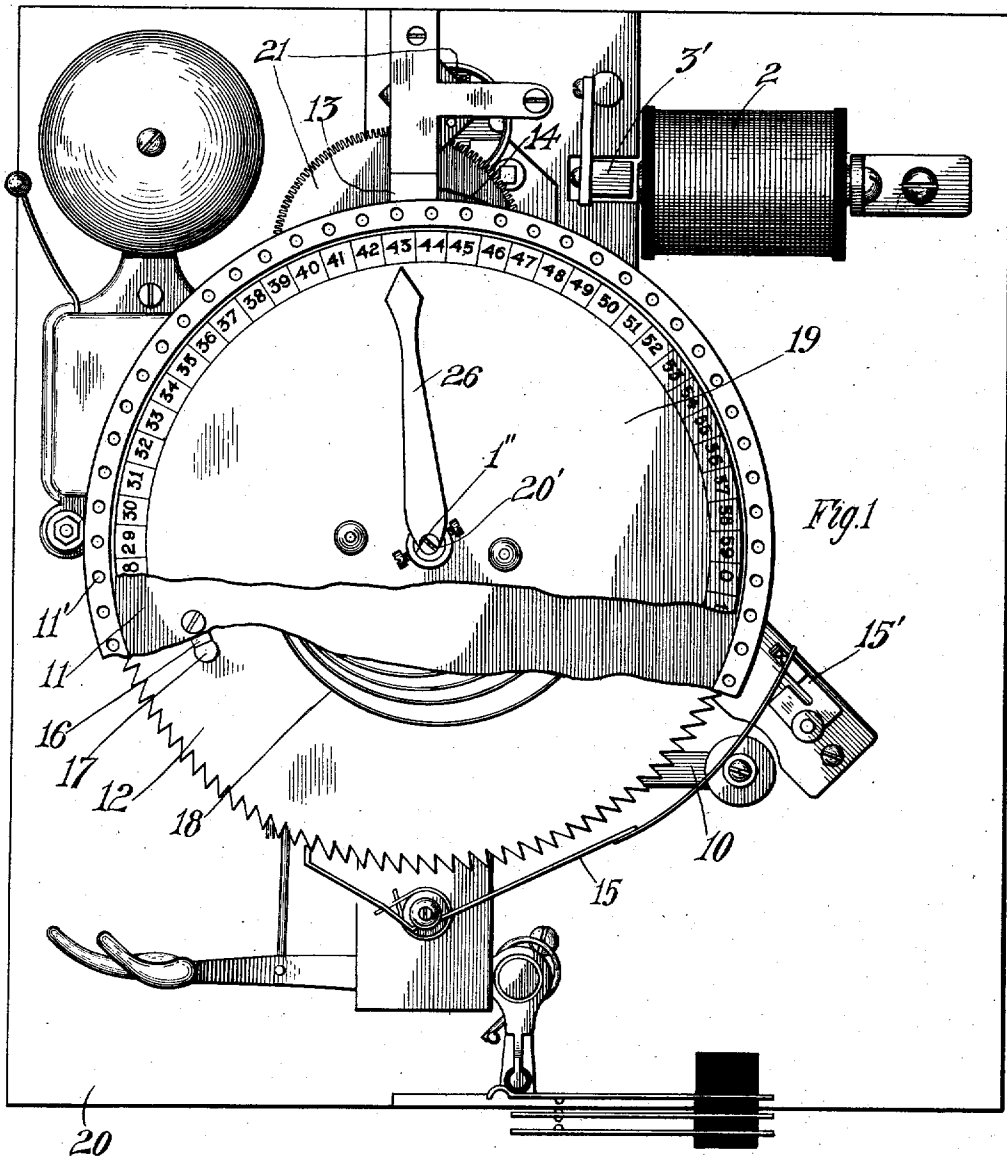


F. E. GRANGER.
TELEPHONE SELECTING DEVICE.
APPLICATION FILED SEPT. 29, 1909.

1,017,967.

Patented Feb. 20, 1912.

