

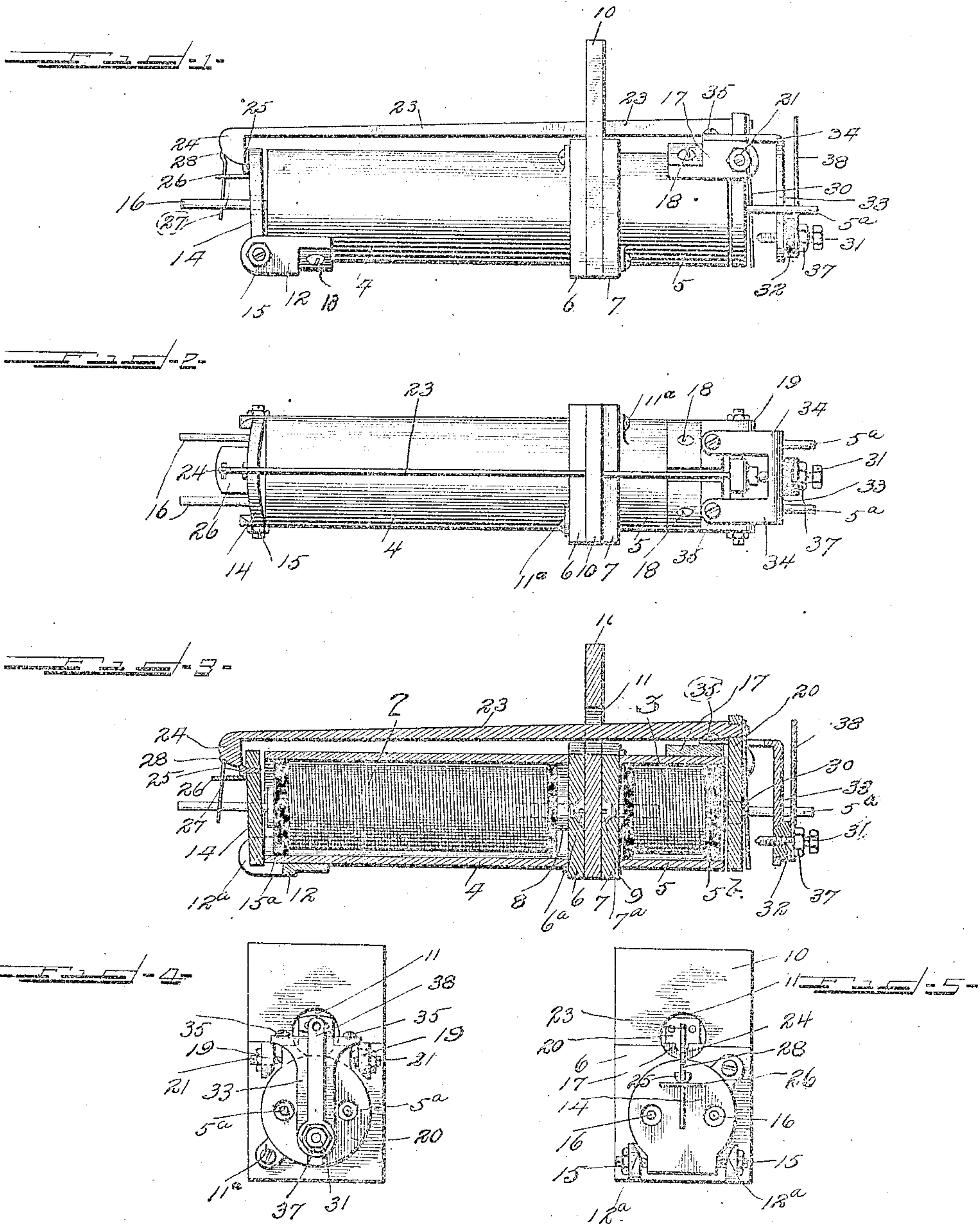
No. 829,628.

PATENTED AUG. 28, 1906.

H. P. CLAUSEN.
SELF RESTORING SIGNALING DEVICE.

APPLICATION FILED APR. 1, 1901.

