereto that but slight movement can be imparted to the lever by the pin or projection *d'*. The abutment *e* may be secured to the case in any suitable manner. The detent *d* is beveled upon its forward and under side, as shown, so that when the rod C is moved rearwardly to its normal position the pin *d'* will raise the detent and pass beneath it.

When the pin or projection is freed from the detent of the lever and the rod C is moved outwardly, it admits of the swinging movement of a lever, I. This lever is fulcrumed upon a pin or stud, *f*, secured in a frame, I', which frame is in turn secured to the case A. It may swing in two directions, and its length of movement in both such directions is limited by stops *r*. (Here shown as rods forming parts of the frame I'.) Connected to the lever I, as shown, near its fulcrum, is one end of a wire, *g*. This wire leads to a battery, J. From the battery J a wire, *g'*, leads to the vibrator B^2. From the vibrator B^2 a wire, g^2, leads to the primary of the induction-coil. From the primary of the induction-coil a wire, g^4, leads to a metal contact-piece, g^5. The metal contact-piece g^5 may be secured in any suitable manner to the case A or to a support extending therefrom. This contact-piece is provided with a suitable aperture through which extends a circuit breaker and closer, g^6. This circuit breaker and closer may be slid to and fro through said aperture. It is so slid by means of the rod C, with which it has a detachable connection, the purpose of which will hereinafter be more fully explained.

When the rod C is moved outwardly, the circuit breaker and closer is moved into contact with an insulated piece of metal, g^7, mounted upon a suitable support. From the piece g^7 extends a wire, g^8, to a contact-piece, g^9, here shown as a flat metallic spring. This spring is secured near one end to, and is suitably insulated from, the frame I'. It extends into such position that it may be caused to bear against the periphery of a metallic wheel, *h*. The wheel *h* is rigidly mounted upon a shaft, *h'*, suitably journaled in the frame I'. Upon the shaft *h'* is keyed a metal gear-wheel, h^2. Upon the lever I, near the lower end thereof, is a segment, I^2. This segment is provided with gear-teeth meshing with the gear-wheel h^2. When, therefore, the circuit breaker and closer g^6 is in contact with the metal piece g^7, and the contact-piece g^9 is in contact with the periphery of the wheel *h*, it is apparent that circuit will be closed on the primary of the induction-coil and the latter will be energized.

The shaft *h'* is rotary. Rotary motion is imparted to it, as here shown, by means of a weight, h^5, secured to one end of a cord or chain, h^6, which cord or chain extends to and is coiled upon a pulley, h^7, rigidly mounted upon the shaft *h'*. The weight h^5 only operates to rotate the shaft *h'* when the rod C is being withdrawn. It is prevented from thus operating when the rod C occupies its normal position, as shown in Fig. 1, by a pin or projection, *i*, upon the rod C, arranged in the path

of movement of the upper arm of the lever I. When the rod C is withdrawn, the pin or projection *i* of course follows it and permits the lever I to rock upon its fulcrum. The gear-wheel h^2, gearing with the segment I^2 thereupon, causes the rocking of the lever I, owing to the rotation of the shaft h' by means of the weight h^5. The upper arm of the lever I is therefore caused to follow the outward movement of the pin or projection *i* upon the rod C. It is thus brought into such position that when the rod C is moved inwardly the pin or projection *i* will contact with the lever I and swing the latter back into its normal position. The segment I^2 during this movement of the lever thus causes the rotation of the gear-wheel h^2 in a reverse direction, thereby winding up the cord or chain h^6 upon the pulley h^7 and elevating the weight h^5. When the rod C and the lever I occupy a normal position, as that shown in Fig. 1, the contact-piece g^9 is not in contact with the wheel *h*. The periphery of said wheel is shown as indented, and the contact-piece g^9 is at such time opposite said indentation. It is therefore not until the rod C has been moved forward sufficiently far to cause the circuit closer and breaker g^6 to contact with the metal piece g^7, and the wheel *h* has been rotated sufficiently far to bring its periphery into contact with the contact-piece g^9, that circuit will be closed on the primary.

Loosely mounted on the shaft *h* is a gear-wheel, P. This gear-wheel meshes with a gear-wheel, *j*, mounted on a shaft, *j'*, journaled in the frame I'. A gear wheel, j^2, on the shaft *j'* meshes with a gear-wheel, j^3, on a shaft, j^4. On the shaft j^4 is rigidly mounted a fan, j^5, outside the frame I'. Rigidly mounted on shaft h' is a toothed wheel, *l*. This toothed wheel is adjacent to the gear-wheel P. On the gear-wheel P is a spring-actuated pawl, *l'*, engaging the teeth on the wheel *l*. When the shaft h' is being rotated by the weight h^5, the toothed wheel *l* imparts rotary motion to the gear-wheel P, and thus to the shaft j^4. The fan is thus caused to operate as a governor.

It is one of the objects of this machine that the secondary circuit shall only be closed for a definite period—say, half a minute—so that a person operating the machine can only receive the current for that length of time. The length of time during which the circuit is thus closed is made dependent upon the time during which the shaft h' is rotated, and the rapidity of rotation of said shaft may be, of course, accurately regulated by the weight of the weight h^5.

