No. 810,878. PATENTED JAN. 23, 1906.

W. PALMER, Jr.

SELECTIVE CALL FOR TELEPHONES AND TELEGRAPHS.

APPLICATION FILED JULY 18, 1902.

6 SHEETS—SHEET 1.

Fig. 1.

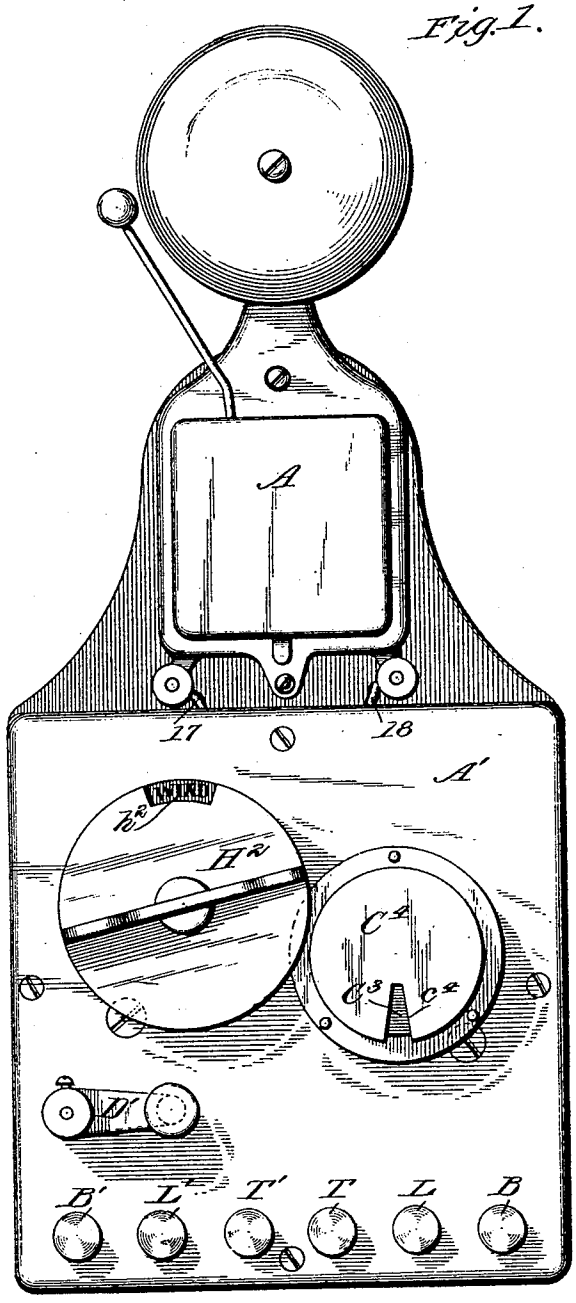
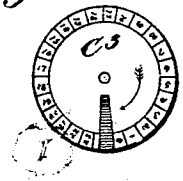


Fig. 1ª



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ATTORNEYS.

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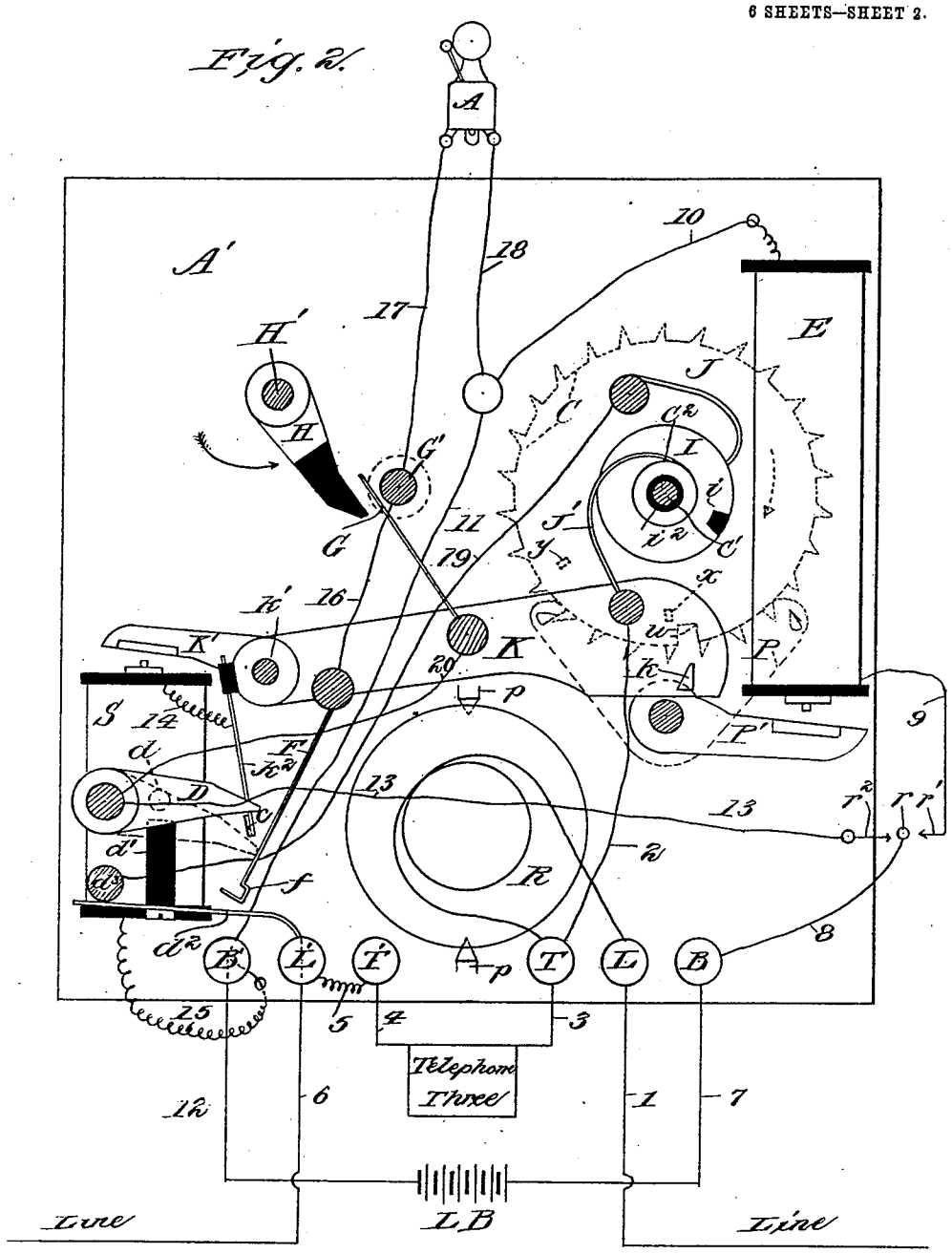
6 SHEETS—SHEET 2.

