No. 726,693. PATENTED APR. 28, 1903.

C. K. JONES.

TELEGRAPH SYSTEM.

APPLICATION FILED MAY 24, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

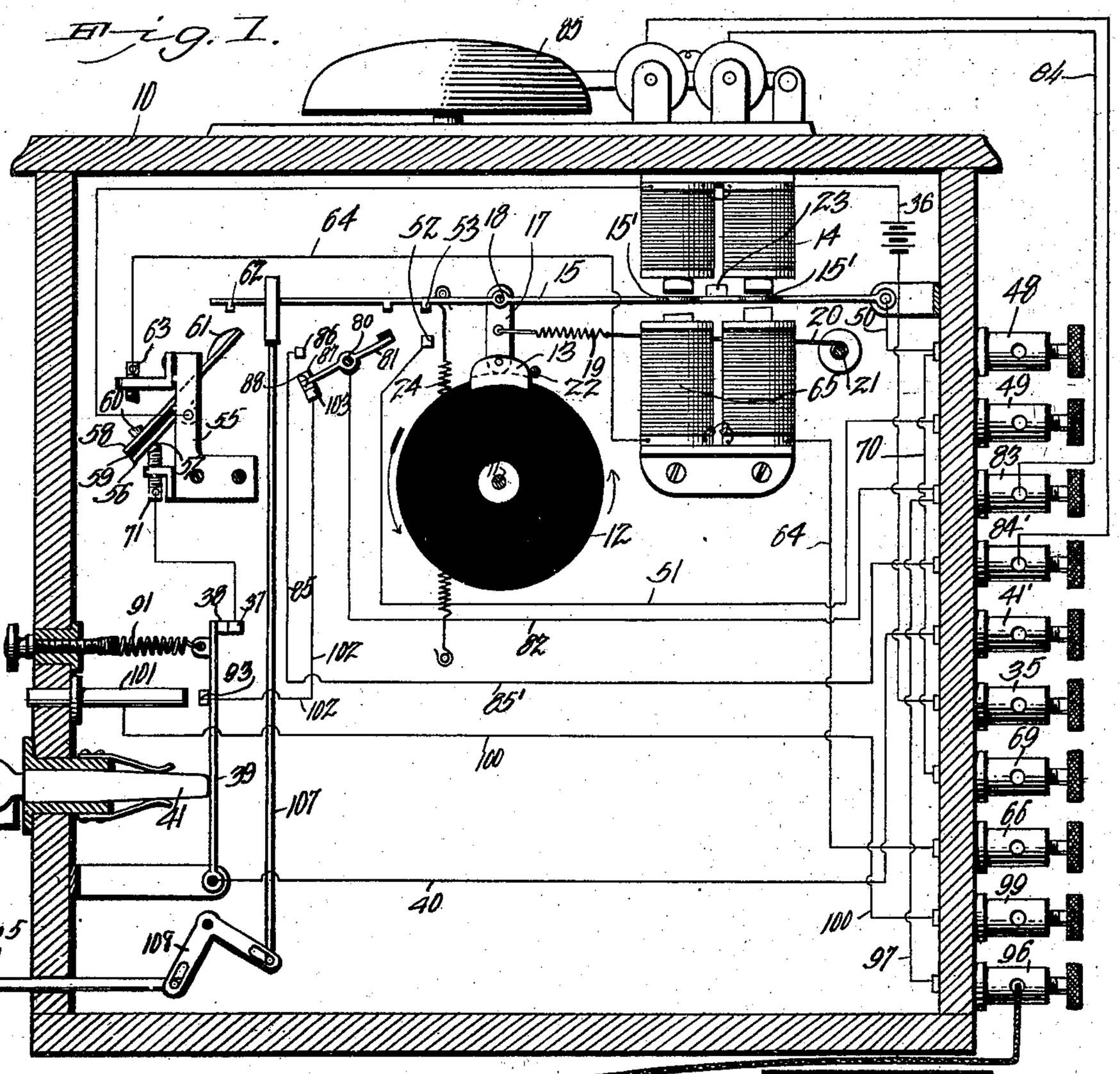


Fig. 3.

