

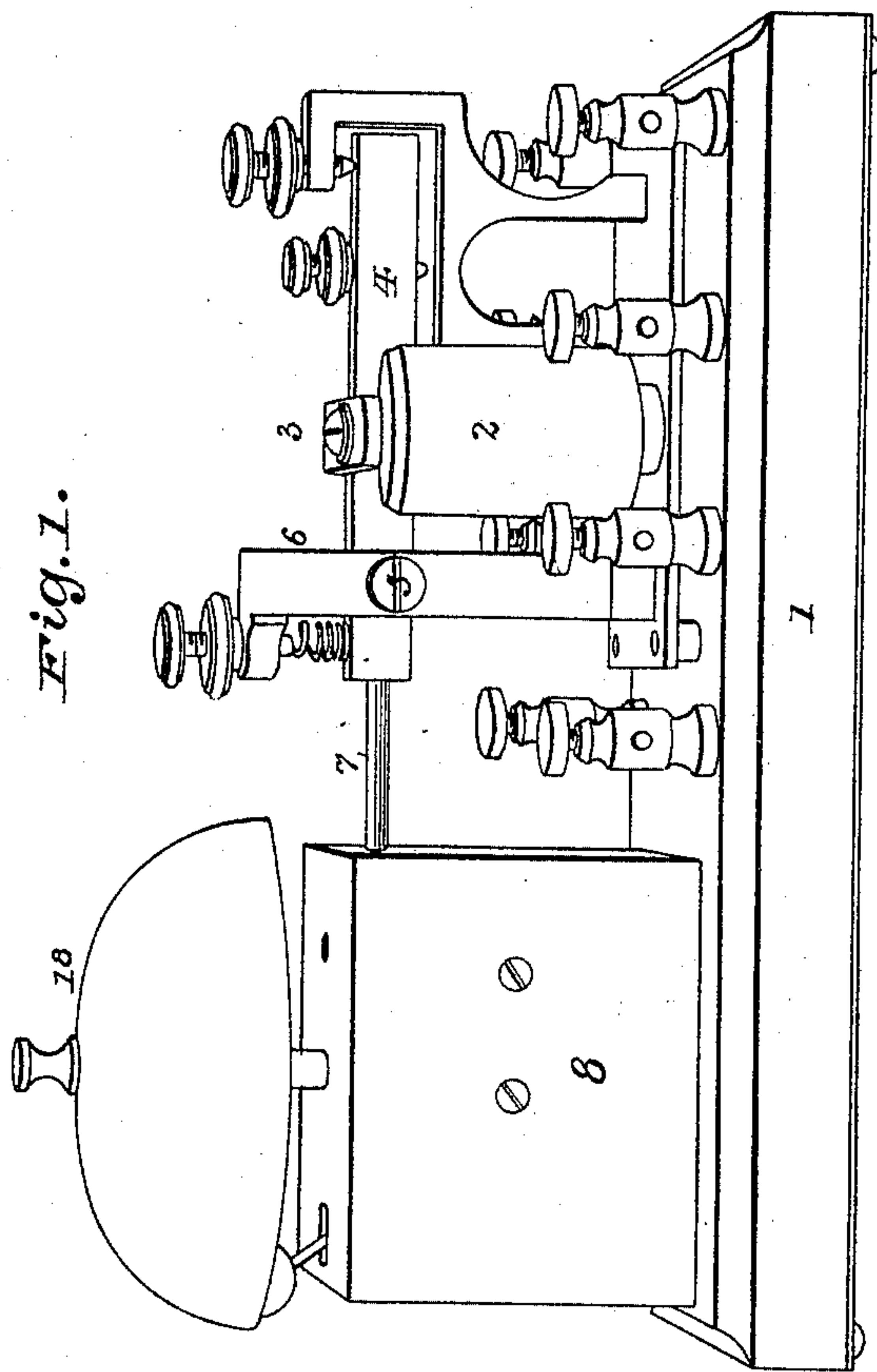
(No Model.)

5 Sheets—Sheet 1.

A. L. CREELMAN.  
TELEGRAPHIC SOUNDER.

No. 584,466.

Patented June 15, 1897.



