No. 763,911.

PATENTED JUNE 28, 1904.

J. W. LATTIG & C. L. GOODRUM.

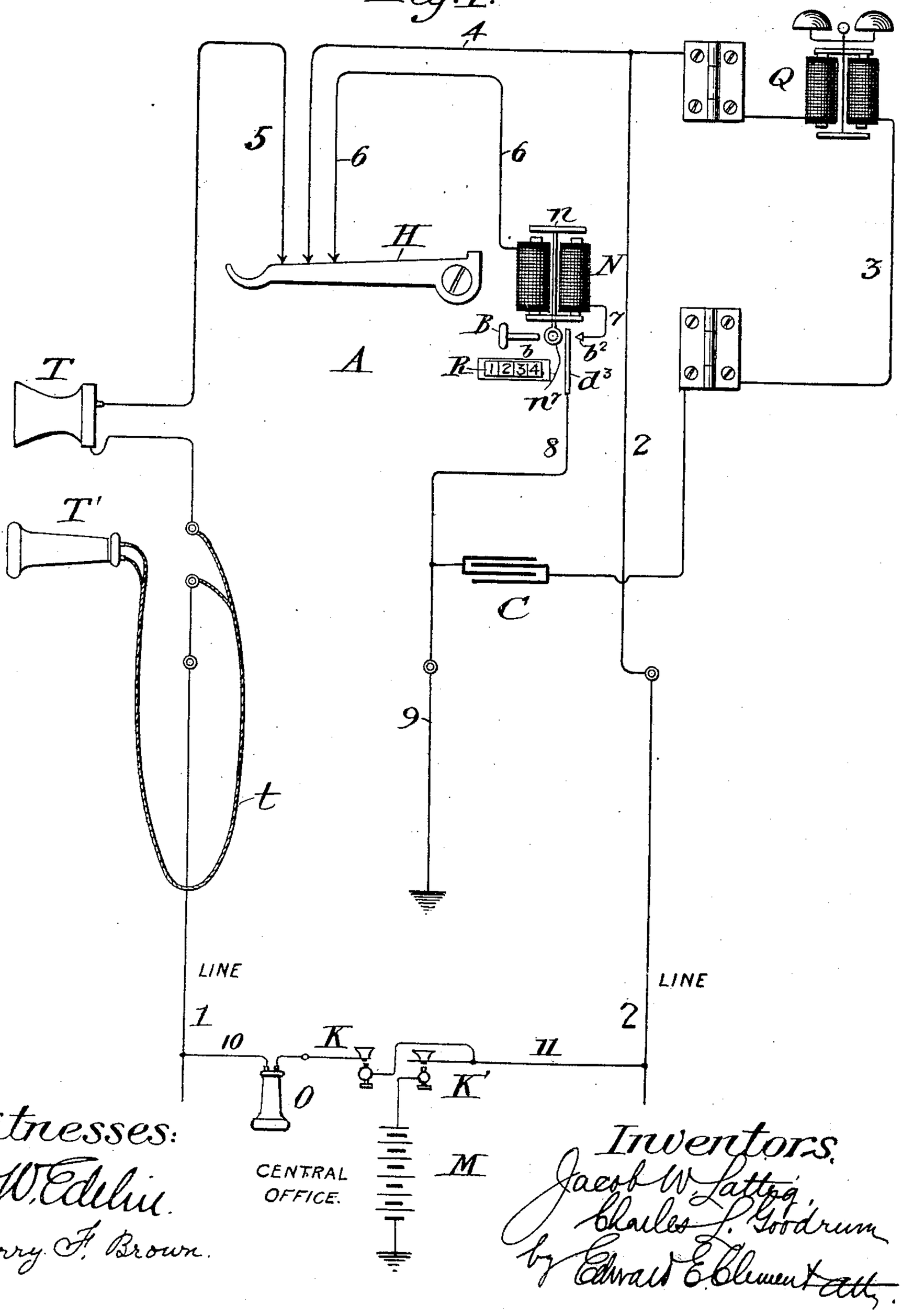
CALL REGISTER FOR TELEPHONE SYSTEMS.