Fig. 2.



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6 SHEETS—SHEET 3.

Fig. 4.

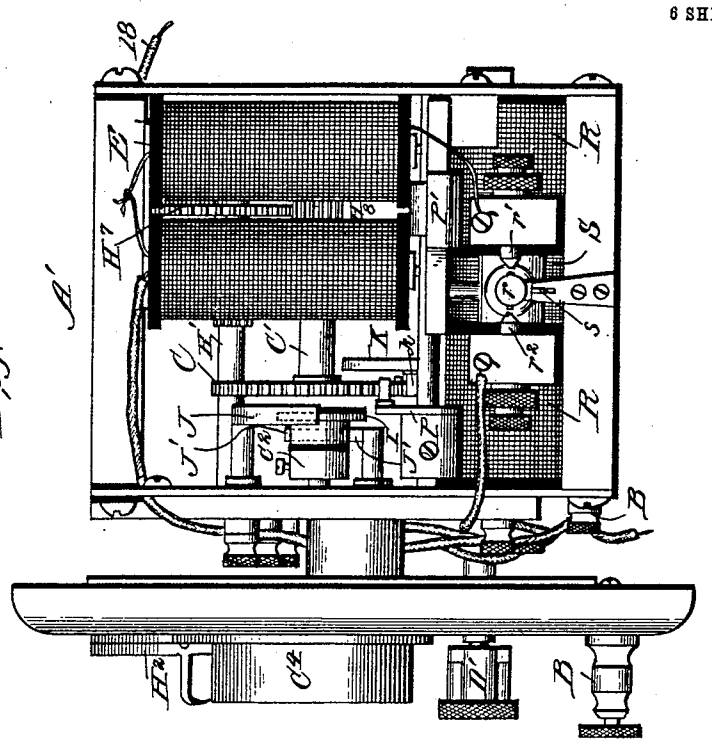
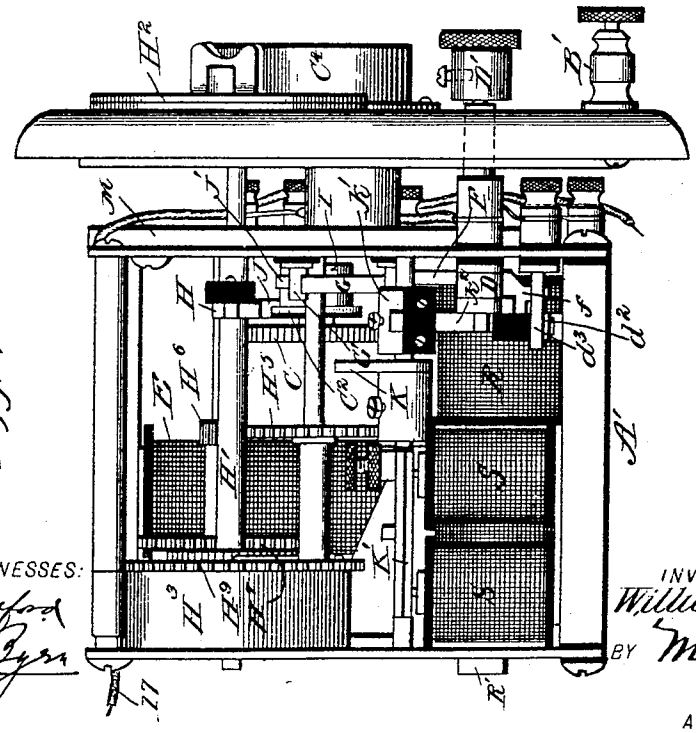


Fig. 3.