In our machine as here organized the time during which the secondary circuit may remain closed covers a complete rotation of the shaft h'. At each complete rotation of the shaft h', therefore, the depression in the periphery in wheel *h* is brought opposite the contact-piece g^9. Circuit is thus broken on the primary, the induction-coil de energized, and the induced current of course caused to cease.

We further desire to prevent a person grasping the electrodes from perpetuating the induced current beyond the time limited by causing a partial rotation of the shaft h' in a direction to wind up the cord or chain h^6 and raise the weight h^5, through a partial retraction of the rod C toward its normal position. Such partial rotation of the shaft h', it is clear, will cause the contact-piece g^9 to remain in contact with the wheel *h*, because the former will not be brought opposite the depression in the wheel, thereby breaking the primary circuit. It is to be understood in this connection that the outward movement of the rod C is sufficient before circuit is closed by the circuit breaker and closer g^6 to move the pin or projection *i* into a position which will permit of the full range of movement of the lever I. Therefore, before a person grasping the electrodes gets any current the mechanism for breaking the primary circuit within the allotted time is in condition to operate fully. In order to provide for the contingency just previously referred to, the circuit breaker and closer g^6 has a detachable connection with the rod C, as previously stated. This connection consists, as here shown, of resilient jaws *k*, secured to the innermost end of the rod C, which jaws are adapted to grasp an upwardly-projecting portion of the circuit breaker and closer g^6. In Fig. 1 we have shown the jaws thus grasping the circuit breaker and closer.

When the rod C is withdrawn, the grasp of the jaws upon the circuit breaker and closer is sufficient to move the latter into contact with the piece g^7. Any further outward movement of said rod releases the jaws from the circuit breaker and closer. When the rod C is retracted rearwardly, the jaws again engage the circuit breaker and closer and move it out of contact with the piece g^7, thus breaking the primary circuit. Of course, as this breaking of the circuit will be coincident with the return-contact of the pin *i* with the lever I, circuit is broken before the weight h^5 can be again wound up, or even partially so.

On the front of the case A we have shown a dial-plate, *n*, displaying figures indicating current-strength. Over this dial-plate may play an index-finger, *n'*. The index-finger *n'* is mounted on a shaft, n^2, upon which is a pinion, n^3, actuated by a rack, n^4, secured to the shell B^3. When the shell B^3 is elevated, the rack will cause the play of the index-finger over the dial.

The circuits are not closed until the rod C has been withdrawn a certain distance and the shell B^3 correspondingly elevated. We prefer to interpose between the secondary coil of the induction-coil and the shell B^3 a ring, R, of insulating material, so that when the induced current is first transmitted to the shell B^3 it will be faint, and the shock felt by the person grasping the electrode correspondingly light. This ring of insulating material will be of the same height as the distance moved by the circuit breaker and closer g^6 before closing primary circuit. To accomplish the same result,

the winding of the secondary may begin at a point from the lower end of the coil equal to such distance.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with a case, of an induction-coil, a primary circuit therefor, an electric battery, a secondary circuit comprising electrodes outside of said case, one of said electrodes being capable of being moved outwardly or downwardly, a longitudinally-movable part, as B^3, in electrical contact with the secondary of the induction coil, a connection between said longitudinally-movable part and said movable electrode, a circuit breaker and closer in the primary circuit operated upon the movement of said electrode in one direction to close the circuit and upon the movement of said electrode in the contrary direction to open the circuit, time mechanism, and another circuit breaker and closer also in the primary circuit operated by the time mechanism to make and break said circuit, substantially as specified.

2. The combination, with a case, of an induction-coil, a primary circuit therefor, an electric battery, a secondary circuit comprising electrodes outside of said case, one of said electrodes being capable of being moved outwardly or downwardly, a longitudinally-movable part, as B^3, in electrical contact with the secondary of the induction coil, a connection between said longitudinally-movable part and said movable electrode, and time mechanism for breaking circuit to de-energize the induction-coil, and pawl-and-ratchet mechanism, whereby said time mechanism is rewound by the said connection when moving in one direction, substantially as specified.

3. The combination, with a case, of an induction-coil, a primary circuit therefor, an electric battery, a secondary circuit comprising electrodes outside said case, one of said electrodes being capable of being moved outwardly or downwardly, a detent securing said electrode against movement in one direction, a swinging arm, a lever for operating the detent mounted upon said swinging arm, and a stop for limiting the swinging movement of the lever, substantially as specified.

4. The combination, with a case, of an induction-coil, a primary circuit therefor, an electric battery, a secondary circuit comprising electrodes outside said case, one of said electrodes being capable of being moved outwardly or downwardly, a longitudinally-movable rod to which said electrode is connected, a circuit breaker and closer in the primary circuit, a sliding contact-piece comprised in said circuit breaker and closer having a detachable connection with said rod, a projection on said rod, and time mechanism comprising a lever extending into the path of said projection, all being arranged and combined, substantially as described, whereby when the rod is moved in one direction the said projection will be moved away from the lever to permit the operation of the time mechanism and said sliding contact-piece will be moved to close circuit, said projection being moved sufficiently far before circuit is closed to admit of a complete movement of the said lever in one direction, substantially as specified.

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