APPLICATION FILED JUNE 6, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

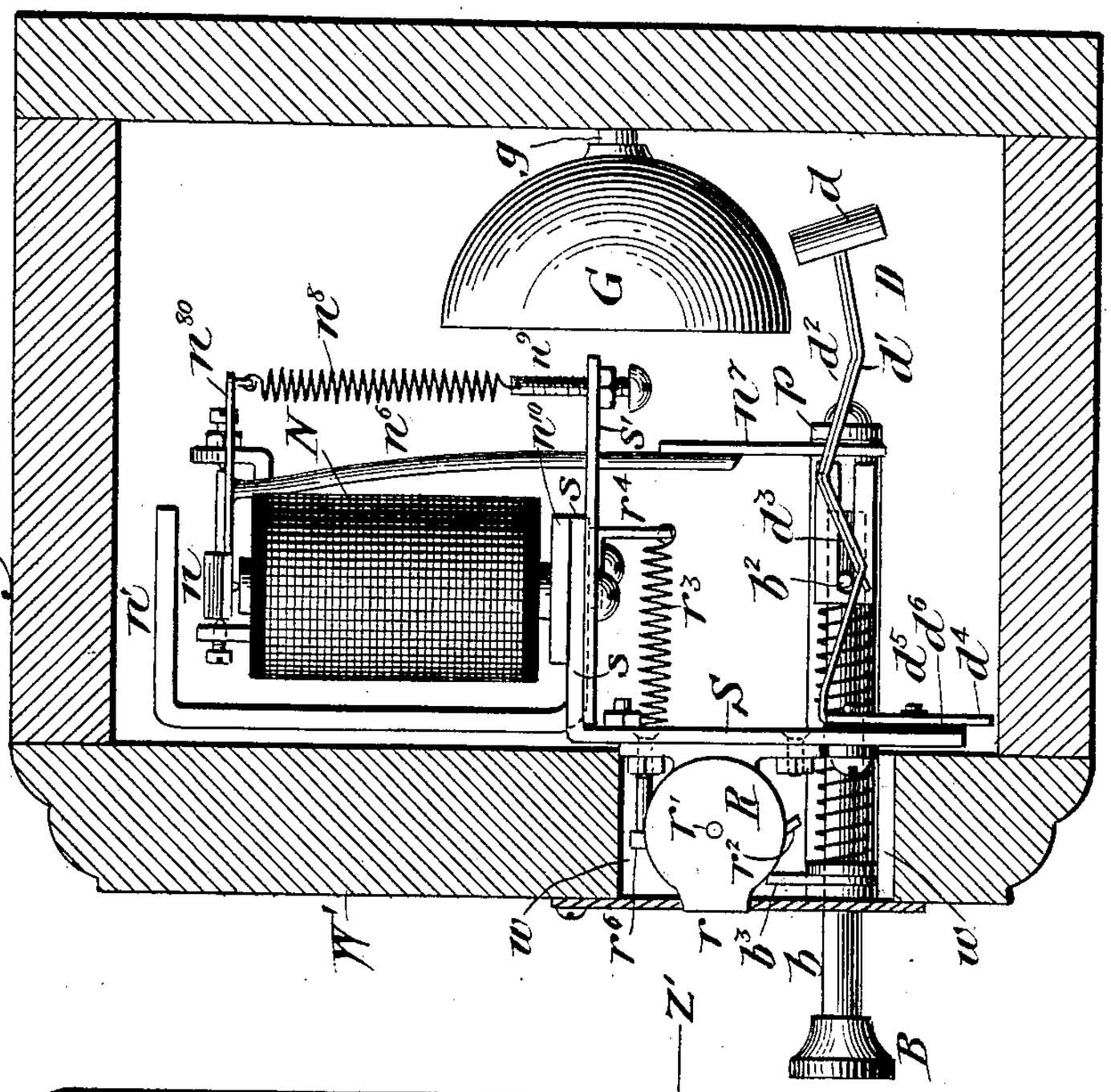
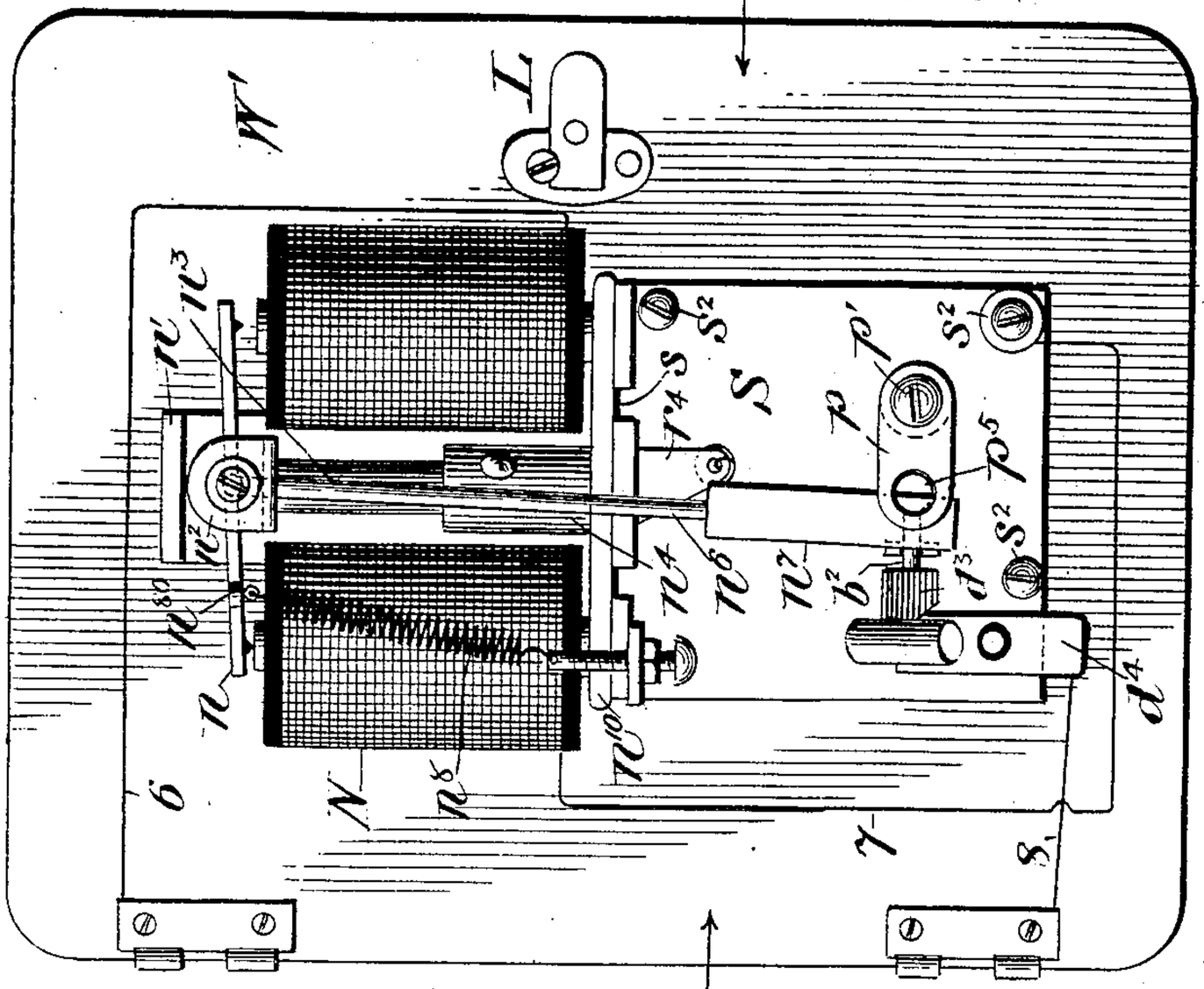


Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

Fig. 5.

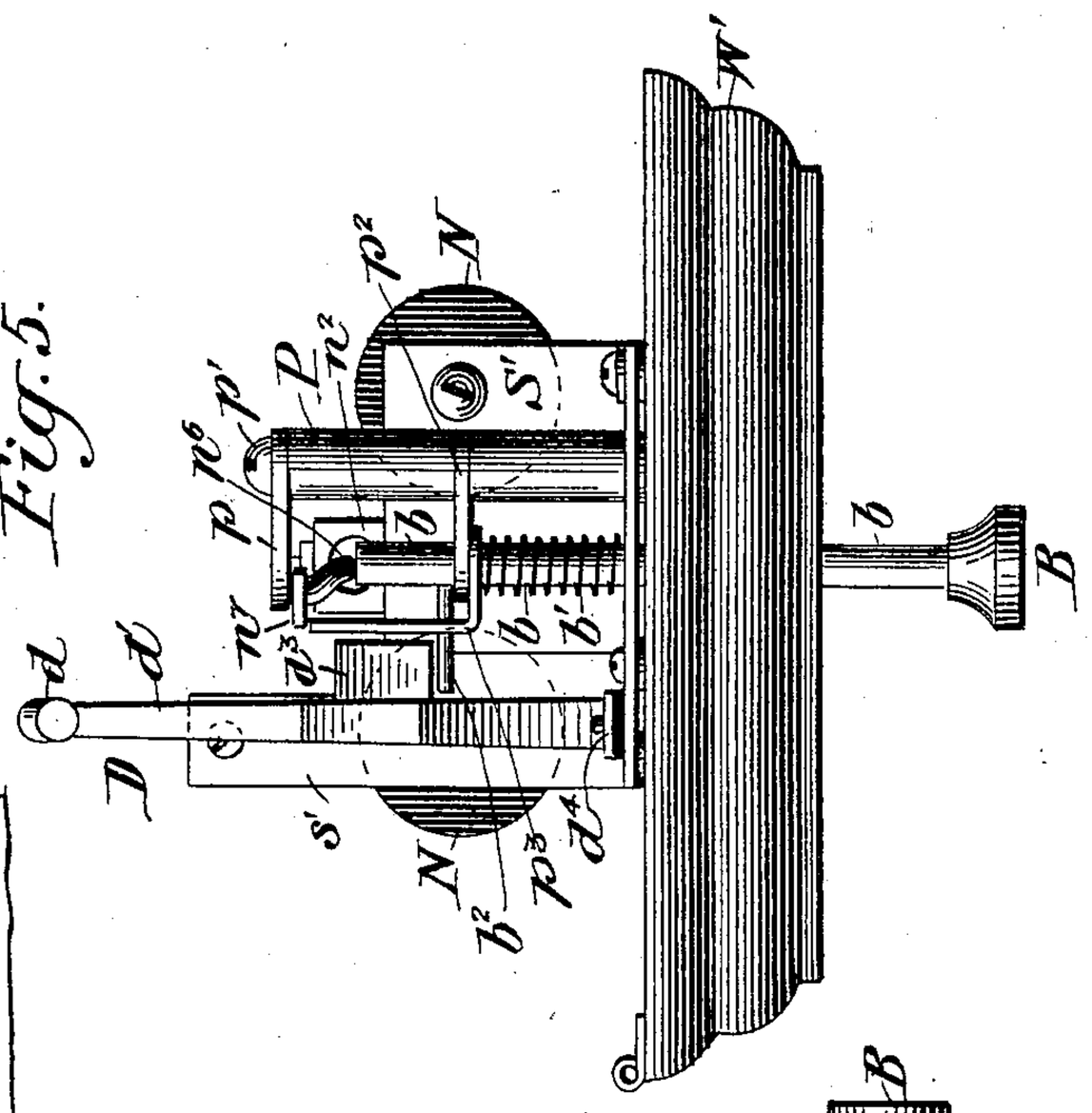

Fig. 4.

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UNITED STATES PATENT OFFICE.

JACOB W. LATTIG, OF WEST BETHLEHEM, AND CHARLES LANE GOODRUM, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO EASTERN TELEPHONE MANUFACTURING COMPANY, OF WESTCHESTER, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CALL-REGISTER FOR TELEPHONE SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 763,911, dated June 28, 1904.

Application filed June 6, 1903. Serial No. 160,327. (No model.)

To all whom it may concern:

Be it known that we, JACOB W. LATTIG, residing in West Bethlehem, county of Northampton, and CHARLES LANE GOODRUM, residing in Philadelphia, county of Philadelphia, Pennsylvania, citizens of the United States, have jointly invented a new and useful Call-Register for Telephone Systems, of which the following is a specification.

