

No. 848,568.

PATENTED MAR. 26, 1907.

A. R. PIEHN.
TELEPHONE DETECTOR.
APPLICATION FILED MAR. 31, 1906.

2 SHEETS—SHEET 1.

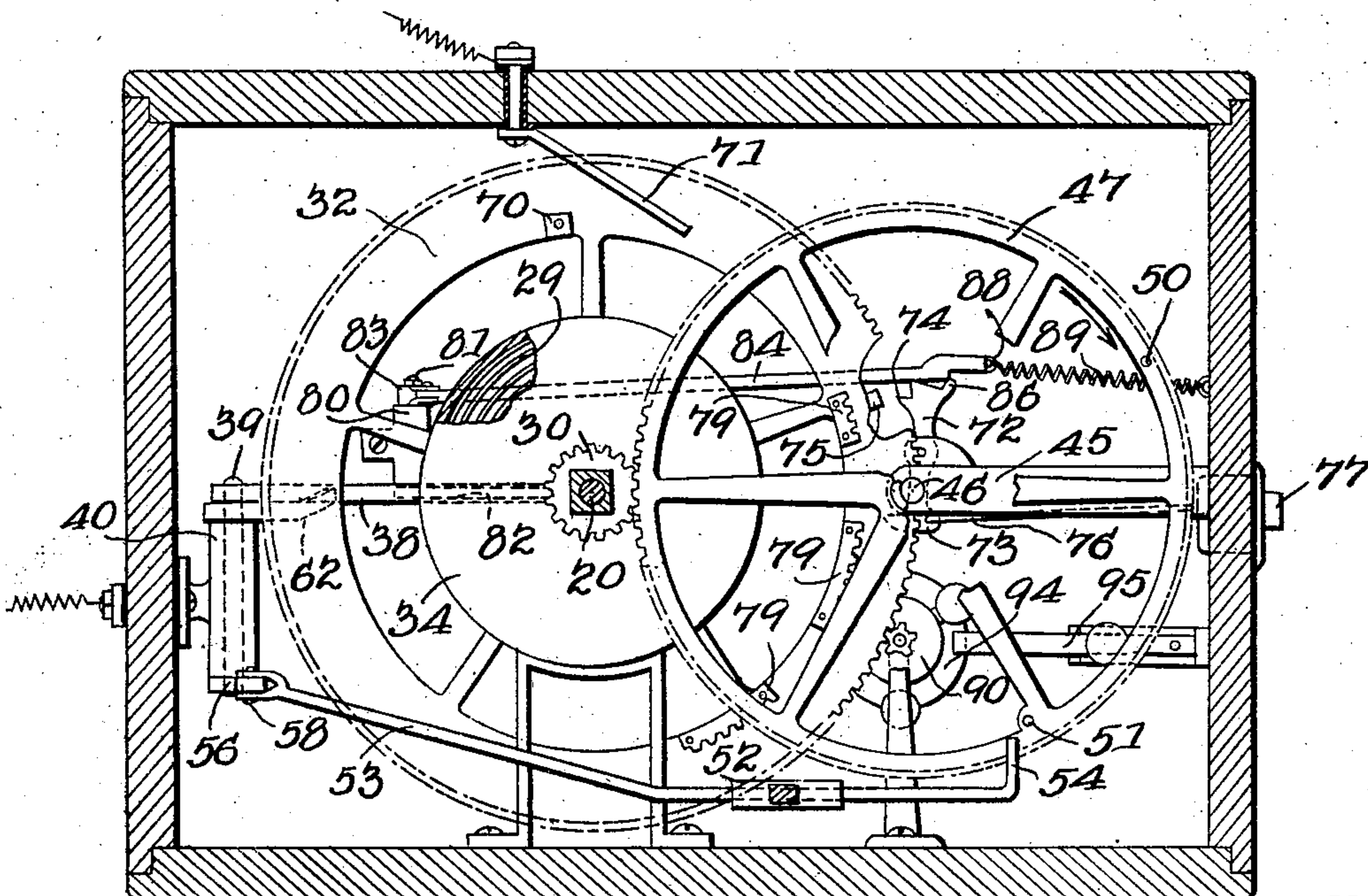
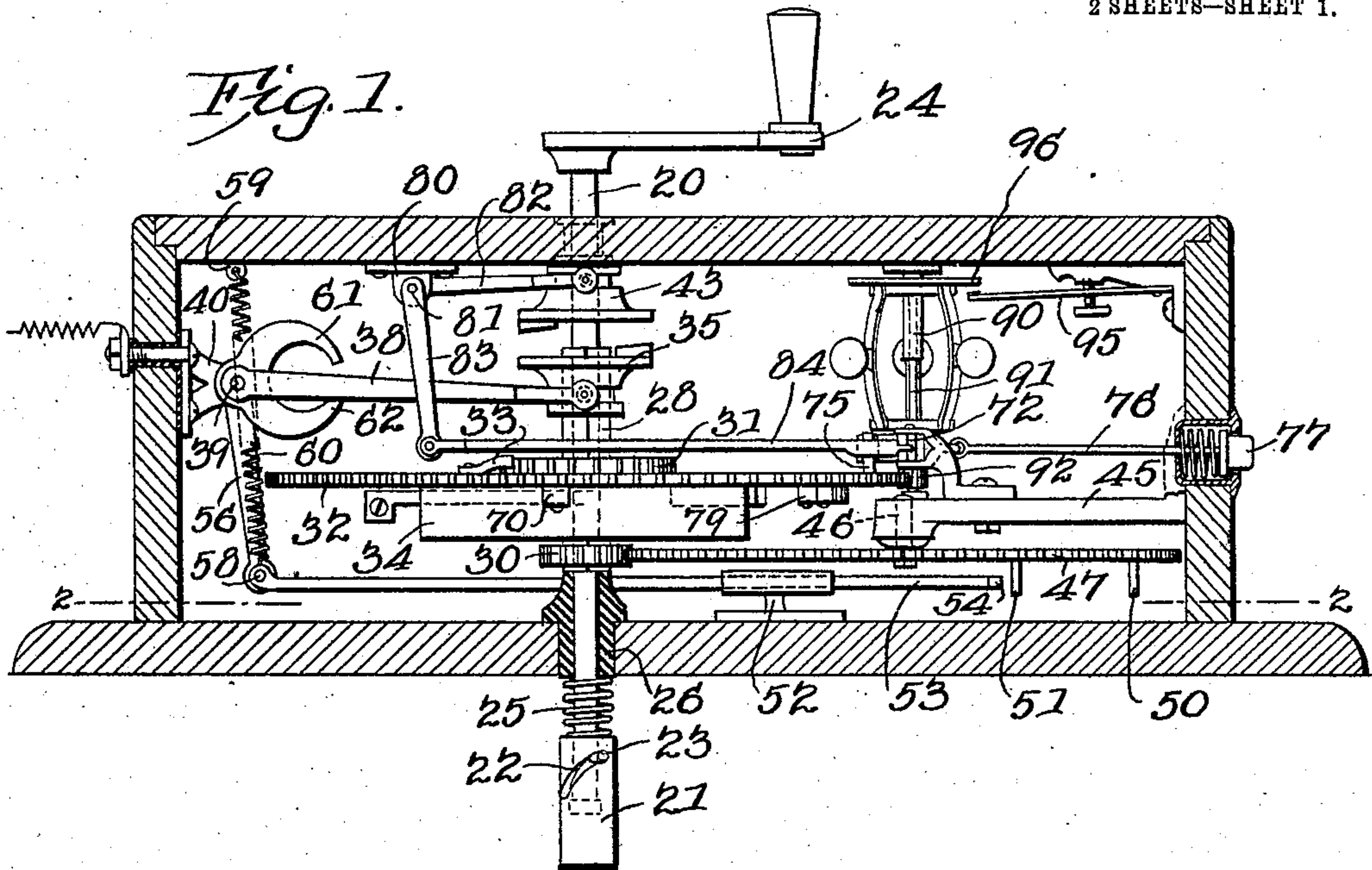