2 SHEETS—SHEET 1.



WITNESSES

J. B. Weir
Robert Lewis Ames

INVENTOR
Henry P. Clausen.
By Chas. Buckley

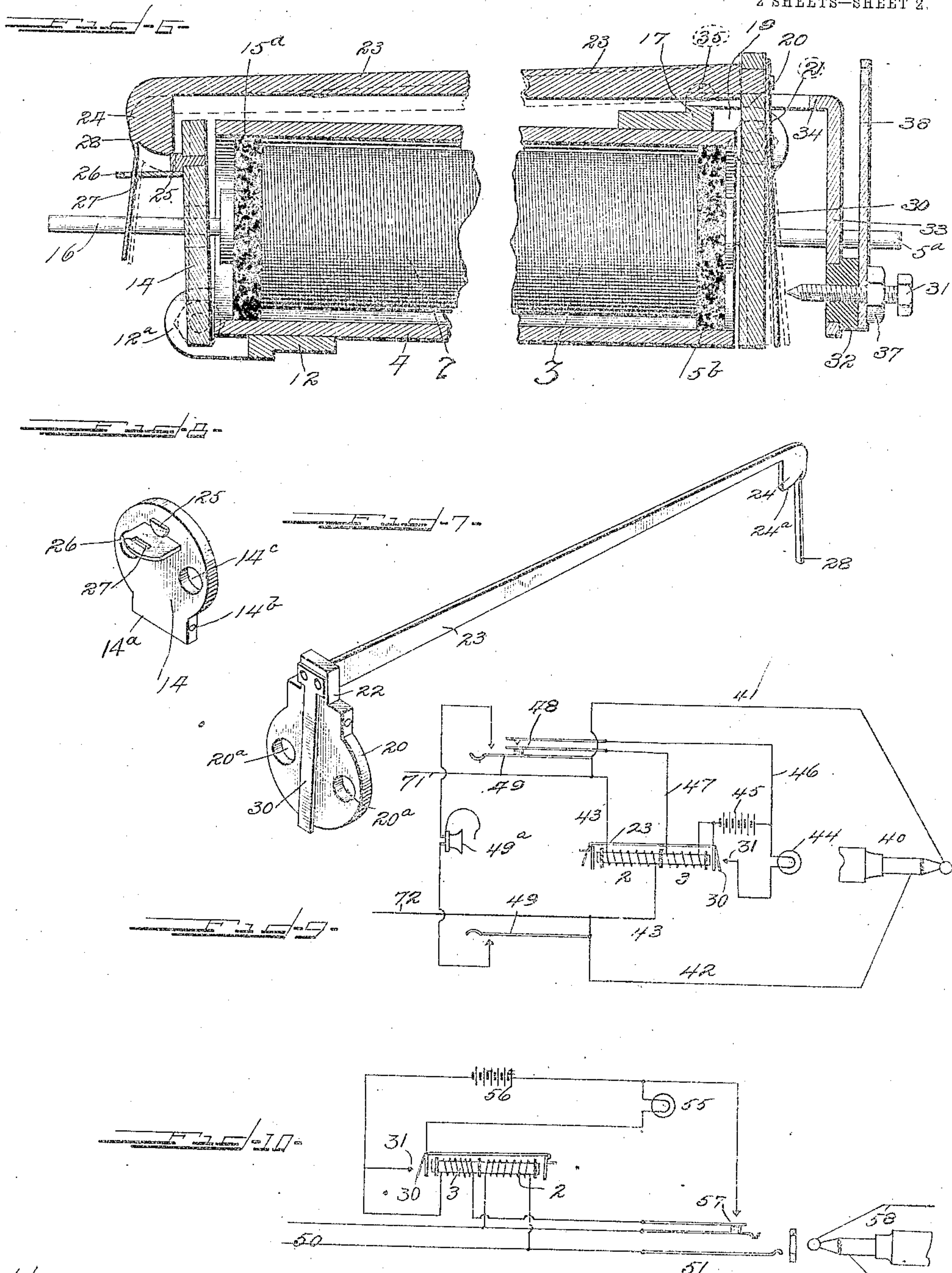
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Robert Lewis Ames,

INVENTOR

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UNITED STATES PATENT OFFICE.

HENRY P. CLAUSEN, OF CHICAGO, ILLINOIS, ASSIGNOR TO AMERICAN
ELECTRIC TELEPHONE COMPANY, A CORPORATION OF NEW JERSEY.