Our invention relates to call-registers or measured-service meters for use in telephone systems, and has for its object the provision of a register to be mounted at the subscriber's station as a part of his telephone set to give visible indications of the number of calls recorded, that may be read at any time by the subscriber, and to be controlled as to its operation permissively from the central office. To this end we provide a mechanism adapted to be actuated by a push-button when the subscriber makes a call, the first function of this button being to cut in circuit a locking-magnet through which the operator at central controls the further movement of the button. If the desired connection can be obtained, the magnet withdraws its lock, and the continued movement of the button actuates the register and also sounds an audible signal which may be heard by the listening operator through the operation of the subscriber's transmitter.

Our invention is fully illustrated in the accompanying drawings, wherein—

Figure 1 is a diagram showing a line-circuit having a subscriber's station with a register at one end thereof and conventionalized central-office apparatus at the other end thereof. Fig. 2 is a rear view of the register apparatus removed from its casing. Fig. 3 is a side view thereof looking in the direction of the arrow Z in Fig. 2, the casing being shown in section. Fig. 4 is a similar view looking in the direction of the arrow Z′ in Fig. 2 and with parts in section. Fig. 5 is a bottom view; and Fig. 6 is a detail of the face-plate, push-button, and number-wheels.

Referring to Fig. 1, A is a subscriber's station having line-wires 1 and 2 connecting it to a central office. The station has the usual transmitter T and receiver T′, switch-hook H, ringer Q, and condenser C fitting it for the common-battery system, in which it is supposed to be connected. With the hook H down the condenser C and ringer Q form the only operative bridge across the line-wires or from the calling-wire to ground, as shown in the figure. With the hook up the transmitter and receiver are placed across the line. The ringing-circuit is over wire 2, ringer Q, wire 3, condenser C, wire 9 to ground, and back to central. The talking-circuit is from line-wire 2 to wire 4, hook H, wire 5, transmitter and receiver to wire 1. Our invention is not directly concerned with any of these circuits or the apparatus therein, except as the transmitter coöperates with our gong-striker to be described.

The register constituting our invention is housed in a box or casing attached to the backboard of the telephone if it is a wall set or to the table or wall if it is a desk set. It consists, essentially, of a push-button B, a circuit-closer b^2 d^3, operated by the button, a magnet N, cut in thereby to a circuit traced from wire 2 to 4, hook H, wire 6, magnet N, wire 7, circuit-closer, wire 8, wire 9, and ground, and from the other line-wire, 1, by way of wire 5 also to ground, together with a locking-dog n^7, operated by the magnet N to keep the push-button plunger from completing its movement unless proper current is on the line, and finally a multiple-disk register R of the cyclometer pattern giving direct readings and operated by the push-plunger b at the end of its movement if permitted to finish it. We add a gong and an attachment on the push-plunger to strike it when it registers only. If no number is registered, no stroke is given on the gong. So if the operator hears the gong she may be quite certain a call is chalked up. This is not shown in Fig. 1, but appears in Fig. 3 complete and in other figures partially. In order to have

current or proper direction in the line when the register is to be operated, the operator at the central office is supposed to be provided with a suitable circuit-changer whereby reversals can be effected. In practice this might be accomplished in various ways, according to the particular circuits used in any particular exchange. So we have chosen to indicate the simplest kind of connections and apparatus in conventional form, and it will be understood that we consider all equivalents therefore to be within the scope of our invention. Thus in completing the connection the operator might have extra contacts on her listening or on her ringing key, or she might have a pole-changing switch in each cord to swing the main-battery connections end for end when it is time to register, and so on. In Fig. 1 we show the line-wires 1 and 2 with branches 10 and 11, connecting them, respectively, with keys K and K′, the former completing the circuit 1 10 O K 11 2 for the operator's telephone O and the latter connecting battery M to the wire 2 to send current to the magnet N to unlock the push-button plunger B *b* and permit the register to be operated and the gong sounded, the latter being audible by transmission of instrument T and receipt by instrument O. In the ordinary wall-telephone the transmitter is mounted on an iron arm secured to the backboard, and as our register and gong are mounted on the same backboard the sound of the gong is well and easily communicated mechanically through the wood of the mountings and the iron of the transmitter-arm. In case the register is employed with a desk set the same mechanical sound transmission from gong to transmitter can be effected through the wood of a table or desk if both are mounted thereon.