5 SHEETS—SHEET 1.



Witnesses:

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Wm Berghahn

Inventor:

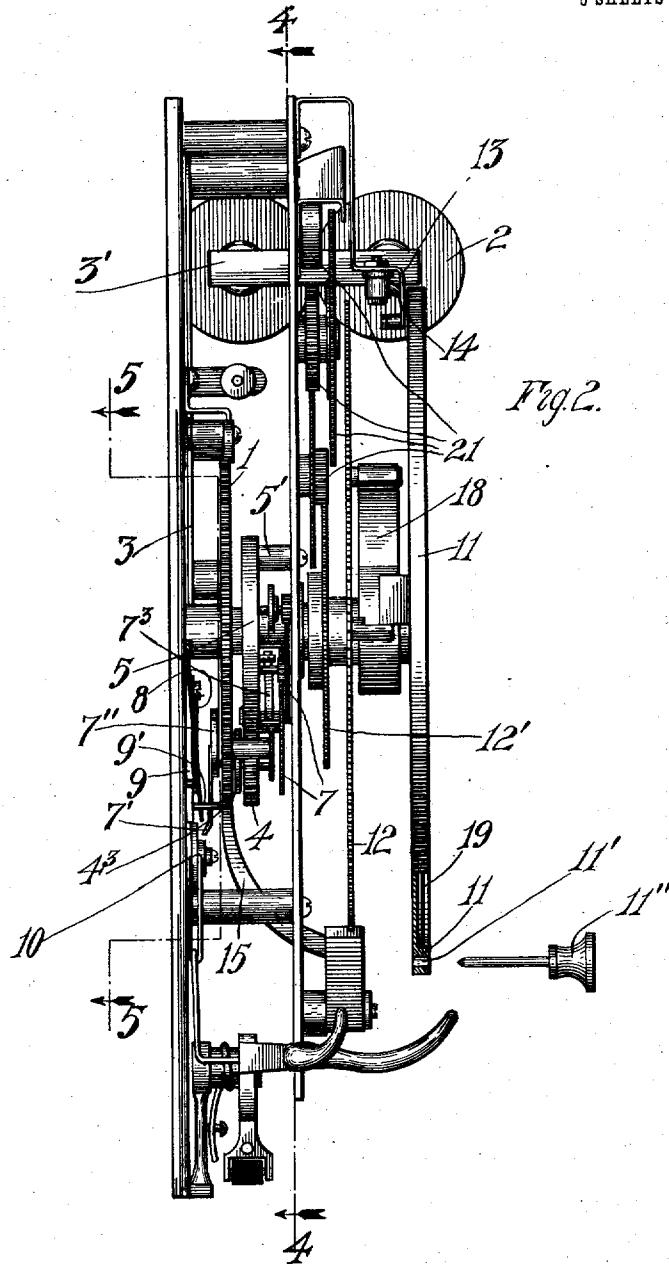
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5 SHEETS—SHEET 2.