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6 SHEETS—SHEET 4.

Fig. 6.

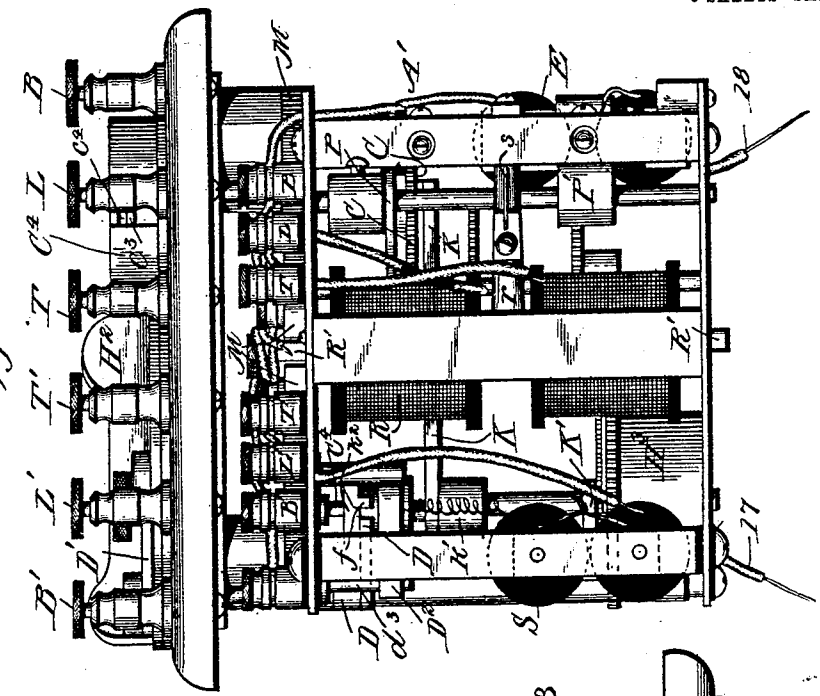
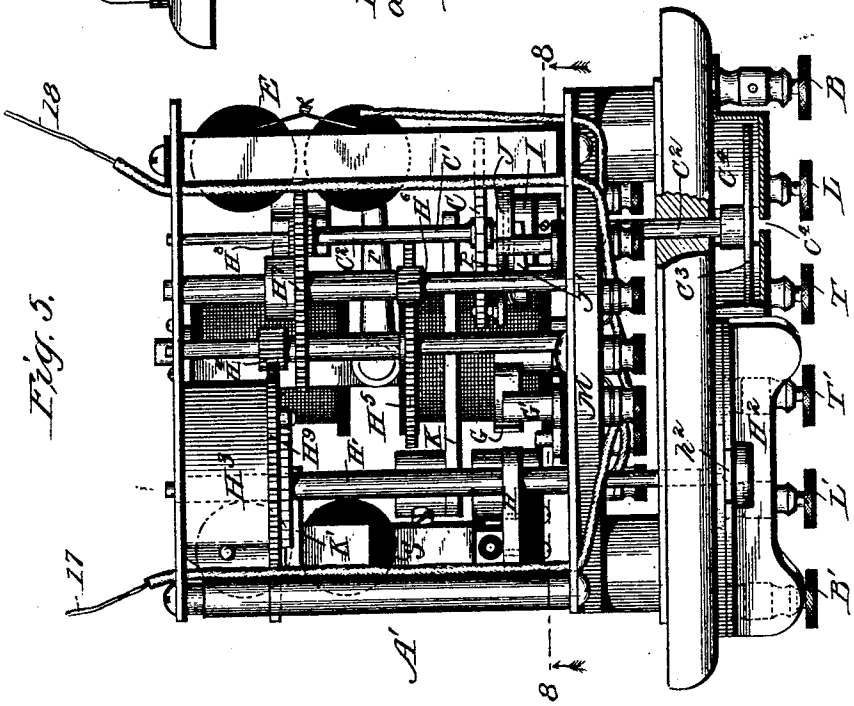


Fig. 5.



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Systems,
Polystation lines,
Lockout, Central.

33

No. 810,878. PATENTED JAN. 23, 1906.

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APPLICATION FILED JULY 18, 1902.

6 SHEETS—SHEET 5.

Fig. 6.