The operation, sequentially stated, of our invention is as follows: Suppose subscriber A calls. The central-office operator plugs into the line and ascertains the number wanted. If after testing she ascertains the wanted line to be idle and if after ringing the wanted subscriber he responds, she closes switch K′ (having already closed switch K) and tells the subscriber calling to push his register-button B. He does so, and the first result is the closure of the circuit of magnet N to line, as already traced. There being current on the line from battery M, the magnet N becomes instantly energized, and the armature *n* is thrown over, moving the locking-dog n^7 out of the path of the plunger *b* and permitting the latter to continue its movement, when the register is operated and the gong struck. The sound of the gong is conveyed to the operator, and she thereupon withdraws from the connected circuits, which, if she had kept them open until the call was recorded, she then proceeds to unite. The movement of the locking-dog n^7 need be so small to unlock, and the action of the magnet N is so rapid that the movement of the push-button plunger *b* is perfectly continuous when current is put on the line.

Having thus generally described the operation of our apparatus, we will now give some detailed description of the mechanism as illustrated in Figs. 2 to 6.

In Fig. 3 is best shown the casing or box W with its cover W′, on which the principal parts of our mechanism are mounted. The box is usually of hard wood and is of the type currently known as "ringer-boxes," having a hinged cover W′ and a lock L. In the bottom of the box is secured a post *g*, carrying the gong G, in position to be engaged by the hammer *d*, which will be referred to later, when the cover W′ is closed. All other parts are carried on the inner face of the cover. Cut through the cover or lid of the box W is a rectangular opening *w*, in which the register R is seated and other parts work. Over the rear face of this opening is a plate S, suitably secured to the wood, as by screws s^2 s^2. (Shown in Fig. 2.) All the operative parts of the mechanism are directly mounted on this plate, which we shall therefore denominate the "base-plate" hereinafter. The base-plate has a portion of its length returned to form an outsetting flange or shelf *s* above the opening *w*, and on this shelf is secured the electromagnet N, its yoke n^{10} resting on the shelf and being secured thereto. On this yoke is mounted a hollow pillar n^4, in which slides a post n^3, carrying at its upper end a cradle-yoke n^2, in which is pivoted, preferably between pointed pivot-screws with lock-nut fittings, the armature *n*, from which projects forwardly an arm n^{80}, to which is secured one end of a biasing-spring n^8, the lower end of which is secured to an adjustable screw-post n^9, having a lock-nut to hold its adjustment, this post being carried in the end of an arm *s*′, projecting from the shelf *s*. Projecting downwardly from the armature *n* is the rod n^6, carrying at its lower extremity the locking-dog n^7, which as the armature *n* is tilted swings to right or left, being held normally to the right (in Fig. 2) by the spring n^8. Mounted on the plate S and extending rearwardly therefrom is a post P, carrying an arm p^2 about midway of its length and having another arm *p* secured to its end by a screw *p*′. Both arms are perforated at their extremities, as shown at p^5 in Fig. 2. Over the front of the opening *w* is a face-plate F, having two openings *f* and *f*′, the former being filled by the dial-face of the register R and the latter serving for the passage of the plunger *b*, carrying the push-button B on its outer end. This plunger passes through the opening *f*, then back through an opening s^3 in the plate S and through the opening in the end of the arm p^2, being terminated at a point about midway be-

tween that arm and the arm p. Just beyond the arm p^2 the plunger carries a lateral pin b^2, which slides in a slot p^4, formed in a guide-strip p^3, which has its end turned under and secured to the arm p^2, these parts being best shown in Figs. 3 and 5 and suggesting the cross-head and guideway of a piston-rod. Between the end of the plunger b and the arm p the locking-dog n^7 normally lies, as best shown in Figs. 2 and 4. The pin b^2 extends out laterally from the plunger b far enough to engage during its movement with a cam d^3, constituting a lateral projection from a spring member d^2 on the arm d' of the gong-striker D. The arm d' is bent over at one end at d^4 and there secured by suitable screws or rivets d^5 to the plate S, being insulated therefrom by the strip d^6, the screws or rivets being bushed with insulation. Normally the cam and other parts of the hammer-arm D are separated electrically from all other parts of the mechanism. Between the plates F and S the plunger b has rigidly attached to it a finger b^3, normally pressed forward against the plate F as the plunger is pressed forward by a coiled spring b', one end of which abuts against the plate p^3 on the arm p^2 and the other end against a leather washer placed inside the finger b^3. This spring keeps the plunger out, as best shown in Figs. 3 and 4.