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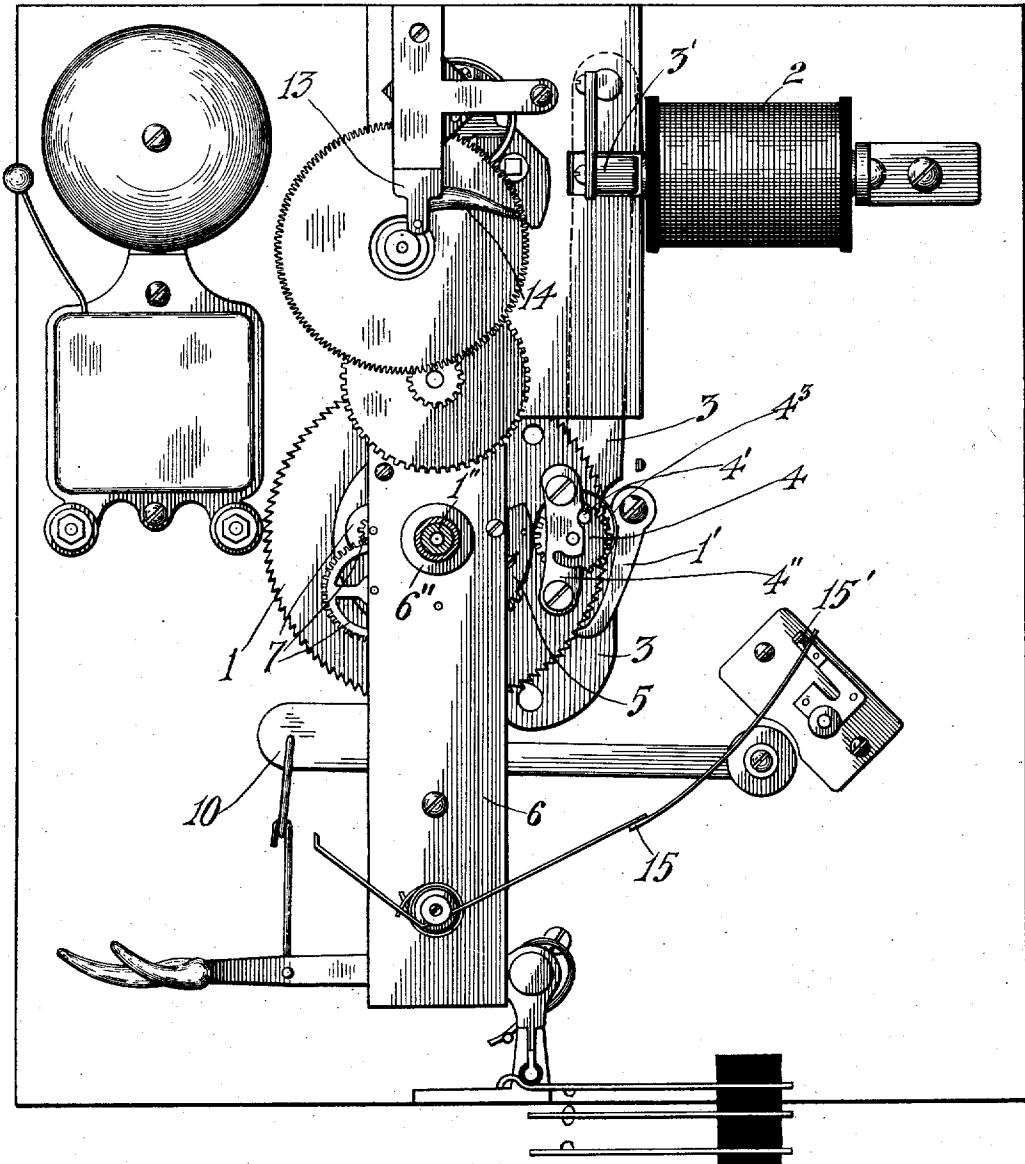
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5 SHEETS—SHEET 3.

Fig. 3



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5 SHEETS—SHEET 4.

Fig. 4

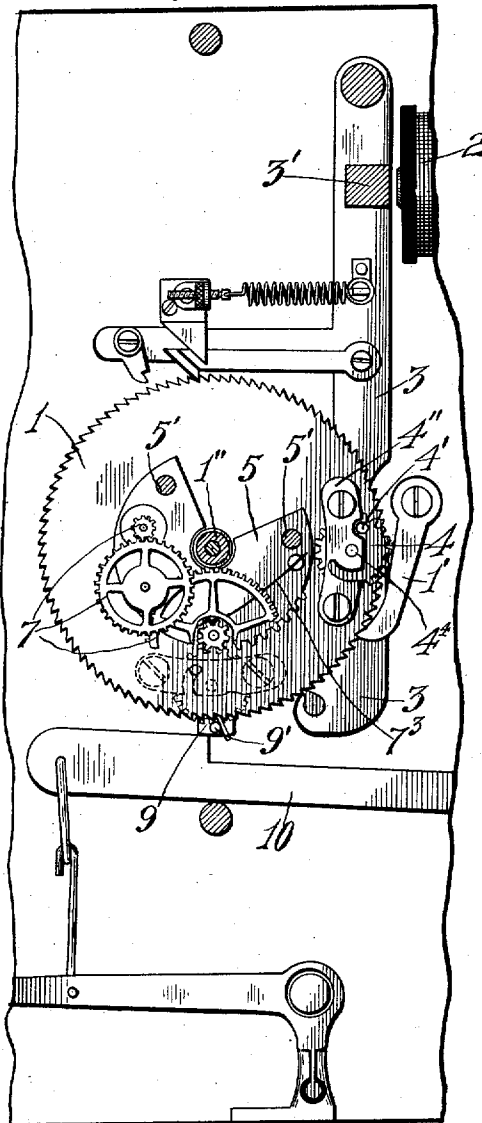
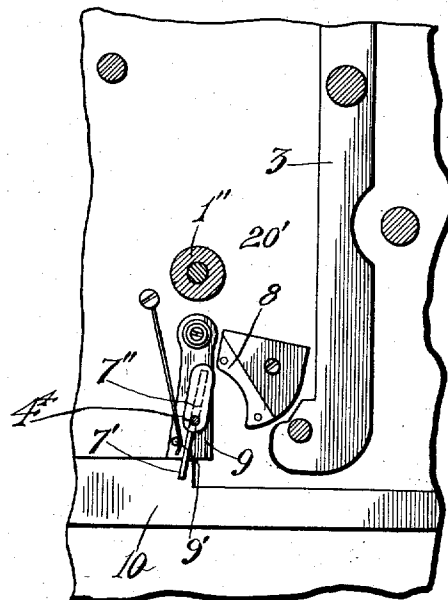