Fig. 2.

WITNESSES:

E. H. Stewart
John E. Carter

Arnold R. Piehn,
INVENTOR.

By *C. A. Snow & Co.*
ATTORNEYS.

No. 848,568.

PATENTED MAR. 26, 1907.

A. R. PIEHN.
TELEPHONE DETECTOR.

APPLICATION FILED MAR. 31, 1906.

2 SHEETS—SHEET 2.

Fig. 3.

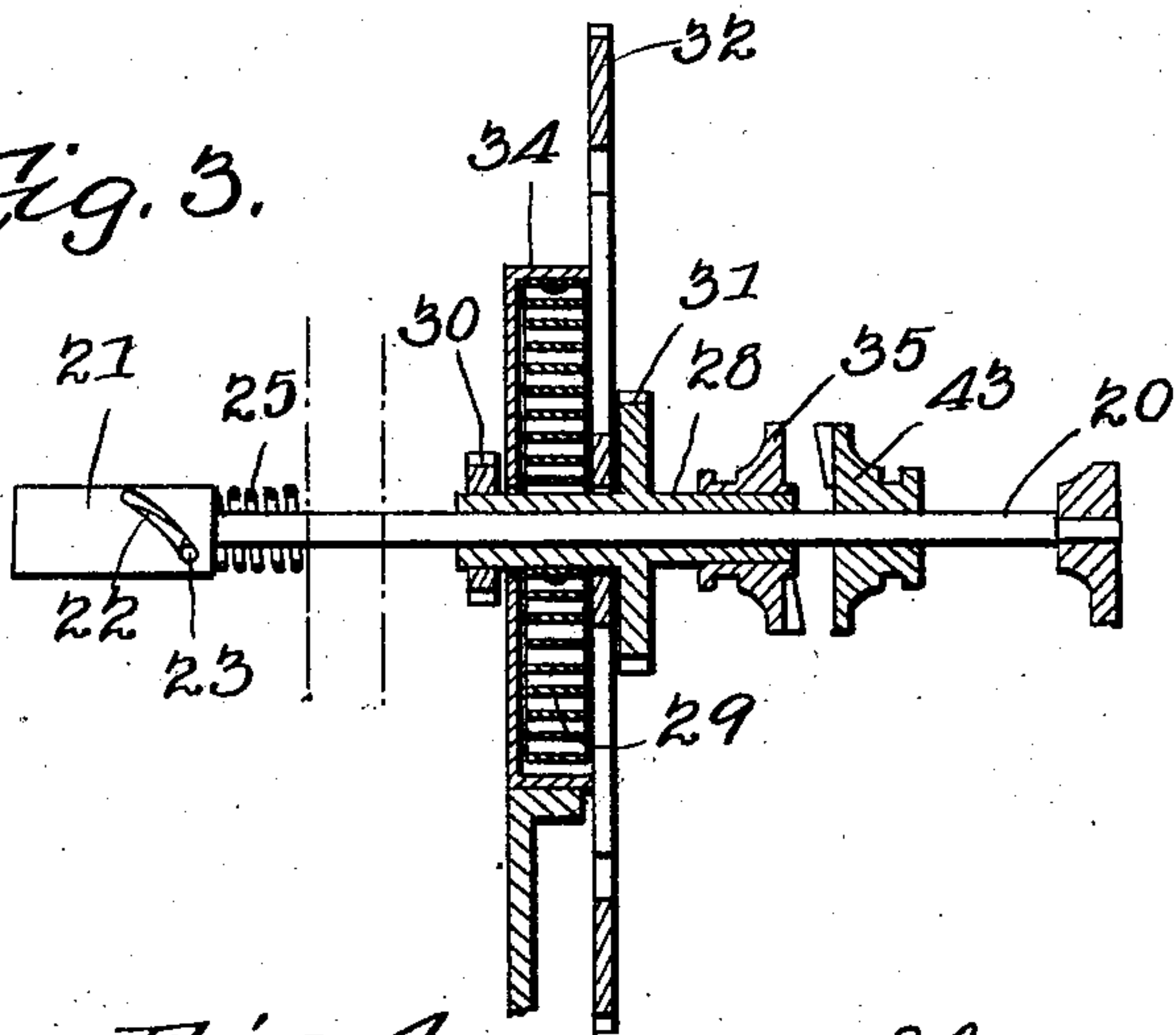


Fig. 4.

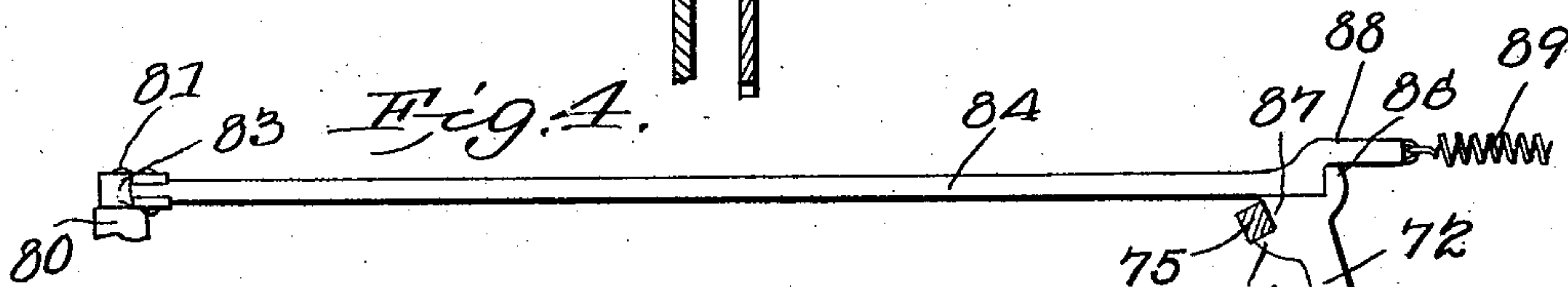


Fig. 5.