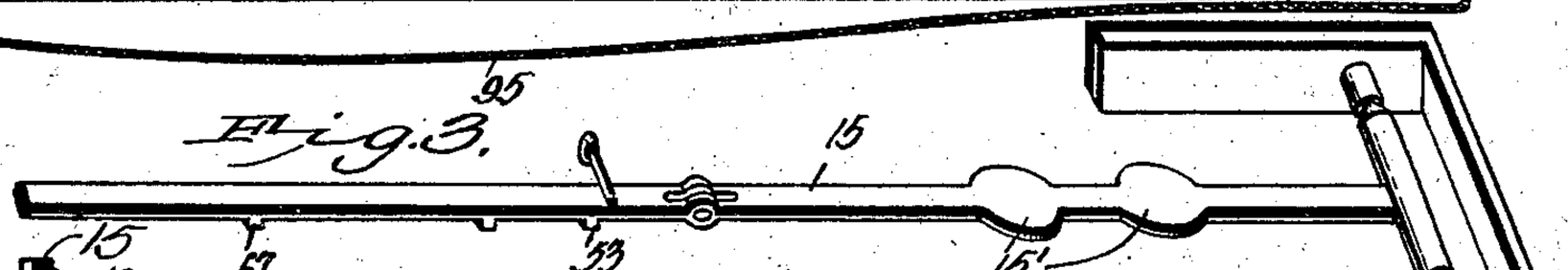
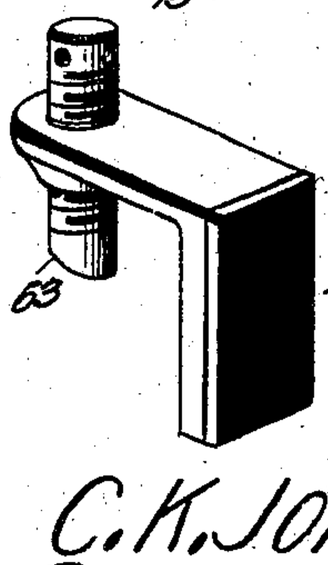


Fig. 6.

Fig. 4.

Fig. 5.



Witnesses

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NO MODEL. 2 SHEETS—SHEET 2.