Fig. 5



Witnesses:

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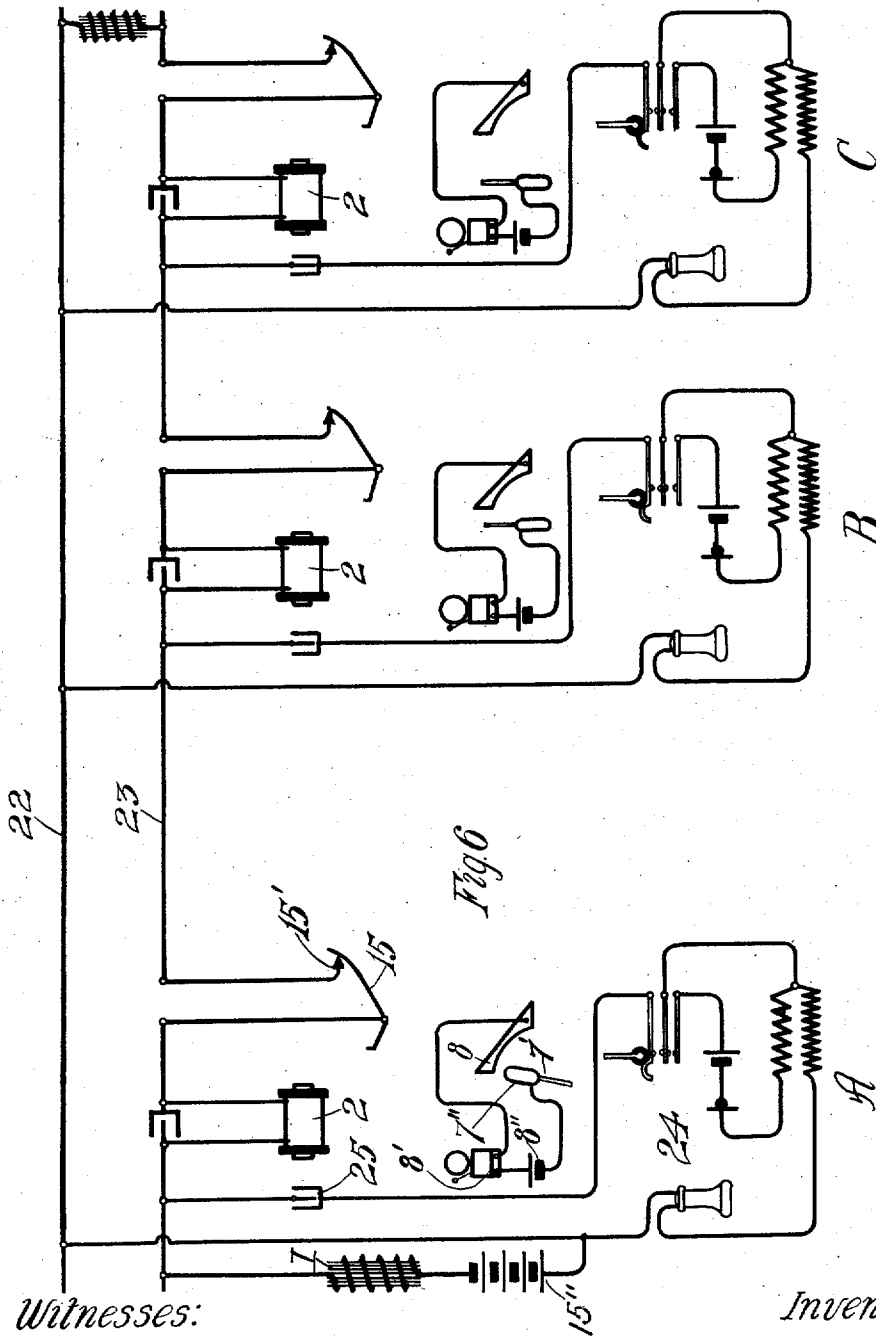
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1,017,967.