Witnesses

Arthur Ashley  
J. J. Elmore

Inventor

A. L. Creelman  
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Attorney

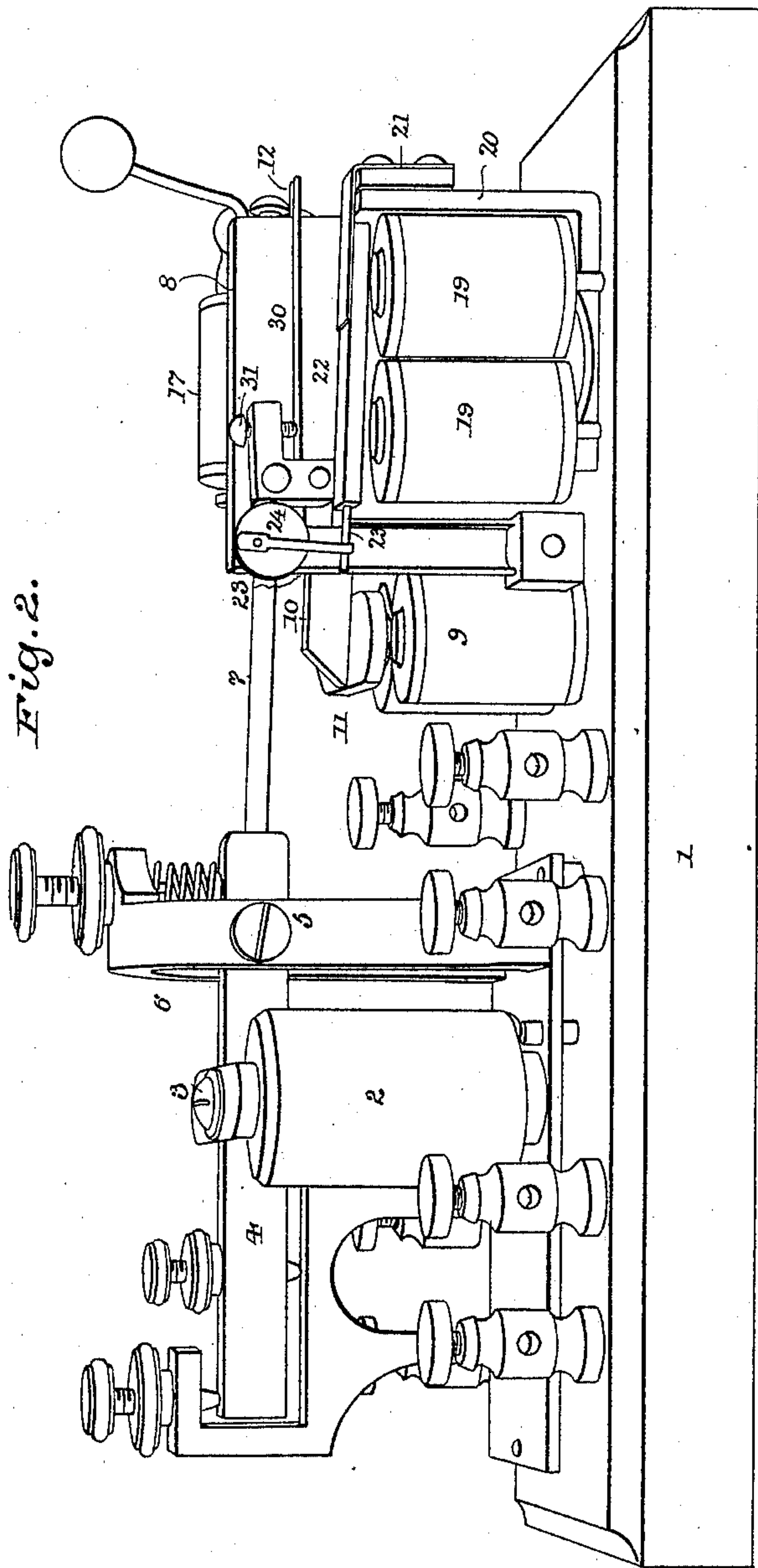