SELF-RESTORING SIGNALING DEVICE.

No. 829,628.

Specification of Letters Patent.

Patented Aug. 28, 1906.

Application filed April 1, 1901. Serial No. 53,767.

To all whom it may concern:

Be it known that I, HENRY P. CLAUSEN, a citizen of the United States of America, and a resident of Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Self-Restoring Signaling Devices, of which the following is a specification.

My invention relates to self-restoring signal devices, and has special reference to those used in connection with telephone central-office apparatus.

It has for its primary object the simplification of instruments of the class described, whereby they will consist of but few parts, be efficient in operation, and cheap to construct.

It therefore consists in a signaling device, such as a relay, having a main coil, preferably inclosed in a tubular shell, and a restoring-coil in line with the main coil and also suitably inclosed, the said coils being preferably secured to opposite faces of a supporting-plate. An armature for the main coil is provided and also one for the restoring-coil, and an arm or lever is rigidly secured to the latter armature and extends longitudinally of the coils to the other end of the relay, where its free end normally rests upon the other armature. An electrical contact is carried by the restoring-coil armature to close a local circuit containing the signal-indicating device. Means are also provided for preventing the main-coil armature from "freezing" to the poles of the magnet.

The invention also consists in the novel details of construction and combinations of parts hereinafter fully described, and particularly set forth in the appended claims, reference being had to the accompanying drawings, forming a part hereof, in which the same reference characters designate like parts throughout the several views, and in which—

Figure 1 is a side elevation of the relay; Fig. 2, a plan view of the same; Fig. 3, a longitudinal sectional elevation thereof; Figs. 4 and 5, elevational views of the main-coil and restoring-coil ends of the magnet, respectively. Fig. 6 is an enlarged sectional detail view showing the operation of the armatures and contacts. Fig. 7 is a perspective of the arm or lever and the armature for the restoring-coil. Fig. 8 is a perspective of the armature for the main or signaling coil. Figs. 9

and 10 are diagrammatic views illustrating two different applications of my invention.

In the figures, 2 and 3 denote, respectively, the main and restoring magnets provided with the tubular shells 4 and 5 and inclosed end pieces 6 and 7, which serve to complete the magnet-circuits at those ends of the magnets from the shells 4 and 5 to the cores 8 and 9 of the two magnets, the latter being secured to the end pieces 6 and 7 by the screws 6^a and 7^a, and which plates 6 and 7 are secured to the main supporting-plate 10 on opposite sides thereof through the medium of ears or lugs 11^a on said shells, through which screws are adapted to be inserted and threaded into the said end pieces 6 and 7. This plate is preferably the main supporting-plate of the relay and can be secured in any desired manner to the said support. If it be considered desirable to install a bank of such relays, the said plate may be extended and a plurality of coils attached thereto. As shown, these coils are placed with their inclosed or rear ends on opposite sides of the supporting-plate 10 and in line with each other, an aperture 11 in the plate 10 being provided above the said magnets and the plates 6 and 7 suitably notched, for a purpose hereinafter explained.

The main-coil shell 4 at its forward end has secured thereto a casting 12, as by screws 13, in the projecting ears or lugs 12^a of which the armature 14 is pivoted upon the pivot-screws 15, passing through said ears. This armature 14 is circular except at its lower portion, where it is provided with a squared section 14^a, containing the pivot-pin sockets 14^b. This armature 14, as well as the insulating-disk 15^a, interposed between the core 8 and the shell 4 to properly support and space them apart, have apertures through which the magnet-coil terminals 16 extend and to which the external circuit-wires may be connected, the apertures 14^c through the armature 14 being of such size as to allow a slight vibration of the armature without touching said terminals. Any other suitable or preferred construction and arrangement of these terminals may be adopted; but that shown is deemed best.