Patented Feb. 20, 1912.

5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

FRANK E. GRANGER, OF ABERDEEN, SOUTH DAKOTA.

TELEPHONE SELECTING DEVICE.

1,017,967.

Specification of Letters Patent.

Patented Feb. 20, 1912.

Application filed September 29, 1909. Serial No. 520,067.

To all whom it may concern:

Be it known that I, FRANK E. GRANGER, a citizen of the United States of America, and a resident of Aberdeen, county of Brown, and State of South Dakota, have invented a new and useful Improvement in Telephone Selecting Devices, of which the following is a specification.

My invention pertains to party-line station-selecting devices for use in telephone party lines, and it comprises, in its complete form, two mechanisms, namely, a signal receiving device adapted to be controlled by electric impulses and acting to render its associated telephone equipment operative when properly so controlled, and second, a signal-sending or electrical impulse-giving device.

In my improved device for party lines of any type, I have produced a device which meets the requirements of the private party line and which meets the desires of the users of such lines as I understand them.

My device offers a means for signaling any desired station without announcing such signal to any other station. In this feature, however, I offer the option of signaling a plurality of stations if so desired, as for instance, a doctor may have a telephone in his office and in his residence, and he desires that the bell shall ring at both places in order that he may answer every call, answering any call from either station. I provide at each station an annunciator device which bears upon its face all the numbers of all the stations upon its line, and which at all times indicates the number of the last station whose telephone equipment was brought into connection with the line conductors.

While in one sense my device is a lock-out device, because at any time all stations but one are unable to connect their telephones to the line, although if previously connected it may remain connected, yet in another sense my device does not provide lock-out features, since any station may gain access of his telephone to the line conductors by manipulating the apparatus at his station. By the design of my improved apparatus, the annunciator devices of all the stations are operated in unison and when the device at any station is manipulated to connect its telephone to the line conductors, the annunciators at all stations will move to indicate the directory number of the station thus connecting itself to the line. It will be seen therefore

that it is impossible for a telephone user at any station to connect itself to a busy line without announcing his own directory number to the parties to the then existing conversation. The indicators at the stations talking would show the number of the station which had come upon the line, and the three parties then would, of course, conduct themselves in view of the existing condition. An emergency call is possible even though the line may be busy, because the station desiring to call has the power to come upon the line and request its use, explaining the condition of emergency.

It will be seen from the above description that the party last connected, being the indicated party upon all the dials, is at liberty to place his telephone in connection with the line conductors without operating the dials, and it is true therefore that with an idle line one of the stations is able to connect himself to the line without operating the dials. However, when a conversation is in progress, one of the stations to the conversation is itself the station last connected to the line, and is itself the station which may be connected without operating the dials; it is, therefore, impossible for any third station to connect with the line without operating the dials. It is, however, provided by means of proper directions to the users of the line that when a subscriber has ceased using the line he shall return the dials to zero, in order that others may know that the line is free. Upon return of the dials to zero and the hanging up of all receivers no telephone is connected with the line and cannot be until the dials are operated to some predetermined number. It will be seen that when the subscriber finds his dial at zero he knows that he does not interrupt anyone by immediately using the line. However, if the dial is off from zero he may wait a reasonable time before putting himself on the line and when he does so if he finds others on the line, proper arrangements to the mutual satisfaction of all can be made.

For the operation of my device in connection with the private party line, as above contemplated, the equipment at each station comprises an impulse receiving and an impulse transmitting device, in order that any station may constitute itself a call sending station; the impulses sent in calling being received by all receiving devices, including its own.

When used upon exchange party lines, the devices of my improved apparatus are fundamentally the same, but their arrangement upon the line may be different. Each of the substations and the central office has the call receiving device and each sub-station would be provided with means for calling the central office. The central station would have the dial and impulse sending mechanism so that it would have the power of selecting substations and switching them on or off the line. If each substation were fully equipped with an impulse-sending device, the stations would be able to call each other without the coöperation of the central office. If, however, a modified calling device were supplied at the stations, the stations might be limited in power to the calling of the central office only, and a simpler equipment at each substation would be attained. Used as a small automatic exchange, the lines would radiate from the central office and each substation would be provided with impulse-receiving and impulse-sending devices.

My invention is illustrated in the drawings, in which like numerals designate like parts throughout, which accompany and form a part of this specification.