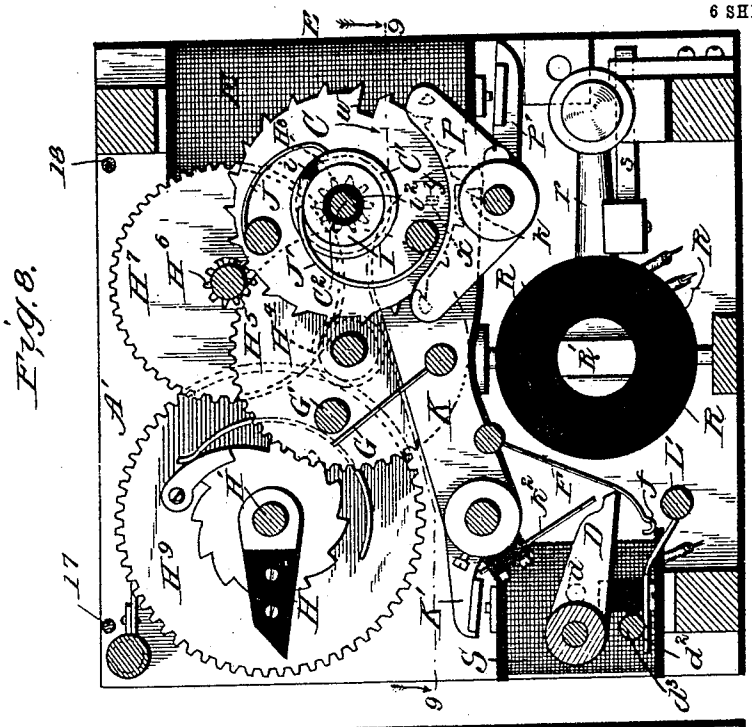
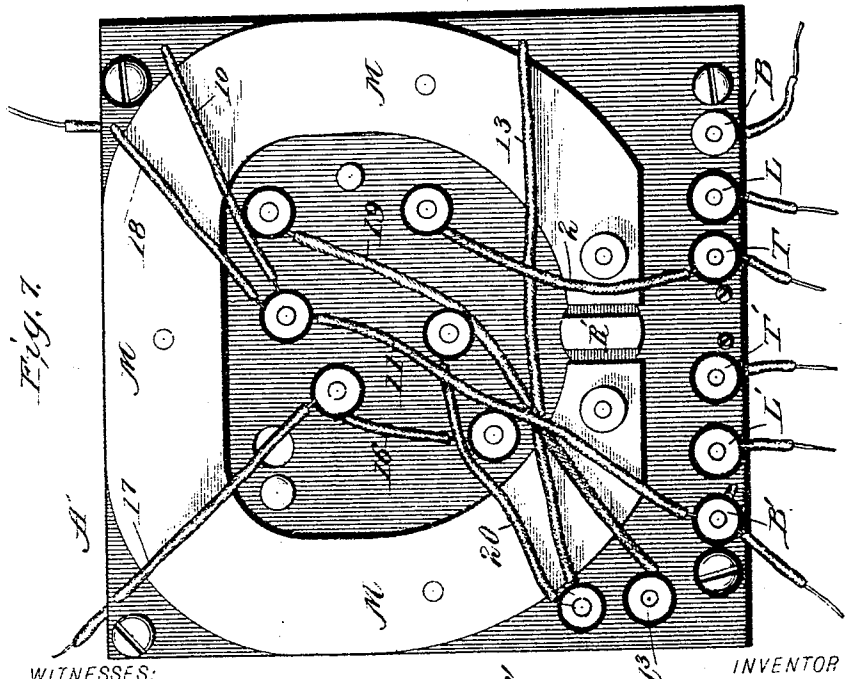


Fig. 7.



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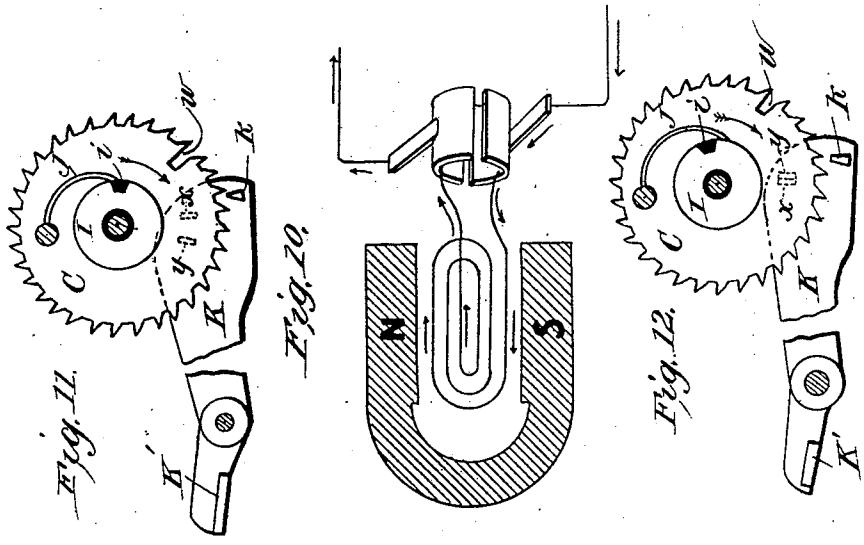
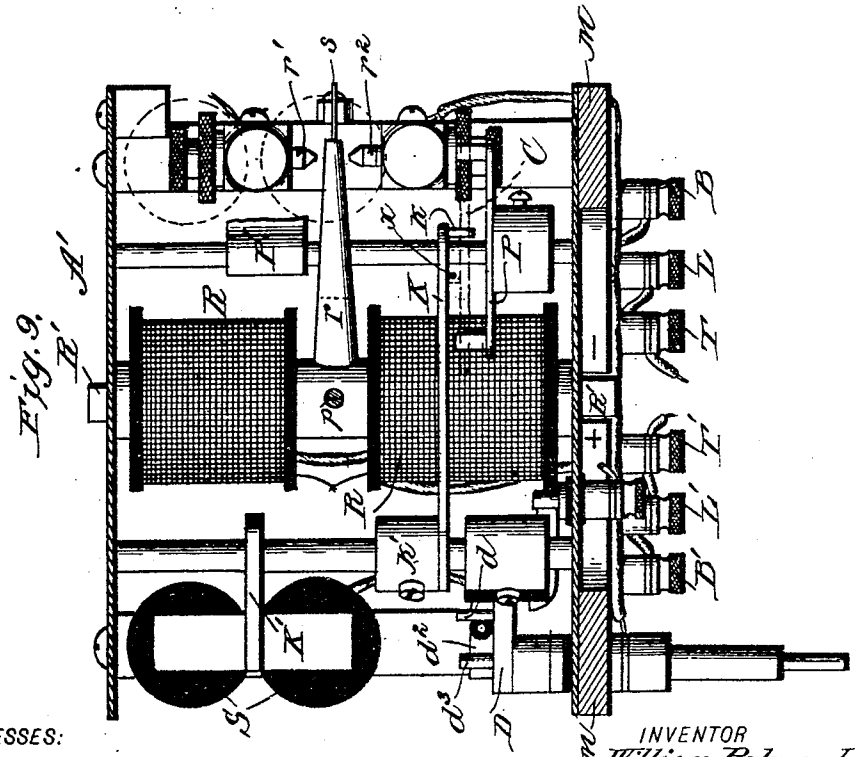
6 SHEETS—SHEET 6.