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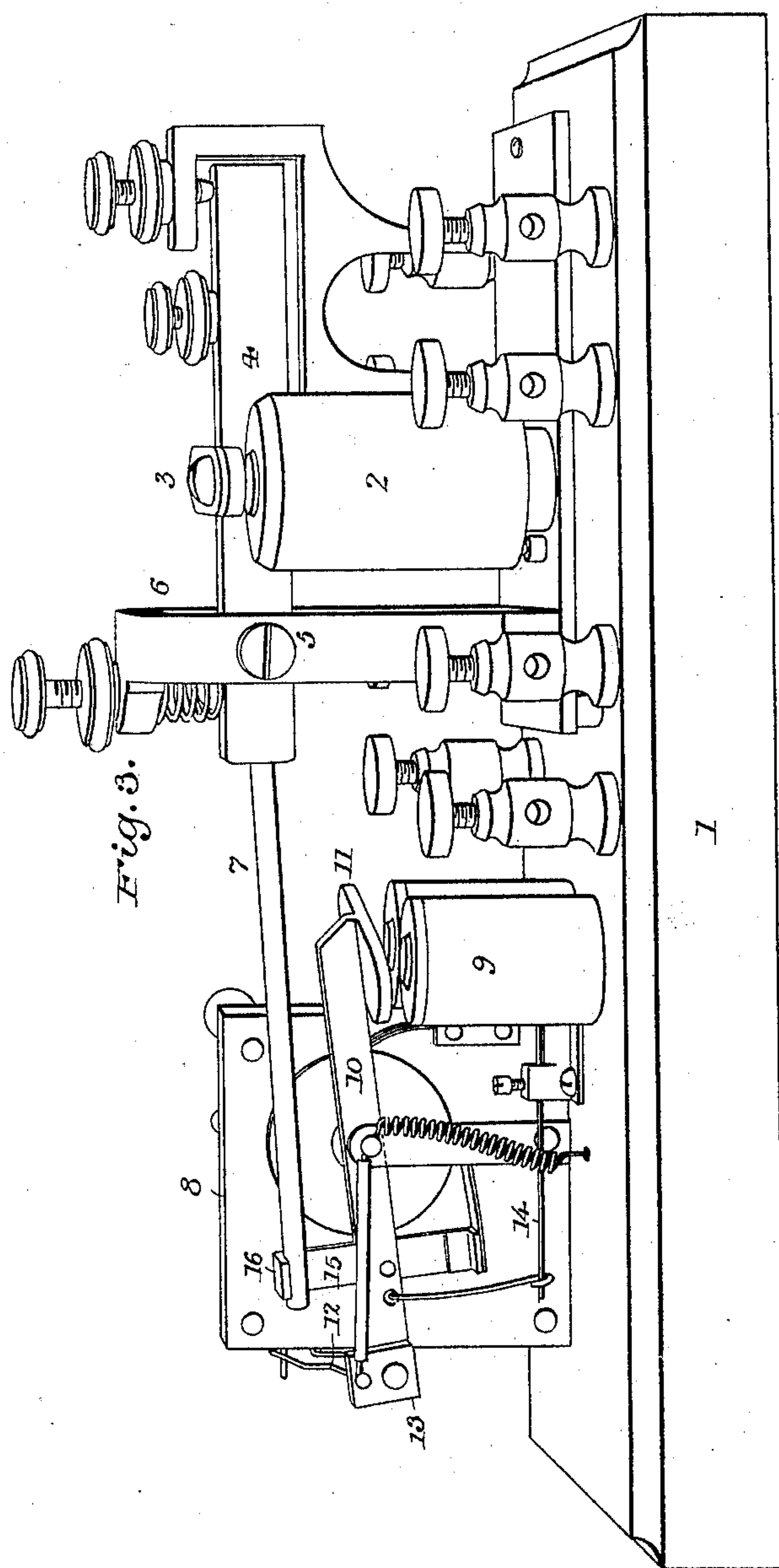
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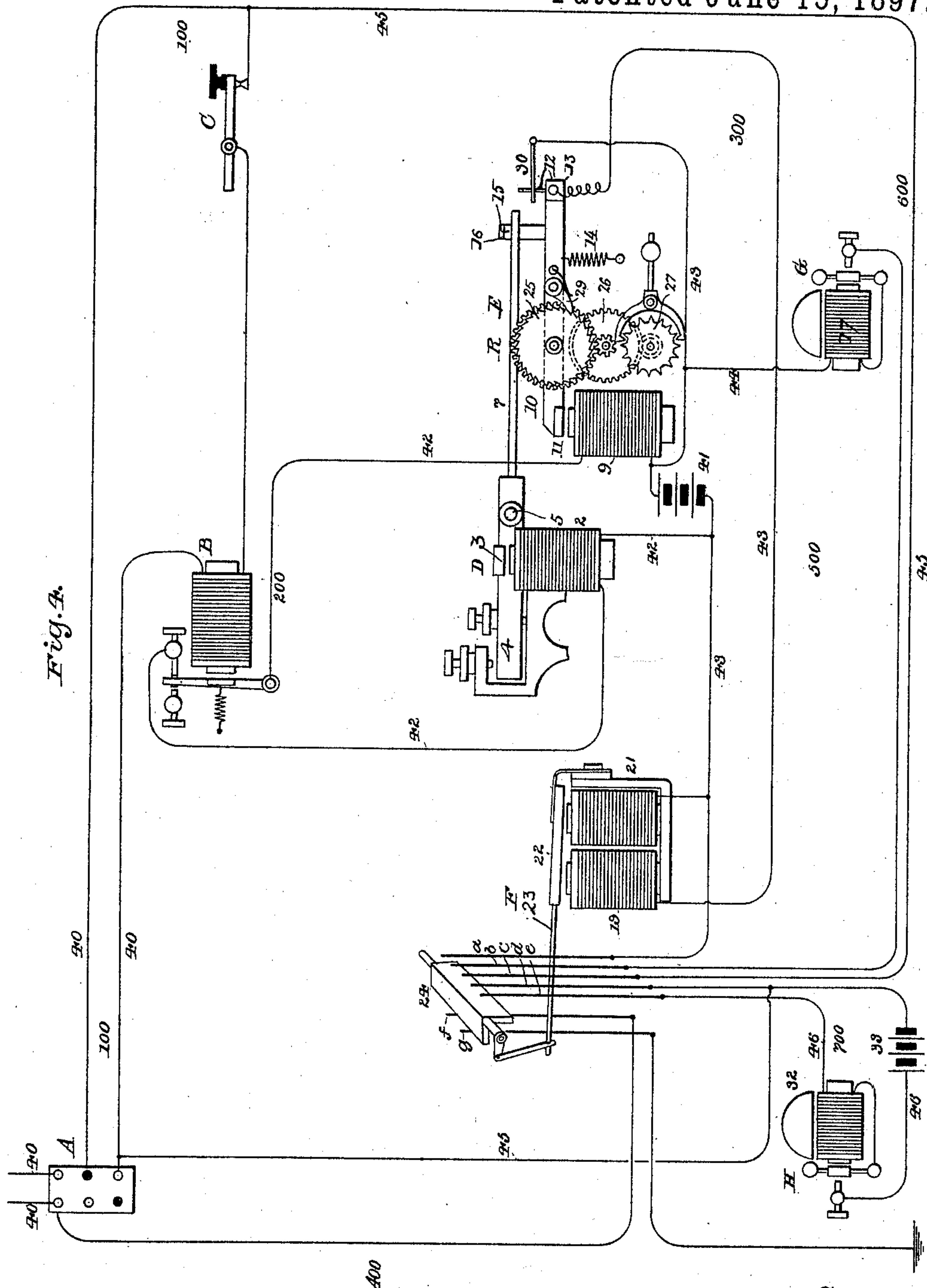