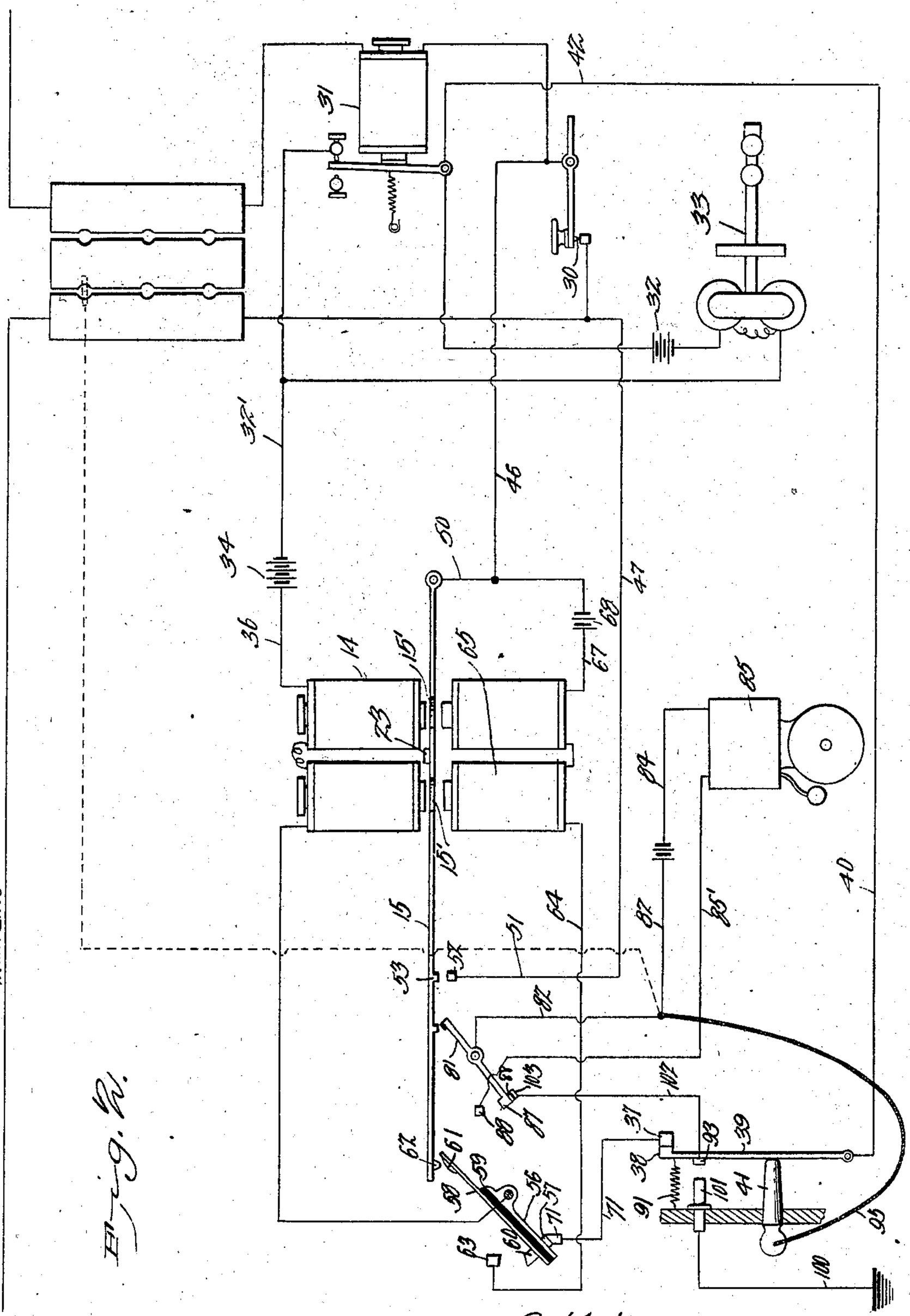

Fig. 4.

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UNITED STATES PATENT OFFICE.

CHARLES K. JONES, OF TUSCUMBIA, ALABAMA.

TELEGRAPH SYSTEM.

SPECIFICATION forming part of Letters Patent No. 726,693, dated April 28, 1903.

Application filed May 24, 1902. Serial No. 108,833. (No model.)

To all whom it may concern:

Be it known that I, CHARLES K. JONES, a citizen of the United States, residing at Tuscumbia, in the county of Colbert and State of Alabama, have invented a new and useful Telegraph System, of which the following is a specification.

The invention relates to certain improvements in telegraphy, and has for its principal object to provide an improved device for sounding an alarm at a local station in the event of the main line being left open by the operator for a predetermined period of time or in the event of the failure to disconnect a ground-circuit for a similar length of time.

A further object of the invention is to provide for the automatic closing of the main line and cutting out of the ground at any local station, so that the continuity of the main line will not be interfered with.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is an elevation of the rear face of a clockwork-casing, illustrating the general arrangement of the circuit-controlling devices forming the subject of the present invention and illustrating the manner in which such devices may be arranged and connected in the form of an attachment ready to be connected to the local line of any station. Fig. 2 is a diagram illustrating the connection of the devices to the main and local lines of a station. Fig. 3 is a detailed perspective view of the main armature-lever and its connected parts. Fig. 4 is a detail view of one of the circuit-closing devices. Fig. 5 is a detail view of one of the contacts. Fig. 6 is a detail sectional view of the time-actuating disk and the block moved thereby.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In the casing 10 is a clockwork mechanism of any ordinary character, the minute-arbor of which is extended out beyond the rear of the casing, as indicated at 11, and is provided with a disk 12, of rubber or similar material, which is preferably provided with a roughened periphery for engaging a movable block 13 in the form of a brake-shoe. To the rear of the casing in the vertical plane of a pair of electromagnets 14 is pivoted an armature-lever 15, preferably formed of a light elastic strip of metal having enlarged portions 15′ immediately below the cores of the electromagnet in order to provide enlarged metallic surfaces within the field of force of the magnet without undue increase in the weight of the armature-lever. The lever is recessed at a point in vertical alinement with the arbor 11, and through said recess extends the upper end of a link 17, pivotally connected to the lever and carrying at its lower end the block 13, the latter being pivotally connected to said link by a pin 18, arranged in the vertical plane of the arbor 11. The link 17 is connected by a spring 19 and flexible cord 20 to an adjusting-screw 21, mounted on the base-plate, said spring serving to normally maintain the link in the position shown in Fig. 1 with the rear end of the block or brake-shoe in contact with a stop-pin 22. The armature 15 is held in elevated position when the magnets 14 are energized; but actual contact between the pole-pieces and the armature is prevented by a fixed stop 23 in order to prevent the armature clinging to the ends of the poles from the effect of residual magnetism. The upward movement of the armature is to some extent resisted by a tension-spring 24, which when the magnets are deënergized pulls the armature-lever down, said lever being constantly vibrated during the sending of a message in the same manner as the local sounder.