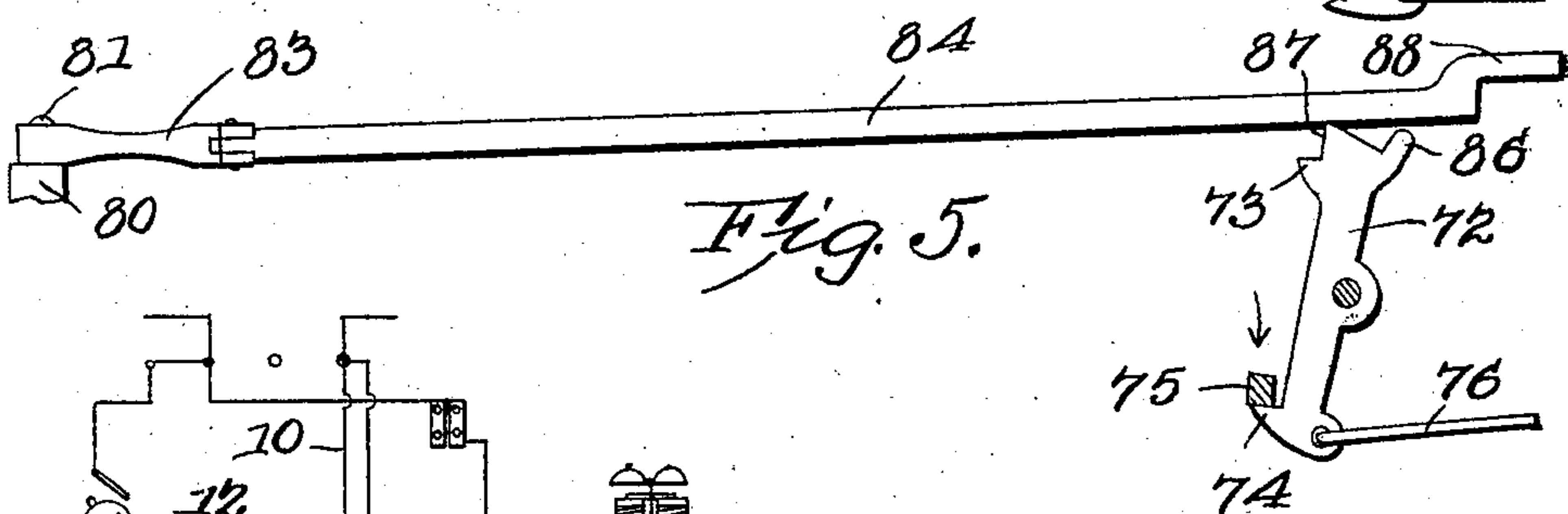
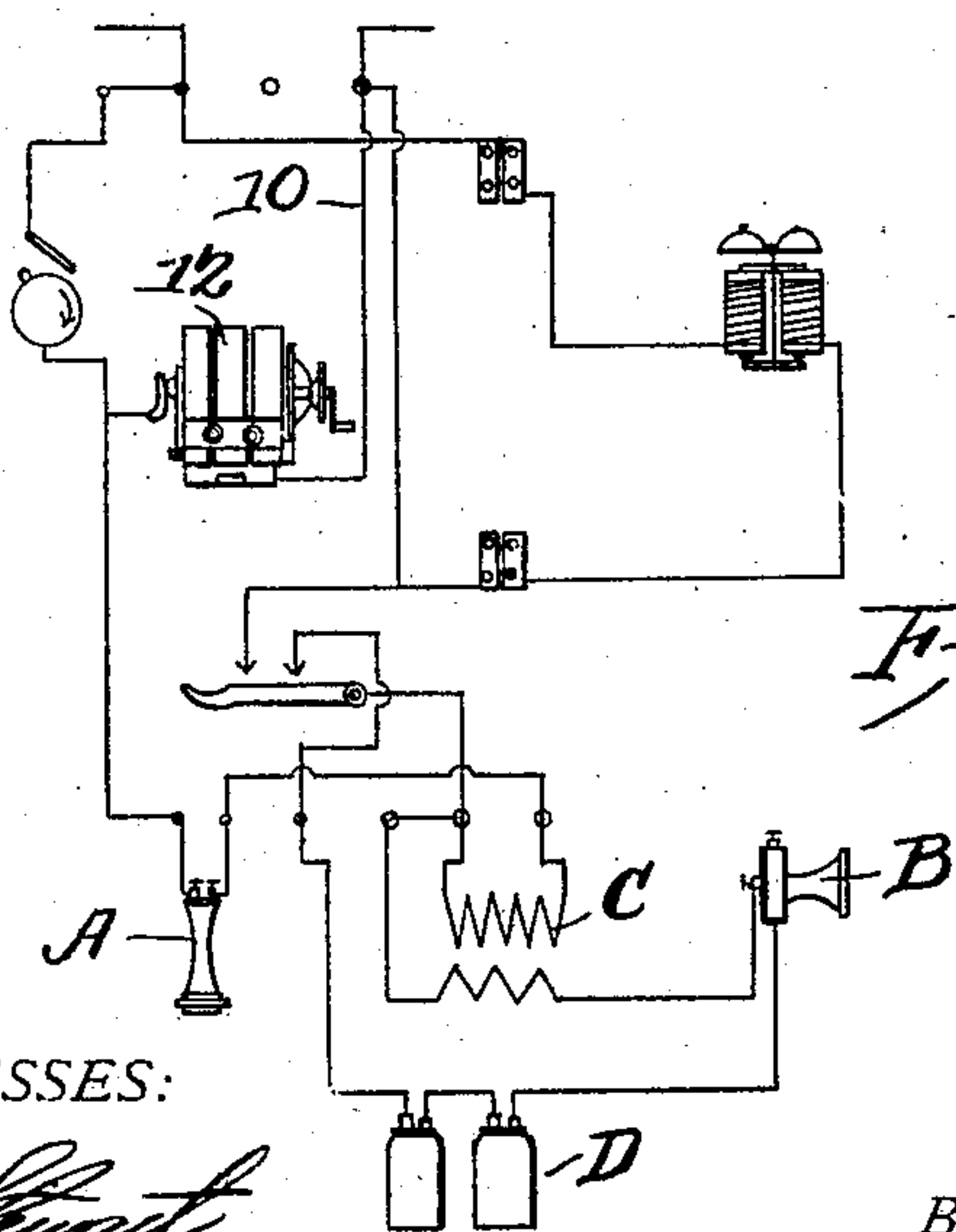