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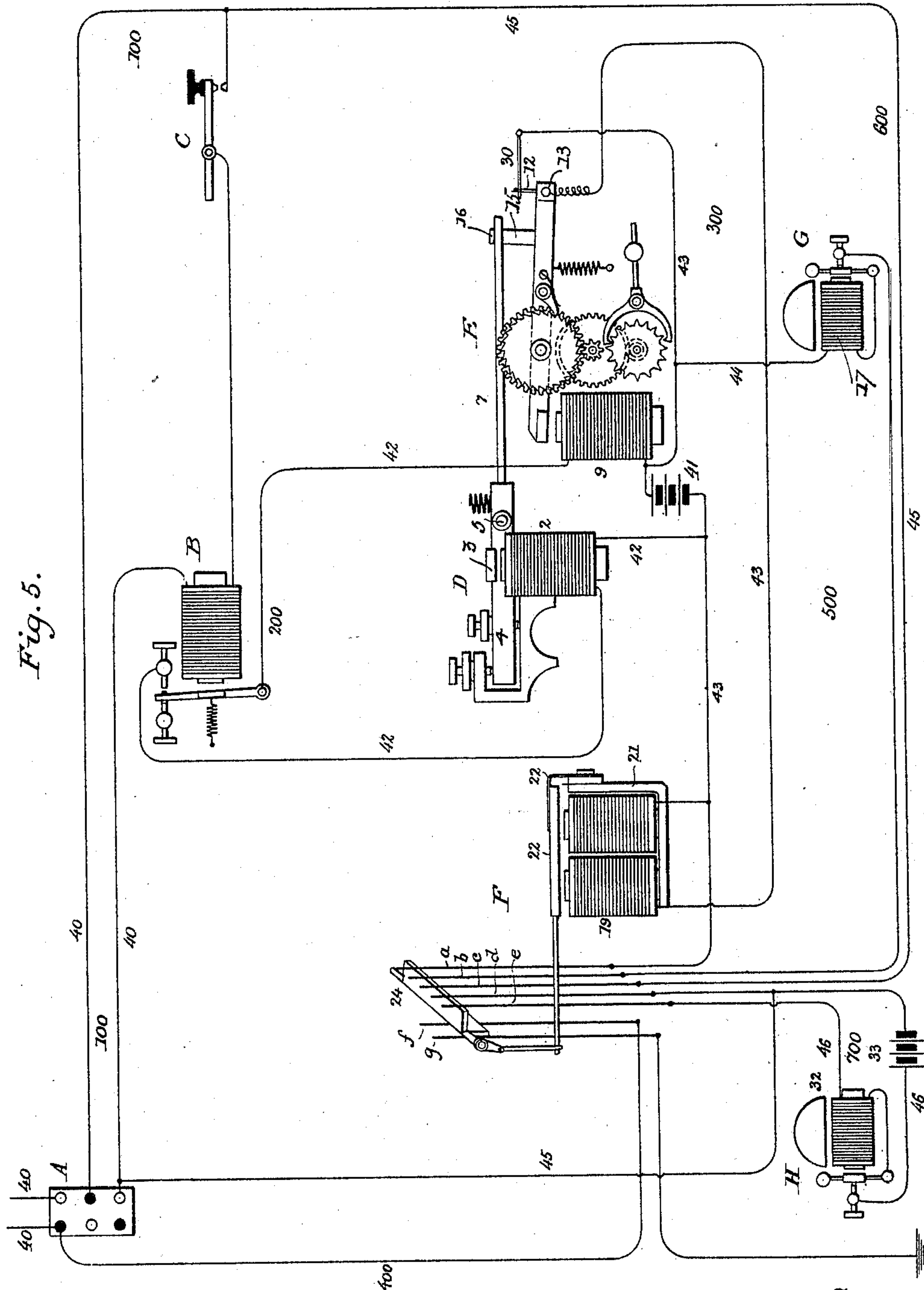
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Patented June 15, 1897.