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UNITED STATES PATENT OFFICE.

WILLIAM PALMER, JR., OF RINCON, TERRITORY OF NEW MEXICO.

SELECTIVE CALL FOR TELEPHONES AND TELEGRAPHS.

No. 810,878. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed July 18, 1902. Serial No. 116,075.

To all whom it may concern:

Be it known that I, WILLIAM PALMER, Jr., of Rincon, in the county of Donna Ana, New Mexico Territory, have invented a new and useful Improvement in Selective Calls for Telephones and Telegraphs, of which the following is a specification.

The object of my invention is to provide a telephone and telegraph call by which the central office may call any subscriber on the line without ringing the bells of the others and by which the two subscribers when called may be enabled to communicate with each other without permitting the other subscribers on the same line to hear their conversation.

To these ends my invention comprehends certain novel constructions and arrrangements of instruments for use by the subscribers adapted to be used in connection with a calling device at the central office having means for reversing the direction of the current, as will be hereinafter fully described with reference to the drawings, in which—

Figure 1 is a front elevation of the subscriber's instrument. Fig. 1ª is a detail of an indicator-disk thereon for showing when the line is in use. Fig. 2 is an enlarged diagrammatic view of the circuits and mechanical devices of the lower portion of Fig. 1, showing the connections to the line, the telephone proper, the local battery, and the bell. Figs. 3 and 4 are side elevations from opposite sides of the working parts of the subscriber's instrument. Fig. 5 is a plan view of the same; Fig. 6, an underneath view of the same. Fig. 7 is a front elevation of the lower part of the subscriber's instrument with the outer face-plate removed. Fig. 8 is a vertical section taken on line 8 8 of Fig. 5. Fig. 9 is a horizontal section on line 9 9 of Fig. 8. Fig. 10 is a perspective detail of a magneto-generator used in my invention, and Figs. 11 and 12 are details of two positions of the subscriber's escapement.

By reason of the compact construction of the subscriber's instrument and the difficulty of properly illustrating and describing its circuits I have been compelled to make in Fig. 2 a view partly mechanical and partly diagrammatic, which will best serve to illustrate my invention.

As fundamental prerequisites of my invention the central office is provided with a special calling instrument which is capable of throwing onto the line a current of reversed polarity at will. The subscriber's instrument comprehends as leading elements a shunting-relay, a switch-magnet, and an electromagnet for working a clock-escapement around to a certain point peculiar to each instrument, which escapement is operated by the central office to said certain point for selecting the subscriber. When this certain point is reached, the central office reverses its current, which act is made through the shunting-relay at the subscriber's station to operate the switch-magnet that cuts in and rings the subscriber's bell and also makes it possible for the subscriber to throw his telephone into circuit (all others being out of circuit) and to thus maintain the privacy of the line as against all other subscribers, except the one he desires to communicate with.

Referring now to Fig. 2, A is the bell, and R is the shunting-relay, of the subscriber's instrument. E is the escapement-electromagnet, and S is the switching-electromagnet. L B is the local battery. The binding-posts B B′ connect with the opposite poles of the local battery L B. L L′ connect, respectively, with the line, and T T′ with the subscriber's telephone, here marked "Telephone Three." The function of the shunting-relay R is to make a current from the line of one polarity send the local-battery circuit through the escapement-magnet E, while a current of reversed polarity from the line sends the local-battery circuit through the switch-magnet S.