Under normal conditions the circuit-closer 30 of the sending-key closes the main line, and the local line is closed through the relay 31, the local battery 32, and sounder 33. In connecting the mechanism forming the subject of this invention to the local line a wire 32′ is run from one of the binding-posts of the relay to a battery 34, from thence to a binding-post 35, from which extends a wire 36 to the electromagnets 14, said wire extending from thence through a switching device, hereinafter described, to a contact-block 37, and from thence by means of a contact-block 38 and lever 39 to a wire 40, leading to a binding-post 41′, said binding-post being connected by a wire 42 to the opposite binding-

post of the relay, so that the armature 15 moves simultaneously with the sounder and relay, and the block 13 is raised and lowered without receiving any movement from the constantly-rotating disk 12, on which it rests when in the lowest position. Should the circuit through the local line be open for any predetermined length of time, as through the failure of the operator to close the circuit at the key or to disconnect a ground, the electromagnet 14 will be deënergized and permit the armature 15 to fall, the block 13 being then held in contact with the disk 12 by means of spring 24 and carried around to the left or in the direction of the arrow, the duration of the operating movement being controlled by the movement of the disk. In the present instance the disk being carried by the arbor of the minute-hand rotates once during each hour, and the parts are so proportioned that the effective movement after the block 13 is moved into contact with the disk will occupy a period of two minutes, more or less. This movement of the contact-block to the left causes an excessive downward movement of the armature 15 and resulting in the sounding of an alarm, the cutting out of a ground-line, or the closing of the main line without reference to the circuit-closer of the sending-key, the key being left in inoperative position, but the sounder and relay of the local station being still connected in the main line.

To effect the short-circuiting of the main line around the key, shunt-wires 46 and 47 are run from the main line on either side of the key to the binding-posts 48 and 49. From the binding-post 48 extends a wire 50 to the armature-lever 15, and from the binding-post 49 extends a wire 51 to a contact-block 52, carried by the clock-casing and adapted to be engaged by a contact-block 53, arranged on the under side of the armature-lever 15, so that when said lever is depressed by the action of the disk and block and the contact-blocks 52 and 53 are brought into engagement the main line will be short-circuited and the key cut out without cutting out the relay, so that the neglect of an operator to close his key will not interfere with the receiving of a message or interfere with the operation of the main line for a longer period of time than is necessary for the disk 12 to carry the block 13 a sufficient distance to permit the lowering of the armature-lever and the contact of the blocks 52 and 53. The mechanism is so timed that this operation will take place if the main line is left open or grounded for a period of two minutes, more or less, or for such other period of time as it may be deemed advisable to allow an operator to restore the line to operative condition.

The device for making and breaking the energizing-circuit of the electromagnet 14 is illustrated more clearly in Fig. 4 and comprises a support 55, carried by the base-plate and provided with a pivot-pin for the support of a metallic strip 56, having at one end a contact-block 57. On the strip 56 is mounted a metallic strip 58, insulated therefrom by a strip 59, of rubber or similar material, and provided at opposite ends with contact-blocks 60 and 61, the latter being adapted for contact with the block 62 on the under side of the armature-lever 15 when the latter is depressed. The switch-lever is of the gravity type and normally rests in the position shown in Fig. 4; but on the downward movement of the armature-lever the contact-block 62 comes into contact with the arm and moves the lever to the position illustrated in dotted lines in Fig. 4, the contact-block 60 being forced into engagement with a contact-block 63, secured to but insulated from the support 55. The contact-block 63 is connected by a conducting-wire 64 to the winding of an electromagnet 65, arranged below the upper magnets 15 and adapted when energized to attract the armature-lever and hold the same depressed. After leaving the electromagnets 65 the wire 64 runs to a binding-post 66, which is connected by a wire 67 to a battery 68, and from the opposite terminal of the battery said wire 67 leads to a binding-post 69, connected by a wire 70 to the binding-post 48, and thence by the wire 50 to the armature-lever 15.