Figure 1 shows face view of the complete receiving and transmitting device of my invention with parts thereof broken away to reveal other parts. Fig. 2 shows side elevation of same viewed from the left of Fig. 1 and with the vibrating electric bell removed to reveal the apparatus at the right thereof in Fig. 1. Fig. 3 is a view similar to Fig. 1 but with the calling pin wheel, the impulse wheel, and the annunciator dial removed to reveal the apparatus under them. Fig. 4 shows sectional view on the line 4-4 of Fig. 2. Fig. 5 is a sectional view of a portion only of the apparatus taken on the line 5-5 of Fig. 2. Fig. 6 shows circuits of a private party line.

I shall describe first my impulse-receiving device. A large ratchet wheel 1, having twice as many teeth as there are stations or directory numbers upon the party line, is driven by an electromagnet 2, operating through an arm 3 which is driven by the armature 3'. The arm 3 carries driving pawls and locking teeth for the ratchet wheel 1, and a detent pawl 1' also is provided, the object of all these pawls and teeth being to insure the movement of the ratchet wheel through an angle of one step for each electrical impulse received by the magnet 2 and to limit its motion under such conditions to a single step or move. The ratchet wheel 1 carries mounted pivotally upon it a toothed wheel 4, the angular motion of which is limited by the engagement of pin 4', carried by the wheel 4, with plate 4'' which is the top sustaining plate of the wheel 4. The

wheel 4 has a spring 4³ (see Fig. 3) tending at all times to rotate the wheel 4 counter-clockwise as viewed in Fig. 3. A fixed toothed rack 5, presenting teeth in the form of a circular arc, is attached rigidly to the under surface of structural plate 6 by studs 5'-5'. Between the rack 5 and the plate 6 is sustained a train of gear wheels 7. The arc of teeth upon the part 5 is such as to mesh with the teeth of the wheel 4 and the small pinion of the first shaft of the train 7 is so placed that it also is engaged by wheel 4 when the wheel 4 is held in certain of its possible positions by a predetermined position of the ratchet wheel 1.

The operation of the parts thus far described is as follows: When the ratchet 1 is propelled by the magnet 2, it carries the wheel 4 first into engagement with the teeth of the fixed part 5 and then into engagement with the teeth of the slowest wheel of the idler train 7. The moving wheel 4, when in engagement with the teeth of part 5, rolls upon that part and rotates upon its moving axis against the tension of the spring 4³. When the wheel 4 is carried by the ratchet 1 beyond the last tooth of the part 5, it is in position to engage the idler train 7, which is free to move, and the wheel 4, under power stored in the spring 4³, returns to its initial angular position with reference to ratchet 1, and in so doing, drives the idler train 7. By reason of the driving of idler train 7, the speed at which the wheel 4 turns, is limited and the time period may be fixed at any desired interval by proper design of the idler train 7 and tension of spring 4³, the angle through which the wheel 4 is moved initially also being controllable by the number of teeth placed upon the part 5. The shaft 4⁴ of the wheel 4 has as many different positions of rest in space as there are teeth in the ratchet 1, and it may pause for an indefinite period in one of these positions, depending upon the number of the station called. In most of these positions it is inactive, but it may be active in a number of them, namely, those which it occupies immediately after it has been propelled beyond contact with the teeth of the fixed part 5. The first positions of the shaft 4⁴, after breaking engagement from the rack 5, may be called the critical positions of that shaft and of the wheel 4. The wheel 4 may be allowed to move counter-clockwise and to run down the tension of its spring 4³ while the shaft 4⁴ stands in its critical position or first position after the wheel 4 loses engagement with the rack 5, or the shaft may progress through several successive positions, or pause in the second position after breaking engagement between the wheel 4 and rack 5. The shaft 4⁴ passes through the ratchet 1, and below the ratchet 1 it carries the striker arm 7'' and electrical brush 7'. Upon the

structural frame work of the device and insulated therefrom is mounted the electrical contact plate 8. In one of the possible positions of the shaft 4', the shaft in turning will move brush 7' into and then out of contact with conducting plate 8. This position of the shaft 4' is its critical position as above described, namely, the first position of rest after the wheel 4 has broken engagement