I will now proceed to describe the mechanical features of Fig. 2 and to trace the circuits and to show how the above general result is obtained in carrying my invention into effective use. The magnet E works an armature P′, rigidly fixed to and rocking with a vibrating pallet P, (shown in dotted lines,) whose two dogs engage alternately the ratchet-teeth of the escapement-wheel C, which is shown in dotted lines and is turned in the direction of the arrow by a clock-gearing. (Not shown in this view.) This ratchet-wheel has a deep notch *w* in its edge, and the position of this notch on the wheel differs for each subscriber's instrument—that is to say, in one subscriber's instrument the notch will be one tooth from the zero or starting-point, the next subscriber will have the deep notch two teeth removed from the starting-point, the next subscriber three teeth removed, and so

on. As shown, the notch is three teeth removed from the starting-point and corresponds to telephone "Three." There is a long horizontal lever K extending across the instrument and rocking about a center at k'. This lever at its end beneath the escapement-wheel has a tooth k, that is adapted at a certain time to rise and enter the deep notch w of the escapement-wheel. The short end of this lever is constructed as an armature K' for the electromagnet S. Depending from the lever K there is a spring-arm k^2, having at its lower end an offset or shoulder c, that normally holds up a hinged metal arm D. This arm carries a laterally-projecting pin d, that is adapted to press downwardly upon a non-conducting block d', which rests on a spring d^2, connecting binding-posts L' and d^3. When pin d forces down block d' and spring d^2, contact is broken between binding-posts L' and d^3. The shunting-relay R has one of its wire terminals connected to binding-post L and wire 1 to line, and its other terminal connected to binding-post T, telephone, wire 4, binding-post T', wire 5, binding-post L', and wire 6 to line. The means by which this relay is made to send a local-battery current through either one of two magnets E or S is made the subject-matter of a separate application for a patent filed by me June 14, 1902, and on which patent was granted me April 12, 1904, No. 757,341. It will be sufficient for the purposes of this invention to describe them briefly as follows, reference being had to Figs. 7, 9, and 2: In Figs. 7 and 9, M is a permanent horseshoe-magnet, of which there may be one at each side of the instrument. This permanent magnet is set in an upright position with its two poles on opposite sides of the extended core R' of the relay-magnet R. This relay is made double with a vertical pivot p between the two helices, so that the magnet vibrates in a horizontal plane slightly, the extended core going to one pole of the permanent magnet when a current of one polarity passes through the helices and moving toward the other pole of the permanent magnet when a current of a reversed polarity passes through the helices. This vibrating relay has a rigid right-angular arm r projecting from one side and playing between the two opposite contacts r' r^2 and held normally in an intermediate position between the two by a spring s. It will be seen, therefore, that if r and r' be made the terminals of a local circuit going through one electromagnet and r and r^2 the terminals of another local circuit going through another electromagnet the movement of the relay in one direction will close one of such circuits, and in the other direction will close the other circuit, and in the intermediate position will leave both open. This arrangement is diagrammatically shown in Fig. 2, where r represents the arm r of Fig. 9 and r' and r^2 of Fig. 2 the front and back contacts r' and r^2 of Fig. 9.

Referring now to Fig. 2, if a current of a given polarity be sent from central office over the line to any subscriber it passes over the following route: 1, L, relay R, T, 3, telephone, 4, T', 5, L', 6 to line again. This will cause the relay to turn on its pivots p, Fig. 9, and will cause arm r, Fig. 2, of the relay to touch terminal r'. A current from local battery LB will now be established through the escapement-magnet E, as follows: from LB to 7, B, 8, r, r', 9, magnet E, 10, 11, B', 12 to the opposite pole of LB. Magnet E therefore attracts armature P' and moves it and pallet P of the escapement. If the central office opens and closes his circuit three times, the pallet P will allow ratchet-wheel C to turn step by step three teeth under the influence of the clock-gearing hereinafter described. When ratchet-wheel C has thus been moved three spaces by central office, the central office then through its instrument reverses its current. The effect of this is as follows: The relay R is turned in the opposite direction on its pivots p, and the arm r of the relay then makes contact with r^2, which throws the local-battery circuit through the switch-magnet S over the following circuit: from LB to 7, B, 8, r, r^2, 13, arm D, spring-arm k^2, wire 14, magnet S, wire 15, B', 12 to the opposite pole of local battery. The effect of charging magnet S is to attract armature K' and lift lever K, whose tooth k enters the notch w of the escapement-wheel. At the same time the spring-arm k^2 of lever K is pulled from beneath arm D and the latter drops to contact with a spring-arm F, as shown in dotted lines. In all the other instruments in which their notches w of the escapement-wheel are out of coincidence with the tooth k this tooth does not rise to its full height and arm k^2 is not pulled from under D, and D does not drop to contact with spring F. As the contact of D with spring F is made the means for cutting in the bell of the subscriber called and forms the bell-switch, it will be seen that only this one subscriber will be called. The circuit through which this subscriber's bell is rung is as follows: from local battery LB to 7, B, 8, r, r^2, 13, D, F, 16, 17, bell A, 18, 11, B', 12 to the opposise pole of the local battery, all the other instruments being cut out because D does not touch F. The subscriber having thus been exclusively called, it remains for him to so adjust his instrument as to place it in circuit, all others being normally short-circuited. To enable the subscriber to do this, the escapement-wheel has a metal disk I on it with an insulating-bushing i^2 in the center and an insulating-block i on its periphery, which metal disk normally closes circuit between the two rubbing-springs J and J', bearing upon the two circles of the disk. Up to