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# UNITED STATES PATENT OFFICE.

ALVAH LEWIS CREELMAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE CIRCUIT PROTECTING SOUNDER COMPANY, OF MEMPHIS, TENNESSEE.

## TELEGRAPHIC SOUNDER.

SPECIFICATION forming part of Letters Patent No. 584,466, dated June 15, 1897.

Application filed July 3, 1896. Renewed February 26, 1897. Serial No. 625,179. (No model.)

*To all whom it may concern:*

Be it known that I, ALVAH LEWIS CREELMAN, of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Telegraphic Sounders, of which the following is a specification.

My invention relates to that class of sounders commonly known as "receiving-sounders" and used in telegraphic or analogous circuits in connection with protecting devices.

The object of my invention is to provide a single instrument adapted to perform the functions both of a sounder and one or more call or alarm bells and which shall embody within itself the devices and connections for protecting the circuit, for avoiding open circuits, for calling attention to imperfect connections, open circuits, and ground connections, for automatically changing connections in the local circuit to give notice within a definite or predetermined time of the opening of the main line, for automatically changing the local circuit and for giving notice thereof within a certain or predetermined time, for automatically shunting a point to be protected after a predetermined time, and for facilitating and insuring the proper working of telegraphic and analogous circuits.

To these ends the invention comprehends a sounder provided with a second and third electromagnet and with devices controlled thereby for making and breaking connections through which the various operations referred to are effected.

It further comprehends an apparatus in which are combined the usual sounder located in one branch of a local circuit, an alarm or call bell located in another branch of said circuit, separate alarms or bells in another branch, and electrically and automatically operated devices for changing the local circuit to operate either the sounder or the bells.