At the other end of the relay or at the forward or open end of the restoring-coil shell 5 and on its upper side a small brass casting

17, similar to the casting 12, is secured by the screws 18 and is also provided with ears 19, projecting beyond the end of the shell 5, in which the restoring-coil armature 20 is pivoted upon the pivot-screws 21, so as to vibrate freely. This armature is also circular, except at the upper portion of its edge, which carries a rectangular portion for the pivot-sockets, this portion being provided with an extension 22, Fig. 7, on its upper edge, to the rear or inner side of which the catch-lever or arm 23 is rigidly secured in any desired manner and extends through the aperture 11 in the plate 10 to the other end of the relay, where it is provided with a downwardly-extending end lug or catch 24, projecting over and beyond the outer and upper edge of the armature 14 and having the lower edge 24^a of the catch 24 normally resting upon a small lug 25, carried by the armature 14 on its outer face and near the upper edge of the same, it being riveted in an aperture therein, as shown in Fig. 6, or secured thereto by any preferred construction.

The armature 20 has holes 20^a therethrough large enough to avoid touching the magnet-terminals 5^a, which are secured in the insulating-bushing 5^b and to which the magnet-wires are soldered, all in the usual way. This arrangement and construction is such that when the main coil is energized and its armature 14 attracted the lug 24, carried by the lever 23, slips off the lug 25 on the armature 14, as shown in Fig. 6, and allows this end of the lever to drop by gravity and moving the armature 20 away from its magnet-poles. When the restoring-coil is energized, the armature 20 is attracted to its normal position and lifts the arm 23, allowing the armature 14 to fall or drop back by gravity with the said lug or rest 25 beneath the catch 24 of the said arm.

In order to be sure that the armature will fall back away from the end of the shell 4 and not stick or "freeze" thereto when the lever 23 is lifted without the use of springs acting upon the armature, a small plate 26 is secured to said armature in any desired way and preferably beneath the lug 25, so as to project horizontally or at right angles therefrom. A slot 27 is provided near the outer edge of said projecting plate, through which a light spring 28, secured to the end of the arm 23, is adapted to pass. As shown in Fig. 6, the slot 27 is of such width and the spring 28 is so adjusted that when the armature is attracted the spring and slot present no obstacle to the movement of the armature, and thereby allow the end 24 of lever 23 to fall until its lower edge 24^a strikes upon the plate 26, (see dotted lines;) but when the arm 23 is lifted, as in the operation of coil 3, the spring 28 bears against the outer edge of the slot 27 and pulls the armature 14 away from the

casing 4 and core 8. Of course it is only necessary that this action of pushing armature 14 back be sufficient to start the armature away from the shell 4, for as soon as started it will lose its magnetism and fall by gravity.

So far as some phases and features of the invention are concerned any signaling device or arrangement, as a shutter or other means, may be applied to the construction so far described; but I prefer to use it as a relay for closing a local circuit containing some auxiliary signaling device, as an electric lamp. The apparatus for accomplishing this purpose consists in a spring 30, rigidly attached at its upper end, as by riveting, to the projection 22 of the armature 20, its lower end being raised slightly above the face of the armature and adapted to contact with the pointed end of the stationary screw-contact 31, insulatingly supported by a washer 32, driven into an aperture in the narrow vertical brass plate or tongue 33, supported beyond the end of the restoring-magnet through the medium of integral arms 34, extending horizontally at right angles to the plate 33 on each side of the projection 22 of the armature 20 and secured by screws 35 to the said casting 17. The screw-contact may be adjusted as desired and is located in place by a lock-nut 37, placed on the screw 31 and which also rigidly holds an upwardly-extending strip 38 in electrical contact with the screw 31 and insulated from the strip 33, though carried thereby, and to the upper end of which a circuit-wire is adapted to be attached.

Normally it will be seen by reference to Fig. 6 the armature 20 is close to the end of the shell 5 by reason of the catch 24 resting upon the lug or stop 25, carried by the armature 14, at which time the circuit between the spring-contact 30 and the screw 31 is broken; but when the armature 14 is attracted and the arm 23 drops, as indicated in dotted lines in said figure, the spring 30 engages with the screw 31 and the circuit through the strip 38, screw 31, spring-contact 30, and the frame of the relay is closed to operate any signaling instrument connected in such a circuit. This relay or annunciator may be used in various relations, and I do not, therefore, wish to be limited to any particular one. As shown in Fig. 9, it serves in the capacity of a clearing-out relay for an operator's cord-circuit. In this figure the cord-circuit plug shown is indicated by the numeral 40, with which the tip and sleeve strands 41 and 42 of the cord-circuit are connected and which are bridged by the conductor 43, containing the main coil 2 of the clearing-out relay. The restoring-coil 3 is in a local circuit containing the battery 45, conductors 46 and 47, and the key-switch terminals 48 which are adapted to be closed upon the actuation of the listening-key 49 to connect the operator's tele-