Fig. 6.



WITNESSES:

E. J. Stewart
Jno. E. Parker

Arnold R. Piehn,
INVENTOR.

By *Chas. Snow*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ARNOLD R. PIEHN, OF ALTA VISTA, IOWA.

TELEPHONE-DETECTOR.

No. 848,568.

Specification of Letters Patent.

Patented March 26, 1907.

Application filed March 31, 1906. Serial No. 309,136.

To all whom it may concern:

Be it known that I, ARNOLD R. PIEHN, a citizen of the United States, residing at Alta Vista, in the county of Chickasaw and State of Iowa, have invented a new and useful Telephone-Detector, of which the following is a specification.

This invention relates to telephone systems, and particularly to apparatus for closing an alarm-circuit on partly-lines each time a subscriber connects his telephone in the talking-circuit, the apparatus being especially applicable to bridging bell systems for the purpose of detecting the number of a station where an attempt is made to overhear or break in on a conversation when the line is in use, although the invention is also applicable for a variety of purposes—such, for instance, as the sending of a signal to the central station, so that the operator's attention will be attracted to the number of the local station desiring a connection—and in this manner accurate accounts may be kept by the central-station operator of tolls for the use of other lines, the number of the subscriber desiring a long-distance or other connection being sent to the operator by means which pass beyond the control of the subscriber as soon as set into operation.

A further object of the invention is to provide mechanism of such nature that it is impossible for any person to operate his calling or signaling mechanism without also signaling the number of his station.

A still further object of the invention is to provide an automatic signaling means for party-line systems wherein the circuit-closing mechanism is operated by a spring-motor that is wound up automatically each time a magneto-generator is operated in sounding a call.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood 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.

In the accompanying drawings, Figure 1 is a sectional plan view of a portion of the switch-box of a telephone, illustrating a cir-

cuit-closing mechanism constructed and arranged in accordance with the invention. Fig. 2 is a vertical section of the same on the line 2 2 of Fig. 1. Fig. 3 is a sectional view of a portion of the same, showing the parts in different position. Fig. 4 is an elevation, partly in section, illustrating the operation of the escapement mechanism after the completion of a calling-signal. Fig. 5 is a similar view showing the manner in which the escapement mechanism is operated. Fig. 6 is a diagram showing the location of the circuit-closing devices in the receiver-circuit.

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

Referring first to Fig. 6, A represents the receiver, B the transmitter, C the inductorium, and D the battery, of a substation. In the secondary circuit represented by the conductor 10 is arranged the circuit-closing device forming the subject of the present invention. Under normal conditions—that is to say, while the line is not in use—the circuit is broken, and in order that the subscriber may carry on a conversation it is necessary in addition to removing the receiver from the hook to press a button 77, which operates to effect the closing of the circuit, and this button must be held so long as the conversation is being carried on. As soon as the button is released the automatic signaling mechanism operates and the number of the subscriber who pressed the button is signaled along the line. This circuit-closing mechanism is also so arranged that while it does not interfere with the sounding of the call-bell of the subscriber should another station signal it will prevent the sending of any signal by the subscriber until the circuit is closed, and then after the calling-signal is sent the number of the subscriber will also be automatically signaled along the line, and in both cases this automatic signaling mechanism will pass beyond the control of the subscriber as soon as the operation is commenced.