It further contemplates details of construction and arrangement, all as hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a perspective view of my sounder complete; Fig. 2, a similar view with the inclosing case removed; Fig. 3, a similar view of the reverse side with the inclosing case removed. Fig. 4 is a diagrammatic view with the main line

closed, showing the connection between the operative devices and the means for changing the connections. Fig. 5 is a diagrammatic view with the main line open, showing the connection between the operating devices and the means for changing the connections.

Referring to the drawings, on a suitable base 1 I secure a sounder of ordinary construction consisting of an electromagnet 2, armature 3, and an armature-lever 4, pivoted at 5 in a support 6. The armature-lever 4, which has the usual stop-screw and spring, is further provided with a bar 7, that extends backwardly in a straight line with the armature-lever on the side of the pivot 5 opposite the armature.

Secured to the same base 1 as the sounder is a frame or casing 8, which supports and to which are attached the various parts to be hereinafter described.

Between the sounder and the casing 8 and near to the latter is an electromagnet 9, its poles standing vertically. To one side of the casing 8 I pivot a lever 10, midway between its ends, one end carrying an armature 11 in the field of the magnet 9, while the other end gives support to a finger 12, secured to an insulated block 13 on the said lever. A spring 14 tends to keep the armature away from the magnet.

Secured to the lever 10 between its pivot and the insulated block 13 is an arm 15, which extends in an upward direction between the casing 8 and the bar 7, where it is provided with a hook 16, which at certain times engages with the bar 7.

Between the vertical sides or plates of the casing 8 is placed the retarding mechanism or gearing R, which consists of a main driving-gear and ratchet-wheel 25, intermediate wheel 26, escapement-wheel 27, and balance 28. The main wheel 25 is driven by the armature-lever 10, whose pivotal point is preferably on the same axial line as the main wheel, through the medium of a pawl 29, pivoted thereon, engaging the teeth of the said wheel. When the magnet 9 is energized, the armature 11 is attracted and the pawl slips over the teeth of the driving-gear, but when the circuit is broken through the said magnet the armature-lever 10 is rocked the other



way by the spring 14, causing the gear 25 to turn by the engagement of the pawl 29 with the teeth of said gear. The descent of the lever 10 will be gradual, the time being regulated by the retarding-gearing, depending upon the range of movement of the lever 10, the speed of the gearing, and the length of the train.

Attached to the upper part of the casing 8 is an electromagnet 17, supported in a horizontal position, which operates an armature and hammer in the usual well-known manner for ringing a bell mounted on the outside of the inclosing case, the hammer protruding through an opening in the top.

On the base 1 near the casing 8, but on the side opposite to the armature-lever 10, is an electromagnet 19, standing in a vertical position. The pole-piece 20 from below the magnet extends upward on one side to the top of the said magnet 19, where a spring 21 is secured. The spring 21 is made of flat metal bent approximately to a right angle. The vertical leg of the spring is secured adjustably to the pole-piece, as above described, while the horizontal leg is securely fastened to an armature 22, which extends over the poles of the magnet 19 and in the field thereof. The armature 22 has an extension 23, pivoted to a connecting-rod, which is in turn pivoted to a rocking circuit-changer 24. (Shown more clearly in Figs. 4 and 5.) The circuit-changer 24 consists of a right-angled plate which may vary in length as desired, pivoted at each end at the angle of the plate to the casing 8 in a horizontal position. The arrangement is such that when the magnet 19 is energized its armature, through the connections described, will rotate the circuit-changer, bringing one side to a substantially horizontal position. When the magnet is de-energized, the spring-plate 21 will raise the armature 22, which will rotate the circuit-changer in the opposite direction and bring the other side to a horizontal position. Contact-fingers *a*, *b*, *c*, *d*, and *e* are secured in position on one side of the circuit-closer to be engaged thereby when the magnet 19 is energized, while fingers *f* and *g* stand on the opposite side to be connected when the magnet is de-energized.

Above the armature 22 and substantially parallel therewith is a finger 30, attached to an insulating-piece screwed to the casing 8. This finger 30 extends beyond the rear edge of the casing in position to be struck by the finger 12 when the rear end of lever 10 reaches its lowest position. A screw 31, which bears on the top of the rod 30, regulates its position vertically, so that the distance between the fingers 12 and 30 can be varied, thus allowing more or less time to elapse before the sounder is cut out from the local circuit, as will be more fully described hereinafter.

In Figs. 4 and 5 are shown an extra call-bell 32 and an extra local battery 33. This bell may be placed at any distance from the

instrument or in any place desired to attract the attention of the operator should he be away from his sounder. Should circumstances require it, any number of extra bells with like circuits may be employed by adding additional fingers to be connected by the circuit-closer.