phone 49^a with the cord-circuit. A parallel branch is taken off from each side of the battery 45 and contains the relay-contacts 30 and 31 and the supervisory or clearing-out lamp 44. When the cord-circuit is in use and the subscribers ring off, the coil 2 will be actuated and the lever 23 dropped to close at the armature 20 through contacts 30 and 31, the local circuit containing the lamp 44 and battery 45, which causes the lamp to give a signal. The operator upon seeing this signal will connect her telephone 49^a by means of the listening-key 49 with the cord-circuit to ascertain the meaning of the signal before withdrawing the plug, which act closes the circuit from the same battery 45 through the restoring-magnet 3 and restores the relay and signal to normal condition, the spring 28 serving to push armature 14 away from the poles of its magnet.

In Fig. 10 another use of the relay is indicated. 50 designates a telephone-line terminating at the spring-jack 51 and having bridged thereacross the main coil 2 of the relay. The restoring-coil is in a local circuit, as before, containing the battery 56 and terminals 57 of the jack, a parallel branch to the battery including the lamp 55 and relay-contacts 30 and 31. Upon sending in a signal the coil 2 is actuated to close the local circuit containing the lamp 55 and battery 56, which signal remains exposed due to the weight of the arm 23 until the plug 58, in answer to the signal, is inserted in the jack 51 and the local circuit containing the restoring-coil and battery 56 is completed to restore arm 23 and extinguish the signal 55. Thus it will be seen that the coil 2 and armature 14 respond to a signaling-current and that the coil 3 and armature 20 respond to a restoring-current. It will also be seen that the arm or lever 23 serves as a weight or weighted connection for closing a current through a signaling device. It will also be seen that the main or signaling armature 14 serves as a means for releasing this weight or weighted connection upon the energization of the signaling-coil. In this way the said main or signaling armature 14 permits the weight or weighted connection represented by the arm or lever 23 to fall, and thereby close the contacts 30 and 31. The energization of the coil 3 causes the restoring armature 20 to lift the weight 23 and also causes the said contacts to separate, so as to extinguish or restore the signal. The energization of the coil 3 and the consequent movement of the restoring-armature 20 and the weight or lever 23 operate to positively move the signaling-armature 14 a short distance away from the magnet of the signaling-coil 2, and after being thus started the said armature 14 then falls or moves outward by gravity to the full limit of its movement. As

previously explained, this outward swing on the part of the armature 14 operates to bring the shoulder 25 below the nose or heel of the weighted arm 23, and in this way the restoring-coil and armature also serve to operate the locking device adapted and arranged to lock the arm or weighted connection in its normal or elevated position and also to lock the contacts 30 and 31 apart. In this way both armatures may be regarded as having a double function, the signaling-armature 14 serving both as a means for operating the devices which close the local circuit and also as a means for locking such circuit-closing devices in an open or unclosed condition. The armature 20, as shown and arranged, serves both as a means for enabling the weight 23 to bring the contact 30 into engagement with the contact 31 and also as a means for separating these contacts and for operating the locking device which locks the contacts apart.

I wish it understood that the invention is not limited to the precise details shown, for I hold it to include such changes and modifications as fairly fall within the scope and spirit thereof.

What I claim is—

1. In an electric signaling device, the combination of a pair of electromagnets, a signaling-armature for one of said magnets, a restoring-armature for the other of said magnets, the said restoring-armature being provided with an arm adapted and arranged to rest upon the signaling-armature, said arm acting as a weight to throw the restoring-armature away from its magnet when the signaling-armature is attracted or drawn to its magnet, substantially as described.

2. In an electric signaling device, the combination of a signaling-electromagnet, a signaling-armature standing normally away from said magnet, a restoring-magnet, a restoring-armature for said restoring-magnet, an arm projecting from the upper portion of said restoring-armature and resting normally upon said signaling-armature, a circuit-closing device, the said arm acting as a weight to swing said restoring-armature away from its magnet when the signaling-armature is attracted or drawn to its magnet, and the said restoring-armature operating to complete the circuit in said circuit-closing device when the said arm is released by the signaling-armature and allowed to fall, substantially as described.