Mounted on the plate S between it and plate F is the register proper, R, consisting of a multiple-disk meter of the type ordinarily used in cyclometers. The casing of this meter extends forwardly through the plate F at r, having an opening through which the numbers may be read as exposed. This will be understood upon inspection of Fig. 6, which is a front view of the plate F and shows the push-button D and the register-window at r. We do not limit ourselves to the use of this particular type of register, but prefer it because it is compact, and being in itself a commercial article it can be purchased complete in the open market. This register has a central arbor r', which when turned through a sufficient angle will move the first number-wheel to add one unit to its indication. Ten successive movements produce one movement of the second number-wheel, and so on. We secure to the arbor r' an arm r^2, having at its lower end a cam-face in the path of the finger b^3 and having at its upper end an eye or hook r^5 for the attachment of one end of a tension-spring r^3, which passes back through an opening s^4 in the plate S and has its other end fastened to an angle-arm r^4, carried by the shelf s. The spring r^3 normally holds the upper end of the arm r^2 back against a fixed stop r^6, carried by the plate S, and returns it to this position after each movement.

The parts having been adjusted as shown in the drawings, the operation is as follows: Supposing the subscriber to have called up and the operator to have advised him that the number wanted is ready and for him to register, the operator has pressed key K' to send current from M over the line, and when the subscriber presses the button B in obedience to the instruction he pushes in the plunger b, the first part of whose movement brings the pin b^2 against the upper face of the cam d^3, depressing the hammer-arm and closing the magnet-circuit, as shown in Fig. 2, by way of wire 6, magnet N, wire 7, to the plate S, through the screw s^2 to the plunger b and associated parts, through the pin b^2 to the cam d^3, back through the arm d' to its bent-over portion d^4, and so by wire 8 out, completing in this detailed manner the circuit conventionally shown in Fig. 1. There being suitable current on the line, the magnet N instantly throws over its armature n against the tension of spring n^8 and moves the locking-dog n^7 away from the opening p^5 in the arm p. The movement of the plunger then continues, its rear end passing through the opening p^5, the finger b^3 forcing the arm r^2 far enough around to actuate the register R, and finally the pin b^2 passing over and off the cam d^3 and releasing the striker-arm D thereby, which being under tension springs up and forces the hammer d against the gong G, the signal of which thus, it will be observed, follows the act of registering. When pressure on the button B is relieved, the spring b' throws the plunger out, the spring r^3 restores the register-arm, and the pin b^2 comes back beneath the cam d^3 without unduly moving the hammer-rod, because the spring d^2, of which the cam is a part, is flexible enough to lift and permit the pin to pass. It should be stated that the spring d^2 is secured to the arm d' near the head of the hammer and possesses considerable resilience, although it is far from being as stiff as the hammer-rod. If the subscriber should press the button through inattention or wilfully or if the button should be pressed by idle meddlers, no effect would be produced on the register, because there being no current or current of wrong direction on the line the armature n will be drawn over, as shown in Fig. 2, with the locking-dog n^7 partly or wholly covering the opening p^5 in the path of the plunger, which can only move far enough under these circumstances to bring the pin b^2 on its cam-face and is stopped before it can register. In connecting up to ordinary common battery-circuits if a grounded main battery is employed care should be taken to have the ground on the same side of line as the register-magnet or the current not of the right direction to operate the latter.

In the claims following this description we shall employ these terms: "actuating member" to designate the plunger b and its equivalents; "disabling device" and "locking device" to designate the dog n^7, its connected parts, and their equivalents; "circuit-closer"

to designate the pin b^2 and cam d^3 in their function of connecting the magnet N in circuit, and "service-meter" or "measured service-meter" to designate the entire apparatus, leaving the word "register" to designate particularly the mechanism R or its equivalent. These expressions are used for convenience, however, and not to be taken as limiting the scope of the claims.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A telephone service-meter comprising a register, an actuating member therefor, a disabling device for the actuating member, an electromagnet controlling the disabling device, terminal connections for circuit-wires, and a circuit-closer controlled in the initial movement of the actuating member to connect the electromagnet to the circuit-terminals, whereby if line conditions are proper the actuating member will be permitted to operate the register, but if not it will be locked against such operation, substantially as described.