Having described my circuit-protecting sounder, I will now detail the circuit connections and the operation of the several parts.

Referring to Figs. 4 and 5, A represents a switchboard, B a relay instrument, and C a normally-closed key; D, the sounder; E, the retarding mechanism; F, the circuit-changing device; G, the alarm-bell secured to the instrument, and H an alarm-bell to be placed in any convenient position. The main-line circuit 100, consisting of the wires 40, which enter the office by the switchboard A, include the relay B and normally-closed key C therein. The local circuit 200 starts from the battery 41 by wires 42 to the sounder-magnet 2, thence to the back-stop of relay and to the relay-armature, thence to the magnet 9 of retarding mechanism, and back to the battery. Normally the local circuit will be closed and the magnets 2 9 energized, attracting their respective armatures. The outer end of lever 10 will be raised, breaking contact between the fingers 12 and 30 and engaging the pawl 29 with the main drive-wheel 25 of the retarding-train.

A message passing over the main line will cause the sounder D to operate in the usual manner. The magnet 9 will also attract and repel its armature synchronously with the sounder. The retarding-train, however, prevents the lever 10 from sensibly moving during the short period of the break, restraining thereby the finger 12 from contacting with the finger 30, which would cause a short circuit and immediately cut out the sounder.

The circuit 300, which contains the circuit-breaking apparatus, passes from battery 41, by wires 43, to the magnet 19, thence to the finger 12, finger 30, when the two are in contact, and back to the battery. This circuit 300, which operates the circuit-breaker F, controls four shunt-circuits, two from the main line and two local circuits. When the magnet 19 is de-energized, the circuit-changer is in the position shown in Fig. 4, which closes one of two breaks in the ground-circuit 400 of the main line through fingers *f* and *g*, the other break being at the switchboard. When the magnet is energized, the circuit-changer rotates to the position shown in Fig. 5, whereby the circuits through fingers *a b c d e* are closed and opened through fingers *f* and *g*. Closing the circuit through fingers *a* and *b* will cause the bell G to sound, this circuit 500 being from battery 41 through wires 44 to the bell, thence to finger *b*, circuit-changer 24, finger *a*, to battery. Circuit 600 is the shunt-circuit of the main line around the relay and key. It passes from the wire 40, by wire 45, to the fingers *d c*, to wire 40 again, outside of the



key. A circuit 700 is controlled by the circuit-changer through fingers *d e*, wires 46, secondary local battery 33, and bell H, which bell can be placed at any distance from the instrument. As many more circuits of this character as desired can be used by the addition of fingers in position to be contacted by the circuit-breaker.

If from any cause whatever the main line should be left open anywhere in its circuit, the local circuit would be broken and the magnets 2 and 9 become deenergized, permitting the outer ends of the armature-levers to be depressed by the springs connected thereto. The sounder-lever would be depressed immediately, and the lever of the retarding-magnet would be slower by reason of the gear-train operated thereby. Should the main line remain open longer than the time set for the lever 10 to reach its lowest position, the fingers 12 and 30 will contact (see Fig. 5) and shunt the local circuit from 200 to 300, cutting out the magnets 2 and 9, which are of greater resistance than the magnet 19. The magnet 19, being energized, attracts its armature, turning the circuit-changer from the position shown in Fig. 4 to that shown in Fig. 5, thereby shunting the main-line circuit 100 around the relay and key by way of circuit 600. The ground-circuit 400 would be opened through fingers *f* and *g*, and the circuits 500 and 700 through the bells would be closed, causing them to ring.

The apparatus will remain unchanged, as above described, even after the main line is closed, until it is reset, which is accomplished by raising the bar 7, which, engaging with the hook 16, raises the lever 10, breaking the contact between fingers 12 and 30 and setting the pawl 29 in position to engage with the main drive-wheel 25. The circuit through magnet 19 being broken, the armature 22 will rise under the influence of its spring 21 and turn the circuit-changer back to its first position, (shown in Fig. 4,) breaking contact with the fingers *a b c d e*. The main line will then pass through the relay and key, the sounder will be operative, and the bells will cease ringing.