The shaft 20 shown in the drawings forms the operating-shaft of an ordinary form of magneto-generator used for calling purposes, and said shaft is shown in the present instance as extending into a sleeve 21, having a cam-groove 22, into which extends a pin 23, carried by the shaft, this mechanism being of a type in ordinary use in that class of magneto-generators wherein the preliminary move-

ment of the operating-shaft effects endwise movement of said shaft to cut out an armature-shunt. It will be seen that as soon as the crank 24 is turned to the right that pin 23 will ride in the cam-slot and the shaft will be drawn endwise against the stress of a spring 25, that is placed between the collar 21 and a collar 26, that surrounds the shaft. This endwise movement of the shaft is taken advantage of in throwing into and out of operation a mechanism for automatically signaling the number of a subscriber when the latter operates his magneto-generator or attempts to break in on the line or to overhear a conversation being carried on between other subscribers.

Mounted on the shaft 20 and free to rotate thereon is a hollow shaft 28, to which the inner end of a spiral spring 29 is rigidly secured. This shaft also carries a fixed pinion 30 and a fixed ratchet-wheel 31. Between the spring and the ratchet-wheel is a large gear-wheel 32, carrying a pawl 33 for engagement with the ratchet-wheel, and to the frame is rigidly secured a spring-barrel 34, to which the outer end of the spiral spring is secured. One end of the hollow shaft 28 is of non-circular form and carries a slidable clutch-disk 35, the hub of which has an annular groove for the reception of a clutch-operating lever 38, that is pivoted on a stud 39, carried by a bracket 40, extending from the frame or casing.

The shaft 20 carries a clutch-disk 43, that is rigid with the shaft, and when the clutch-disk 35 is in its normal position, as shown in Figs. 1 and 2, the endwise movement of shaft 20 will move said disk into engagement with the disk 35, and as soon as the two disks are clutched together the shaft 28 will be rotated and will start to wind the spring 29. During this operation the large gear-wheel 32 is held from rotative movement by mechanism hereinafter described, so that the spring may be wound and will be retained in wound position for the purpose of subsequently utilizing its force.

Projecting from the casing is a bracket 45, carrying a stud 46, on which is mounted a large gear 47, intermeshing with the pinion 30, and this gear is rotated during all the time the clutch-disks 43 and 35 are connected. On the face of this gear are two pins 50 and 51, pin 50 being at a greater radial distance from the axis of stud 46 than the pin 51. Below the stud 46 is a standard 52, forming a guide for a bar 53, having at one end a vertically-extending finger 54, arranged to be alternately engaged by the pins 50 and 51. The rear end of the bar 53 is connected to the outer end of a clutch-operating lever 56, that is pivoted on the stud 39, which also carries the clutch-lever 38, and extending between the pivot-pin 58, that connects the bar 53 to lever 56, is a helical tension-spring 60, that

extends over the vertical axis of the pivot-pin 39, and so long as it remains in this position its stress is neutralized and does not tend to move the clutch-operating lever 56 in either direction. Should the pivot-pin 58 be moved to one side or the other of a plane crossing the axis of the pin 39 and the eye 59, the spring will complete the movement, quickly throwing the clutch-operating lever in one direction or the other. This clutch-operating lever is provided with two fingers 61 and 62, that are disposed, respectively, on opposite sides of the clutch-shifting lever 38 at a point in advance of the fulcrum of the latter. This mechanism is intended principally for the purpose of preventing overwinding of the spring 29, and when the magneto-generator shaft 20 is turned the clutch 43 is moved into engagement with clutch 35 and the winding of the spring will continue until the pin 50 engages arm 54, and movement is transmitted through the bar 53 to the lever 56 for shifting the lever 38, and thus moving clutch 35 from engagement with the clutch-disk 43, so that after the spring is wound the subscriber may continue to move the magneto-generator as long as may be desired without danger of injuring the spring through overwinding. When the spring operates, the pinion 30 is turned in the opposite direction and movement is transmitted to the gear 47 until pin 51 engages the arm 54, and movement is transmitted through the same mechanism to the clutch-disk 35, moving the latter to the initial position in readiness to be engaged by the clutch-disk 43 as soon as the crank is again operated.