3. In an electric signaling device, the combination of a signaling-magnet, a pivoted armature for said magnet, a restoring-magnet, a pivoted armature for said restoring-magnet, and an arm or like suitable connection rigid with said last-mentioned armature and extending between said armatures, said arm or connection when released by the armature for the signaling-magnet operating as a weight

for effecting the desired signal, and the armature for said restoring-magnet being adapted to lift and restore the said arm to its normal position, substantially as described.

4. In a self-restoring signaling device, the combination with a main coil, of a supporting-strip to one side of which said coil is secured, a restoring-coil in line with the main coil and secured to the other side of the supporting-strip, armatures for both coils, the restoring-coil armature having an arm fixed thereto and adapted to rest its free end upon the main-coil armature, and means to operate the signal when the main-coil armature is attracted to allow the free end of the lever to drop and to retire the signal upon the energization of the restoring-coil.

5. In a self-restoring coil, the combination with a main coil, of a restoring-coil in line therewith, an armature for the main coil, an armature for the restoring-coil, the latter having a lever or arm secured thereto normally resting upon the other armature and adapted to fall when the said armature is actuated, and means associated with the restoring-coil armature for closing a circuit at such times and to break it upon the energization of the restoring-coil.

6. In a signaling device, the combination with a main coil and an armature therefor, of a restoring-coil in line with the main coil and facing in the opposite direction, an arm secured to the restoring-coil armature and having its free end supported on the main-coil armature, and means for giving a signal when the main armature is attracted to drop the said arm, and to retire the same when the restoring-armature is attracted.

7. In a signaling-relay, the combination with a main coil and its armature of a restoring-coil in line with the former and facing in the opposite direction, and an armature therefor, an arm secured to the restoring-armature with its free end normally resting upon the main armature, auxiliary-circuit contacts normally separated, means to close said contacts when the main armature is attracted and allows the said arm to drop and to separate them again when the restoring-armature is attracted.

8. In a self-restoring relay, the combination with a main coil and an armature, of a restoring-coil in line with the main coil and its armature, an arm secured to the latter armature and having its free end normally supported by the main armature, normally separated contacts, means to close them when the main armature is attracted to withdraw it from beneath the said arm, and means to again separate the said contacts upon the attraction of the restoring-armature

9. In an electromagnetic device, the combination with a magnet and an armature therefor carrying a projection having a slot therein, an arm resting upon said armature and having an extension or spring passing through the said slot, the said slot and extension or spring being so adjusted that upon the attraction of the armature the arm will drop, and upon raising the arm the extension or spring will move the armature away from its magnet.

10. In a self-restoring signaling device, the combination with a main coil and an armature, of a restoring-coil in line therewith and provided with an armature, an arm secured to the latter armature and extending to the front end of the other relay and having a catch formed on the end thereof, a lug or stop on the main armature on which said catch normally rests, a projecting plate on the armature beneath the said lug or stop and having a slot therein, a tailpiece or spring secured to said arm and passing through the slot and so adjusted that when the armature is attracted the arm will drop a short distance, and when the restoring-armature is attracted the arm will be raised and push back the main armature.

11. In a self-restoring relay, the combination with a main coil, a restoring-coil in line therewith and facing in the opposite direction, armatures for the coils, an arm carried by the restoring-armature having a catch engaging the main armature, a contact-spring carried by the restoring-armature, a stationary contact in proximity to said spring-contact, a plate to insulatingly support the stationary contact fixed to the restoring-coil shell, whereby when the main armature is attracted the arm is allowed to fall and connect the two contacts, and when the restoring-coil is actuated the arm is restored and the contacts separated.

12. An electromagnetic device comprising a signaling-magnet, a restoring-magnet, an armature for effecting the signaling action, and another armature adapted to cooperate with said restoring-magnet in effecting a restoration of the device to its normal condition, said last-mentioned armature having an arm overlying both magnets and engaging said first-mentioned armature, the said magnets being secured end to end, and one armature being mounted at its lower end and the other at its upper end.

Signed by me at Chicago, Cook county, Illinois, this 23d day of March, 1901.

HENRY P. CLAUSEN.

Witnesses:

CHAS. C. BULKLEY,

HARRY P. BAUMGARTNER.