Ground-wires are often purposely or carelessly left plugged to the main line in the switchboard. If the main line be plugged on the north side of the office, any office on the south side can remove it by simply opening the main line a sufficient length of time to allow the circuit-protecting sounder to revolve the circuit-changer 24. If the line be grounded on the south side, it can be removed by an office on the north side in a similar manner. It is immaterial how many wires are contained in a switchboard. The ground can be removed from any one or all of them by simply opening the wire upon which the circuit-protecting sounder is placed, there generally being but one ground-wire to a switchboard and that passing through the instrument it is virtually cut in two when the main line has been

left open a sufficient length of time to allow the instrument to operate.

Having thus described my invention, what I claim is—

1. The combination of an electric circuit, a sounder-magnet and a retarder-magnet forming a part thereof, a second circuit, containing a circuit-changing magnet, a contact carried by the armature-lever of the retarding-magnet for shunting the current from the first circuit through the second, substantially as set forth. 75

2. The combination of an electric circuit, a sounder-magnet and a retarder-magnet forming a part thereof, a second circuit, a circuit-changing magnet located therein, a contact carried by the armature-lever of the retarding-magnet for shunting the current, after a predetermined time, from the sounder and retarder magnets through the circuit-changer magnet of less resistance, substantially as set forth. 80 85

3. The combination of a main electric circuit containing a relay and key, a local circuit containing a sounder and retarding mechanism, a second local circuit containing a circuit-changing mechanism, a main-line shunt-circuit around the relay and key, contact-fingers forming a part thereof and adapted to be closed by the circuit-changing mechanism, when the latter is energized by the shunting of the current from the first to the second local circuit by a contact carried by the retarding mechanism, substantially as set forth. 90 95 100

4. An electric circuit, a sounder-magnet and a retarder-magnet forming a part thereof, a second circuit, a circuit-changer magnet included therein, a circuit-changer operated by the circuit-changer magnet, a bell mechanism, a circuit therefor, and contact-fingers, adapted to be closed by the circuit-changer when its magnet is energized by the operation of the retarding mechanism closing the secondary circuit, substantially as set forth. 105 110

5. The combination of an electric circuit, a sounder and a retarding apparatus therein, a circuit-changing apparatus, a circuit therefor, closed by the action of the retarding apparatus, a third circuit including a bell and a battery, having fingers in such relation to the circuit-changer as to be closed when the circuit-changer magnet is energized, substantially as set forth. 115 120

6. The combination of an electric circuit, a sounder and retarding apparatus therein, a circuit containing a circuit-controlling apparatus, closed by the action of the retarding apparatus, and a ground-circuit from the main line opened when the circuit-changing magnet is energized and closed when it is deenergized, substantially as set forth. 125

7. In combination, an electric circuit, a sounder and a retarding apparatus forming a part thereof, a second circuit closed by the retarding apparatus when the current there-through is broken, a circuit-changing magnet contained in the second circuit, a circuit- 130



changer operated by the magnet, contact-fingers in operative relation to the circuit-changer, and adapted to close the circuits through the main-line shunt around the relay and key; the main-line ground-circuit; an alarm-bell circuit 500, and a second and independent alarm-bell circuit 700, substantially as set forth.

8. The combination of an electric circuit, a sounder-magnet and a retarder-magnet contained therein, the said magnets being of equal resistance, a second circuit, a circuit-changer magnet of less resistance than the aforesaid magnets, forming a part thereof, and a circuit-breaker in the said second circuit, controlled by the first circuit, whereby the said second circuit is closed after the circuit through the retarder-magnet has remained broken for a predetermined time, as set forth.

9. The combination of an electric circuit containing a sounder-magnet and a retarder-magnet of equal resistance, a second circuit

containing a circuit-changer magnet of less resistance than the aforesaid magnets, a circuit-breaker in the second circuit closed after the first circuit has been broken for a predetermined time, a third circuit which is closed when the circuit-changer magnet is energized and a signal-bell in the third circuit, the resistance of its magnet being the same as the circuit-changer magnet, substantially as set forth.

10. An electric circuit, a sounder-magnet and a retarder-magnet forming a part thereof, a second circuit, a circuit-breaker therein, controlled by the retarder-magnet, and a circuit-changer magnet forming a part of the second circuit, substantially as set forth.

In testimony whereof I hereunto set my hand, this 18th day of May, 1896, in the presence of two attesting witnesses.

ALVAH LEWIS CREELMAN.

Witnesses:

CONRAD KOHLER,  
CHARLES F. VOGEL.