Secured to the wheel 32 is a contact 70, that is disposed somewhat to the rear of a spring-contact 71, carried by the casing, and these two members form terminals of the line 10 in which the receiver is located and are normally disconnected from each other, so that the secondary circuit is broken. Pivoted to the frame at a point to one side of the wheel 32 is an escapement member in the form of an anchor 72, having two pallets 73 and 74, which are arranged to successively engage a tooth 75, that is carried by the wheel 32, said tooth being normally in engagement with the pallet 73, and the tendency of the spring 29 being to rotate said wheel in the direction indicated by the arrow in Fig. 2 and hold the tooth 75 against said pallet 73. The lower end of the pallet is connected by a rod 76 to a spring-return push-button 77, arranged at a convenient point outside the casing. When this push-button is depressed, the pallet 73 swings outward from engagement with the tooth 75 and the wheel 32 rotates until the tooth 75 engages the pallet 74. The advance of the wheel 32 is sufficient to bring the contact 70 under the contact 71 and complete the circuit, and as long as the push-button is held depressed the line may

be used. When the push-button is released, the pallet 74 moves from engagement with the teeth 75 and the wheel 32 completes its rotation until the tooth 75 again engages the pallet 73. The wheel 32 further carries a plurality of contacts 79, the number and length of which depends on the number of the subscriber's station or the calling-signal of such station. In the present instance two long serrated contacts and one short serrated contact are shown as attached to the wheel 32, and the station is one which would respond to two long and one short rings. As the wheel 32 rotates its contacts are carried under the contact 71, and as the serrated contacts pass said contact 71 two long and one short signal are sent over the line, and these may be distinctly heard in the receivers of all connected subscribers, so that the subscriber attempting to overhear a conversation will be detected.

The casing is provided with a bracket 80, in which is journaled a vertically-disposed rock-shaft 81, having a lower arm 82, that is bifurcated at its outer end and engages the grooved hub of the clutch-disk 43, so that as said clutch-disk moves to and fro with the shaft 20 it will operate arm 82. To the upper end of the shaft 81 is secured a lever 83, that carries a rod 84, the forward end of said rod being arranged to engage a shoulder 86, that is carried by the upper end of the anchor 72, said shoulder being arranged to the rear of a shoulder 87, that is adapted to engage with the rod 84 when the anchor is rocked from the position shown in Fig. 4 to the position shown in Fig. 5. The rod is provided with a forwardly-extending arm 88, that is connected by a helical tension-spring 89 to a fixed eye of the casing, the spring tending to maintain the rod in engagement with said shoulder 86.

When the shaft 20 is turned, its endwise movement commences, as previously described, by the travel of the pin 23 in cam-slot 22, and as the clutch-disk 43 travels in the same direction it will move arm 82, and this movement will be transmitted, through the rock-shaft 81 and lever 83, to rod 84, pulling the latter in a direction indicated by the arrow in Fig. 1 until its end engages the shoulder 86 in readiness to operate the anchor. The parts remain in this position until the turning of the magneto has ceased and the crank-shaft 20 is released and allowed to move outward under the influence of the spring 25. This movement operates, through the clutch-disk 42 and levers 82 and 83, to permit movement of the rod 84 under the influence of spring 89, and when this occurs the pallet 73 will be moved from under the tooth 75, releasing the wheel 32 and allowing it to rotate in the direction indicated by the arrow in Fig. 2. As the anchor 72 rocks the shoulder 87, engaging against the under side of the

rod 84, moves the latter upward until its end portion is free from engagement with the shoulder 86, whereupon the rod is pulled full forward by its spring 89 and the anchor is free to resume its initial position, thus allowing the wheel 32 to complete its full rotation and carry the contact 79 under the contact 71 and send a signal in accordance with the number or signal-call by which the station is known.

In order to prevent too rapid operation of the automatic signaling mechanism, a governor 90 is mounted on a shaft 91, one end of which is journaled in a bracket 45 and the other end in the casing or frame. This shaft 91 carries a pinion 92, that intermeshes with the teeth of the gear-wheel 32, and at one end of the governor is a disk 94, which may be engaged by an adjustable friction member 95 for the purpose of controlling the maximum speed of the governor.

With an apparatus constructed in accordance with this invention it is impossible for any subscriber on a party-line to send a false number to a central station when a long-distance or other pay connection is desired, and toll accounts may thus be kept with accuracy. It is also impossible for any person to break in on a line or to overhear conversation between connected subscribers without detection.

I claim—

1. In telephony, a circuit making and breaking means arranged in a talking-circuit and serving to signal the number of a station breaking in to the receivers of connected subscribers.

2. In a telephone system, a circuit-closer arranged in a normally disconnected talking-circuit, and means operating through said circuit-closer for signaling the number of the station at which the circuit is closed.

3. In a telephone system, means at each substation for making and breaking the circuit in accordance with a predetermined code, and mechanism for starting said means into operation when the talking-circuit is closed.

4. In telephony, a normally broken talking-circuit, a normally locked circuit-closing and signaling device arranged at each station for making and breaking the circuit in accordance with a predetermined code, and means operable by the subscriber for releasing said signaling device.

5. In telephony, a normally broken talking-circuit, a normally locked signaling device arranged at each station for making and breaking the circuit in accordance with a predetermined code, and a manually-operable releasing device which passes beyond the control of the person operating.