The arrangement is such that on the downward movement of the armature-lever the first effect will be the engagement of the contact-block 62 on the armature-lever with the contact-block 61, causing a movement of the block 60 into engagement with the contact-block 63 and establishing a circuit from the battery 68 through wire 67, binding-post 69, wires 70 and 50 to armature-lever 15, thence through contact-blocks 62 and 61 to strip 58, contacts 60 and 63, wire 64, electromagnets 65, to binding-post 66 and return to battery, thereby energizing the electromagnets 65. This movement of the contact-breaker (shown in Fig. 4) causes a break in the circuit in which the electromagnet 14 is included, the connection being broken between the contacts 57 and the stationary contact 71, so that the upper magnets 14 are first deënergized, and on a continued movement of the armature and contact-breaker the circuit of the lower magnets 65 is energized by the contact of the blocks 60 and 63. While in some cases it may not be absolutely necessary to employ the lower magnets 65, it is preferred to do so in order to hold the armature-lever firmly down and insure the proper closing of the several circuits controlled by the movement of the armature-lever.

As previously described, the downward movement of the armature-lever brings the contact-blocks 53 and 52 into engagement and closes a shunt around the operator's key, so that if the latter is open through carelessness on the part of the operator the main line will be established and the local sending-key cut out.

On a suitable supporting-pin 80, carried by the rear portion of the clock-casing, is piv-

oted a switch-lever 81, connected by a wire 82 to a binding-post 83, from which extends a conducting-wire 84 to a battery and an electromagnetic bell 85 or other audible or visual alarm, the wire being then connected to a binding-post 84′, which is connected by a wire 85′ to a contact 86, carried by but insulated from the support. The switch-lever 81 has one end arranged in the path of movement of the armature-lever 15 and at its opposite end is provided with two contact-blocks 87 and 88, the block 87 being moved into engagement with the block 86 when the switch-lever is depressed by the armature and completing the bell-circuit through the wires 82 and 85′, thus sounding an alarm which rings continuously until shut off by the operator in the manner hereinafter described.

In all local and main telegraph offices provision is made for grounding the main line on either side of the key, thus cutting out all that portion of the main line and local stations beyond the ground-line, and an operator, through carelessness, will sometimes leave the ground connection on and prevent the transmission of messages beyond his station. In order to overcome this difficulty, I so arrange the apparatus that at the end of any predetermined period of time the ground connection at any local station is cut out and the continuity of the main line reëstablished. At one side of the casing is mounted a vertical switch-lever 39, connected at its upper end to the side of the casing by an adjustable tension-spring 91. This lever carries two contact-blocks 38 and 93, the former being normally held in engagement with the stationary contact-block 37 to complete the circuit of the electromagnets 14 through the wires 71 and 40. The lever is held in the position illustrated in Fig. 1 by a plug 41, adapted to a socket in the side of the box and serving to press and hold the lever 39 inward against the stress of the spring 91. The plug is connected by a flexible wire 95 to a binding-post 96, the latter having a connection with the binding-post 83 of the alarm-circuit through a wire 97. Above the binding-post 96 is a binding-post 99, connected to a ground-plate, and said binding-post is connected by a wire 100 to a contact-block 101, arranged opposite the contact-block 93, carried by the lever 39. From the contact-block 93 leads a conducting-wire 102 to a contact-block 103, arranged below the contact-block 88 of the lever 81.