2. In a telephone system, a service-meter comprising a register, a plunger adapted to operate the same, a lock for said plunger, an electromagnet controlling said lock, circuit-terminals for the meter, and a circuit-closer operated in the initial movement of the plunger to connect the electromagnet to the circuit-terminals, together with means to determine the flow of current in the circuit, whereby the plunger may be released and permitted to operate the register under some circuit conditions and not others, substantially as described.

3. In a telephone system, a service-meter comprising a register, a plunger adapted to operate the same, a lock for said plunger, a polarized electromagnet controlling said lock, circuit-terminals for the meter, and a circuit-closer operated in the initial movement of the plunger to connect the electromagnet to the circuit-terminals, together with means to determine the flow and the direction of flow of current in the circuit, whereby the plunger may be released and permitted to operate the register under some circuit conditions and not others, substantially as described.

4. In a telephone system, a subscriber's station and a central station, a line-circuit interconnecting them, a service-meter at the subscriber's station comprising a register, an actuating member therefor, a disabling device for the actuating member, an electromagnet controlling the disabling device, a circuit-closer operated in the initial movement of the actuating member to connect the electromagnet to line, and means under the control of an operator at the central office to determine the flow of current through the line to the electromagnet, substantially as described.

5. In a common-battery telephone system, a subscriber's station and a central station with a metallic line-circuit interconnecting them, common-battery connections for said circuit at the central office, a service-meter at the subscriber's station comprising a register, an actuating member therefor, directly movable by the subscriber to register, a polarized electromagnet and a locking-dog controlled thereby normally preventing the operation of the register, together with means at the central office for grounding or shifting the ground on the main battery, whereby an operator can cause an unbalancing of potentials in the line-circuit to cause current of proper direction to energize said magnet and permit the operation of the register, substantially as described.

6. In a telephone system, a central office, a subscriber's station, a line-circuit interconnecting them, a common battery connected to the line at central, a service-meter at the subscriber's station comprising a register, an actuating member therefor, a disabling device normally preventing the operation of the register, a polarized electromagnet controlling the disabling device, a ground-tap including said magnet and completed in the operation of the actuating member, together with means under the control of an operator at the central office to ground the line-circuit and to determine in the circuit so grounded a flow of current of proper direction to operate the meter-magnet, whereby the subscriber if permitted by the operator may register a call, but without the permissive act on her part will be unable to actuate the register, substantially as described.

7. In a telephone system, a service-meter comprising a register, an actuating member therefor, a locking device for the actuating member, an electromagnet controlling the locking device, a circuit-closer operated in the initial movement of the actuating member to cut in the electromagnet, and an audible signal sounded by the actuating member in the act of registering, together with a line-circuit, central-office apparatus, and means operable in the use thereof to control the meter-magnet, substantially as described.

8. In a telephone service-meter, a base-plate or support, a register mounted thereon, an actuating-plunger for said register also mounted on the plate, guides for said plunger, a locking-dog lying between the guides normally in the path of the plunger, and an electromagnet controlling said locking-dog, substantially as described.

9. In a telephone service-meter, the base-plate S having an extension s, the register R mounted on the base-plate and the magnet N mounted on the extension, a reciprocating plunger b, having a retractile spring b' and sliding in guides secured on the base-plate, a

gong, and a striker-arm therefor carrying a cam-plate and secured to the base-plate, a finger, as b^3, on the plunger to engage with and operate the register, and another finger or projection to engage the cam on the striker-arm, a pivoted armature for the magnet N and a locking-dog as n^7 supported from and moved by said armature into and out of the path of the plunger, and circuit connections including the magnet, the striker-arm, and the plunger mechanism, said striker-arm being insulated from the rest of the apparatus, substantially as described.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

JACOB W. LATTIG.
CHARLES LANE GOODRUM.

Witnesses:
M. S. LEWIS,
EDWARD E. CLEMENT.