6. In telephony, a normally broken talking-circuit, a normally locked circuit-closing and signaling means arranged to make and

break the circuit in accordance with a predetermined code, and a releasing device arranged at each station and which the subscriber is compelled to operate before his talking-circuit is closed.

7. In telephony, a normally broken talking-circuit, a circuit make and break mechanism arranged at each station for signaling in accordance with a predetermined code, means for locking said signaling device from movement, and a releasing member which the subscriber is compelled to operate before his talking-circuit can be closed.

8. In party-line telephone systems, in which the talking-circuits are normally disconnected, a normally locked circuit-closer for establishing the talking-circuit, and having means for making and breaking the circuit to send an audible signal, and means for releasing said circuit-closer and temporarily holding the same with the circuit closed while the telephone is in use.

9. In telephony, a revoluble make-and-break device, connected in the talking-circuit, means for moving the same, an escapement member for holding the make-and-break device from movement, and a push-button connected to said escapement device.

10. In telephony, a spring-revolved make-and-break device connected in the talking-circuit, and carrying a contact for closing said talking-circuit, an escapement member arranged to permit first a limited movement of the make-and-break device to complete the talking-circuit, and then a complete movement to send a signal, and a push-button connected to said escapement.

11. In telephony, a revoluble make-and-break device connected in the talking-circuit, a contact carried thereby, a stationary contact with which the make-and-break contact engages to complete the talking-circuit, a lug projecting from said make-and-break device, an anchor having pallets for engaging the lug, and means for operating said anchor.

12. An automatic signaling device, comprising a revoluble wheel having spaced contacts, a fixed contact with which said spaced contacts engage, to alternately make and break a signaling-circuit, a lug or tooth projecting from the wheel, an escapement member for permitting limited movement and then a further movement of the wheel, and means for operating said escapement member.

13. In telephone signaling mechanisms including magneto-generators, a wheel or disk having a projecting contact, a stationary contact with which said projecting contact engages, means for locking and releasing the wheel, a spring for rotating said wheel, a spring-winding means, and mechanism for automatically connecting and disconnecting the same from the operating-shaft of the magneto-generator.

14. In signaling mechanism, a revoluble and endwise-movable shaft, a spring placed under stress during the turning of the shaft, and a signaling means operable by unwinding of the spring, and controllable by the endwise movement of the shaft.

15. In electric signaling, a revoluble and endwise-movable shaft, a spring placed under stress during the turning of the shaft, a signaling device arranged to make and break a circuit in accordance with a predetermined code, said signaling device being operable during the unwinding movement of the spring, and a signal-locking means releasable by the endwise movement of the shaft.

16. In electric signaling, a revoluble and endwise-movable shaft, a signaling means arranged to make and break a circuit during the turning of the shaft and serving during unwinding to transmit movement to the signaling device, and an escapement mechanism controlling the movement of the signaling device, and releasable by the endwise movement of the shaft.

17. In electric signaling, a revoluble and endwise-movable shaft, a clutch-disk thereon, a hollow shaft, a clutch-disk adjustable longitudinally of the hollow shaft, said clutch-disks being engaged on endwise movement of the first shaft, a ratchet-wheel, and a pinion secured to the hollow shaft, a spring having its inner end secured to said hollow shaft, a gear-wheel mounted loosely on the shaft and having a pawl intermeshing with the ratchet-wheel, circuit-closing contacts carried by said gear-wheel, a counter-shaft, a gear carried thereby and intermeshing with the pinion, a pair of projecting pins carried by the gear of the counter shaft and arranged, respectively, at different radial distances from the center of said counter-shaft, means for shifting the loose clutching-disk, and mechanism controlled by the pinions for operating the clutch-shifting means.

18. In mechanism of the class described, the combination with a gear-train, of a revoluble member, having a pair of pins arranged, respectively, at different distances from the center of rotation of said member, a clutch through which movement is imparted to the gear-train, a clutch-shifting lever, a pivotally-mounted operating-lever having a pair of fingers arranged one on each side of the clutch-shifting lever, a bar connected to the operating-lever and having a projecting finger arranged to be alternately engaged by the pins, and a spring engaging the operating-lever and tending to complete the movement of the same in either direction after the commencement of such movement through the medium of the pins.

19. In mechanism of the class described, the combination with a magneto-generator, having a revoluble and endwise-movable

shaft, of a spring placed under stress during
the turning of the shaft, a revoluble contact-
carrier operable during the unwinding of the
spring, a locking device for said contact-car-
rier, and means operable by endwise move-
5 ment of the shaft for releasing said locking
device.

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

ARNOLD R. PIEHN.

Witnesses:

GEO. J. SCHOLZ,
OTTO R. PIEHN.