this time all the telephone instruments on the line are cut out, or short-circuited, and it remains for the subscriber to cut himself in. To explain this, I will first describe how all the instruments are cut out, or short-circuited, and then describe the means by which the subscribers called cut themselves in. The talking-circuit over the line passes from 1 to L, relay R, T, but does not get down to and through telephone "Three" because of its greater resistance than that afforded by the following path, viz: 2, spring J', disk I, spring J, 19, d^3, spring d^2, L', 6 to line. It will thus be seen that up to this time telephone "Three" and all others on the line are short-circuited. To enable the subscriber called to cut his instrument in without cutting any of the others in, he moves by hand the arm D down from its dotted position to a still lower one, in which the end of arm D enters and is locked in the seat f in the end of arm F. The effect of this is as follows: The pin d of arm D presses down insulating-block d' and forces spring d^2 away from contact with binding-post d^3. The current from line cannot get from d^3 to d^2 around the telephone, but is forced to take the following path: from line to 1, L, relay R, T, wire 3, "Telephone Three," 4, T', 5, L', 6 to line. It will thus be seen that the two subscribers called can talk; but all the instruments of the other subscribers are so short-circuited through their disks I and springs J J' that their telephones are dumb, and hence the line between the two talking subscribers is maintained strictly private for their uses alone.

It will be understood from the foregoing description that the central office is able to send at will a current of either polarity to the subscribers. The subscribers, however, must only be allowed to send calling-currents or impulses of one polarity, so as to act on the switch-magnet only at the other office, for if an alternating current or current of reversed polarity be sent from the subscriber to other offices it would act alternately upon the escapement-magnet and switch-magnet of each of said offices. This feature of my system, it will be seen, requires a change to be made in the magneto call-generator in that it must be organized with a commutator and brushes so as to send impulses of one polarity only. Such a magneto-generator is shown in Fig. 10, in which two brushes are in contact, respectively, with the two sections of a split tube, which sections constitute the terminals of the armature-bobbin. It will be understood that any means for sending an intermittent current of one direction may be used.

I will now proceed to describe more minutely the escapement of the subscribers' instruments, referring more especially to Figs. 11 and 12. The subscribers' escapements in the normal position of rest, as in Fig. 11, have the non-conducting piece i under the spring J, and hence the telephones of the subscribers are not short-circuited by the wire 19 and spring d^3 of Fig. 2, and therefore the subscribers can talk to central office. On the lever K of the subscriber's escapement there is a rigid laterally-projecting lug x, Figs. 11 and 12, and on the ratchet-wheel a laterally-projecting lug y, which latter strikes x and is stopped thereby when the lever K is down, as in Fig. 12, but when lever K with its lug x rises then y passes under x and gains a position behind x, as seen on Fig. 11. Now assuming that the instruments are at rest in the position shown in Fig. 11, if the central office wishes to call subscriber No. 3 the central-office operator closes the line-circuit three times through the subscriber's escapement-magnet, which causes ratchet-wheel C, Fig. 11, to be turned step by step until its deep notch w comes over the tooth k of the lever K. The central office then reverses the current through the subscriber's switch-magnet, as hereinbefore described, and rings the subscriber's bell. After the central-office operator has made the call he causes all of the escapement-wheels of all subscribers to be turned by successive makes and breaks until the stop-lug y of each escapement-wheel strikes against the lug x of the lever, as shown in Fig. 12, which leaves all of the subscribers' instruments short-circuited by reason of the contact of spring J with metal disk I, (and the consequent short circuit 19, d^2 of Fig. 2, hereinbefore described.) The subscriber called then by pulling down arm D into notch f (of Fig. 2) is enabled to break the short circuit between d^2 and d^3 and individually and exclusively cuts his telephone into circuit, even though spring J of his instrument rests on disk I. When the subscriber has finished his conversation and has rung off, the central office by an impulse over the line raises the lever K and raises the stop-lug x from behind y, as seen in Fig. 12, and allows lug y to pass by x and assume the position behind it shown in Fig. 11, with spring J on insulation i in the normal position of rest, which permits all the subscribers to communicate with central office again.