When the operator desires to ground the main line on either side of his key, he removes the plug 41 from the socket in the side of the casing 10 and inserts the same in the proper opening in the switchboard, the circuit of the main line thence passing through the plug and wire 95 to binding-post 96, wire 97, binding-post 83, wire 82, lever 81, contact-block 88, contact-block 103, wire 102, contact-block 93, contact 101, wire 100, and binding-post 99 to ground. The length of time for which the operator can maintain his ground is determined by the clockwork mechanism. The time is usually set for two minutes, and at the end of that period the armature-lever 15 will have descended for a distance sufficient to cut out the ground-wire. This movement of the armature-lever is permitted as soon as the plug 41 is removed from its socket in the side of the casing. When this occurs, the spring 91 draws the lever 39 to the left to bring the contacts 93 and 101 into contact, and thereby establish the ground connection while the contacts 38 and 37 are disconnected to break the circuit through the conducting-wire 71 and the electromagnets 14. As the block or shoe 13 is carried to the left by the disk 12 the armature-lever 15 descends and causes the energizing of the lower magnets 65 and the shunting of the circuit around the sending-key in the manner previously described. When the armature-lever comes into contact with the switch-lever 81, the lower end of the latter is raised and separates the contact-block 88 from the contact 103, thus breaking the ground-circuit and reestablishing the main-line circuit.

The various contacts are preferably in the form of screws, as shown in the detailed view of the contact 63 in Fig. 5, each screw being provided with a plurality of openings for the insertion of an operating-tool by which accurate adjustment may be effected.

The device as a whole is so arranged that the various parts may be assembled together with the clockwork mechanism in an inclosing casing provided with the several binding-posts at one side and the plug-socket on the opposite side, and in one wall of said casing is a manually-operated push button or rod 105, by means of which the operator may restore the parts to initial position and stop the ringing of the alarm-bell. For this purpose I employ a rod 107, arranged below the outer portion of the armature-lever 15 and connected to a bell-crank lever 108, the latter being in turn connected to the push-button, so that when the button is operated the armature-lever will be restored to initial position and the several switches will return to initial position by gravity.

With a device of this character the operator's attention is called to the fact that his key is open or line grounded within a period of two minutes from the time he stops sending or from the time he establishes a ground by the removal of the plug 41 from its socket and its insertion in the switchboard-socket. Should the operator not be at hand or neglect the signal, the apparatus immediately cuts out his key by a shunt, without, however, cutting out the relay and sounder, or if a ground be formed the ground is cut out and the continuity of the main line reëstablished. It thus becomes impossible for a careless operator to tie up the line beyond a period of two minutes or for such other time as the clockwork mechanism is set.

The apparatus is of especial value in lo-

cating a break in the main line. Should a break occur at any point, the current through the main line ceases and all of the local circuits are opened, permitting the release of all of the armatures 15 and sounding an alarm in each of the local stations connected to the line. When the attention of the station-master or other operator is thus called, the train-despatcher or other official of a central station may call up the stations in successive order and ascertain from the local stations how far the line is clear, and thus locate the break within a few minutes after its occurrence. In the use of the ordinary systems the local operators are not notified of the break until an attempt is made to send a message, and considerable time is necessarily lost in locating and repairing a break in the main line.

For the sake of convenience and in order to prevent confusion in the drawings the several circuits have been illustrated as connected to different batteries; but it will be understood that the circuits may be connected in multiple with a single battery or batteries when required.

While the construction herein described, and illustrated in the accompanying drawings, is the preferred form of the device, it is obvious that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described the invention, what I claim is—

1. The combination with the main and local lines of a telegraph system including a key, sounder, and relay, of an electromagnet arranged in a relay-controlled circuit, an armature arranged within the field of force of said electromagnet and having a synchronal movement with the striking-lever of the sounder, means under the control of said armature for cutting out the local key and closing the main line when said magnet is deënergized for a predetermined period of time, and a normally deënergized electromagnet adapted to attract said armature when the electromagnet in the relay-circuit is deënergized to thereby assist in the movement of the armature.

2. The combination with the main and local lines of a telegraph system including a key, sounder, and relay, of an electromagnet, a relay-controlled circuit in which said electromagnet is located, an armature arranged within the field of force of the electromagnet and having synchronal movement with the striking-lever of the sounder, a clockwork mechanism including a constantly-revolving disk controlling the outward movement of the armature when the magnet is deënergized, and means under the control of said armature for closing the main line when the magnet is deenergized for a predetermined period of time.

3. The combination with the main and local lines of a telegraph system including a key, sounder and relay, of an electromagnet, a relay-controlled circuit in which said electromagnet is located, an armature-lever arranged within the field of force of the electromagnet and having synchronal movement with the striking-lever of the sounder, a clockwork mechanism including a continuously-revolving member controlling the outward movement of the armature when the magnet is deenergized, and means under the control of said armature-lever for sounding a local alarm and closing the main line when said magnet is deenergized for a predetermined period of time.