As so far described I have not given any detailed description of the purely mechanical features of the subscriber's instrument, this being reserved to avoid prolixity in the description of the circuits and operative adjustments of the instrument. I will now describe these subsidiary mechanical details of construction. Referring to Figs. 1 and 2, A of Fig. 1 is the bell A of Fig. 2, and A' of Fig. 1 is the instrument, which is shown in an enlarged diagram at A' of Fig. 2. The six binding-posts at the bottom of Fig. 1 are the six binding-posts bearing the corresponding letters at the bottom of Fig. 2. D' of Fig. 1

is the crank-arm, which adjusts the arm D of Fig. 2 when the subscriber cuts his telephone into the talking-circuit. H^2 of Figs. 1 and 5 is a winding key on shaft H′, which winds up a clock-spring H^3, having the usual ratchet and pawl seen in Fig. 8. Shaft H′ also bears a gear-wheel H^9, which, (see Figs. 5 and 8,) through a train of gears H^4 H^5 H^6 H^7 H^8, turns the shaft of escapement-wheel C. When the clock mechanism runs down to a point requiring rewinding, I provide means for automatically sounding an alarm to indicate this fact by causing the instrument so requiring winding to have its bell jingled at every time any subscriber's bell is rung. For this purpose (see Fig. 2) the winding-shaft H′ bears an arm H with an insulated end, which when the shaft H′ is sufficiently unwound strikes against a spring G and forces it into contact with a metal rod G′, which connects with circuit-wires 16 and 17. This spring G is connected by wire 20 to the arm D, which establishes the following ringing-circuit from local battery, 7, B, 8, r, r^2, 13, D, 20, spring G, rod G′, 17, bell A, 18, 11, B′, 12, back to local battery. When this contact is made by arm H pressing spring G against G′, the winding-shaft H′ has turned the key H^2 backward, and a disk on said key bearing a cut-out segment h^2 is made to uncover the indication-mark "Wind," as seen in Fig. 1. I also provide means for indicating on each subscriber's instrument the fact that the line is in use by other subscribers and who these subscribers are that are called. To do this, the shaft C^2 of the escapement-wheel C is extended through the front of the case (see Fig. 5) and has rigidly attached to its end a disk C^3, graduated to correspond with the escapement-teeth having at one radial section of its face a red segment or other indication. (Seen in Fig. 1^a.) This disk is housed within a cap C^4, Fig. 1, which has at c^4 a cut-away portion through which the red segment of the disk C^3 shows whenever the escapement-wheel is locked by the lugs x y of Fig. 12.

To avoid a needlessly prolix description of the wiring of the instrument A′, I have described only one set of binding-posts B L T B′ L′ T′. For convenience in wiring there are really two such sets, one on the outer wooden casing (seen in Figs. 1 and 6) and another corresponding set on the inner metal plate. (Seen in Fig. 6.) The latter correspond to the former and need not be considered as entering into the essential features of my invention and may, in fact, be omitted.

Some of the features of my invention are applicable for calling on telegraph-lines as well as telephone-lines, and my invention contemplates such use.

It will be seen that in the construction of the subscriber's instrument that both armatures of the two electromagnets act from gravity alone in receding from the electromagnets, and all the subscribers' instruments having their armatures and connected parts of the same weight and leverage I am enabled to get synchronous action in all the instruments and avoid all the difficulties due to possible variations in the tension of the armature-springs as ordinarily employed.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A selective telephone and telegraph call, comprising a subscriber's instrument having a local battery and two local circuits, a step-by-step escapement, and a bell-switch, two electromagnets arranged one in each local circuit, one for working the step-by-step escapement and the other for adjusting the bell-switch to ringing position, a vibrating shunting-relay for sending the local-battery current through either electromagnet by a reversal of the main-line current, and a switch under the control of the subscriber for enabling him to exclusively introduce his telephone into circuit for private communication substantially as described.

2. In a selective telephone and telegraph call, the combination of an escapement-electromagnet and its armature, a pallet located on the same shaft and moving with the armature, an escapement-wheel having a deep notch varying in position on the wheel for different instruments, a lever with a tooth on one end adapted to enter the deep notch of the wheel, an armature at the other end and a switch-arm support between the two, a second electromagnet acting on said latter armature, an arm held up by said support and a contact switch-spring for the bell-circuit, a shunting disk or commutator on the escapement-wheel shaft, a short circuit controlled by said commutator to cut out the telephone, said arm being adapted to make contact with the bell-switch when the said second electromagnet is energized and to be then adjusted to a position to break the short circuit around the telephone and cut in the telephone by the act of the subscriber as described.

3. In a selective telephone and telegraph call, the combination of an escapement-electromagnet and its armature, a pallet located on the same shaft and moving with the armature, an escapement-wheel having a deep notch varying in position on the wheel for different instruments, a lever with a tooth on one end adapted to enter the deep notch of the wheel, an armature at the other end and a switch-arm support between the two, a second electromagnet acting on said latter armature, an arm held up by said support and a contact switch-spring for the bell-circuit, a shunting disk or commutator on the escapement-wheel shaft, a short circuit controlled by said commutator to cut out the telephone,

said arm being adapted to make contact with the bell-switch when the said second electromagnet is energized and to be then adjusted to a position to break the short circuit around the telephone and cut in the telephone by the act of the subscriber, and a stop mechanism between the lever and escapement-wheel consisting of two engaging lugs one on the escapement-wheel and one on the lever acting together to prevent further movement of the escapement, substantially as described.

WILLIAM PALMER, JR.

Witnesses:
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G. W. KREIS.