4. The combination with the main and local lines of a telegraph system including a key, sounder and relay, of an electromagnet, a relay-controlled circuit in which said electromagnet is located, an armature-lever arranged within the field of force of said electromagnet, a clockwork mechanism, a continuously-revolving disk operatively connected thereto and serving by its revoluble movement to permit a retractile movement of the armature-lever when the electromagnet is deenergized and means under the control of said armature-lever for sounding a local alarm and closing the main line when the circuit of the electromagnet is deënergized for a predetermined period of time.

5. In a device of the class specified, a relay-controlled electromagnet, an armature arranged within the field of force of said electromagnet and adapted to make contact with circuit-closing devices when the magnet is deënergized, a continuously-revolving clockwork-actuated disk, and a block connected to the armature-lever and resting on and movable by said disk.

6. In a device of the class specified, a relay-controlled electromagnet, an armature-lever arranged within the field of force of said electromagnet and adapted to make contact with circuit-closing devices when the magnet is deenergized, a clockwork-actuated disk, a block adapted to rest against the periphery of the disk, a link connecting the block to the armature-lever, a spring tending to maintain the axis of the disk and the pivotal connections of the block and armature in a common plane, and a spring connected to the armature and tending to withdraw the same from the electromagnet.

7. In a device of the class specified, a relay-controlled magnet, an armature-lever arranged within the field of force of said electromagnet, auxiliary circuits having circuit-closing devices arranged in the path of outward movement of the armature-lever, a clockwork mechanism for controlling the outward movement of the armature-lever when the electromagnet is deënergized, and a normally deënergized electromagnet disposed opposite the first magnet and arranged in a circuit controlled by the movement of the arma-

ture-lever, said normally deënergized magnet serving to attract the armature and hold the circuit-closing device in intimate contact.

8. In a device of the class specified, the combination with the main and local lines, of a relay-controlled magnet, an armature arranged within the field of force of said magnet, a ground-circuit having a circuit making and breaking device arranged in the path of outward movement of the armature, said ground-circuit being normally held open by a grounding-plug, and a circuit opening and closing means under the control of said grounding-plug for breaking the circuit of the electromagnet and releasing the armature when the plug is removed to establish a ground connection.

9. In a device of the class specified, the combination with the main and local lines, of a relay-controlled electromagnet, an armature arranged within the field of force of said electromagnet, a ground-circuit having movable contacts arranged within the path of movement of the armature-lever, a movable lever forming a part of the circuit of the electromagnet, contacts arranged in the ground-line, one of the contacts being carried by said lever, a grounding-plug adapted to electrically connect with the main line and normally holding the lever in position to close the circuit of the electromagnet, and a receiving-socket in which said plug is normally held to maintain the electromagnet-circuit and to break the ground-line, the removal of the plug breaking the circuit of the electromagnet and releasing said armature.

10. In a device of the class specified, a relay-controlled magnet, an armature arranged within the field of force of said magnet, circuit making and breaking devices arranged in the path of outward movement of said lever, a clockwork-controlled mechanism controlling the movement of the armature-lever, and a manually-operated lever for engaging and restoring the armature to an initial position, the returning movement of the armature breaking the circuits established on the downward movement thereof and effecting the reënergizing of the relay-controlled magnet.

11. An attachment for a local telegraph-station, comprising a box or casing, a clockwork mechanism arranged therein, a disk operatively connected to said clockwork mechanism, a pair of oppositely-disposed electromagnets in said casing, an armature arranged within the field of force of said electromagnets, a block depending from the armature and resting on the periphery of said disk, a plurality of circuit-closing devices arranged in the path of outward movement of the armature, said circuit-closing devices having connection with the circuits of the two electromagnets, a pivoted lever disposed in said casing and carrying contacts, a grounding-plug adapted to a socket in the casing and serving to normally maintain said lever in an initial position, a manually-operated lever for returning the armature to initial position, and binding-posts disposed on the exterior of said box or casing and connected to the various electromagnets and circuit-closing devices and adapted for connection in the local line of the telegraph system.

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

CHARLES K. JONES.

Witnesses:
JNO. E. PARKER,
J. H. JOCHUM, Jr.