with the fixed part 5. The finger spring 7^a engages the teeth of the first wheel of the train 7 and holds it in one of its proper angular positions to mesh properly with the wheel 4 as the wheel 4 is leaving the rack 5. The second position of rest, being one step farther to the left (see Fig. 5) permits the brush 7' to rotate near the plate 8 but not in contact therewith. The wheel 4 will start to revolve immediately upon leaving the part 5, and if it is stopped with its shaft in its first or critical position, it will, by its continued revolution, retarded by the train 7, cause an electrical connection of limited

time duration between parts 7' and 8. If, however, another step is taken by the ratchet 1, and the wheel 4 is carried to its next position, before the brush 7', retarded by the idler train 7, has moved a sufficient distance angularly to engage the plate 8, then the release of the wheel 4 may be effected without electrical connection between parts 7' and 8. The speed of impulses received by the magnet 2 shall be sufficient to propel the ratchet 1 a step or more in the time interval after 4 leaves 5 and before 7' makes contact with 8, and it is necessary therefore, if 7' is to make contact with 8 at all, that the impulses received by the magnet 2 shall stop when the critical position of the shaft 4' is attained. This electrical contact is adapted to close the ringing circuit of the station, and the angular relation of wheel 4 and the last tooth of 5, as determined by the angular relation of parts 5 and 1, is varied in the stations, to effect the selection of the desired station or stations and no other, when all ratchet wheels 1 are in a predetermined position. In addition to the electrical function of 7' and 8, the striker arm 7'' will strike pin 9' upon spring-pressed pivoted arm 9 and move pivoted arm 9 out of engagement with the shoulder upon hook switch lever 10, if the wheel 4 is permitted to return to its normal position of rest when its shaft 4' is in the critical position, but not otherwise.

The setting of the ratchet wheel 1 at the different stations, is such that the shaft 4' occupies different relative positions in all the stations which are to be separately selected, and therefore, in all such stations, but one such shaft will stand in the critical position when the impulses cease upon the magnet 2. Therefore but one such station can be called, and in all other stations the wheel 4 and idler train 7 will run down under the unwinding of the spring 4^a without closing the circuit between 7' and 8, and without moving the unlocking lever 9.

My improved calling device, or impulse-transmitting device, comprises a pin disk 11 and a vibrator disk 12, the pin disk being associated with a pin stop 13 and hold-

ing pawl 14, and the vibrator disk being provided with a vibrator contact-making lever 15. The two disks are sleeved upon the same shaft and have abutment projections 16 and 17 respectively, by which they engage each other. A spring 18 is attached at its two ends to the two disks in such manner as to draw the two abutments together, that the disks, when at rest, always may occupy the same relative position. The pin wheel 11 has as many pin holes 11' as there are stations which may be selected separately, and the disk 12 has double the number of teeth. The pawl 14 drops into the holes 11' upon the under side of the disk

and permits the disk to be rotated clockwise, but not counter-clockwise. A pin 11'' may be inserted in any of the holes 11', and when so inserted projects through so far that it engages the structural part 13 which therefore constitutes a pin stop when the disk 11 is operated. The annunciator disk 19 is attached to the sleeve 1'' upon the alining stud 20', the sleeve 1'' being rigid with the ratchet wheel 1. The pointer 26 is rigidly fixed to the alining stud 20', and always remains in a fixed position indicating the last station called or connected to the line, which is also the pin stop position, and when zero is indicated by this pointer it would mean that the line is free. Thus, annunciator dial 19 moves with the ratchet wheel 1 and by its position indicates the position of the ratchet wheel. The dial is so adjusted to the ratchet wheel that, when all devices are at rest, the directory number under the pin stop position, which is directory number "43" in Fig. 1, is the directory number of the station at which the wheel 4 is in its critical position or signal-causing and telephone unlocking position, so that the directory number under the pin stop position indicates at all times the number of the station which then has access to the line without operating the selecting devices.

The operation of the impulse-transmitting device may now be understood. The pin 11'' is placed in the pin wheel 11 opposite the number which it is desired to connect to the line. The pin wheel then is revolved clockwise by means of the handle of the pin until the pin is stopped by the part 13. This draws abutment 16 from the abutment 17 and the spring 18 urges the wheel 12 clockwise. The wheel 12 is affixed rigidly to gear wheel 12' which meshes with idler train 21 and by the retarding effect of the idler train, the speed of motion of the wheel 12 is governed and is determined as desired in the design of the machine. The movement of the wheel 12 oscillates the arm 15 and causes a making and breaking of contact between parts 15 and 15', the lat-

ter being a fixed insulated contact point. The number of contacts made between these parts is double the number of pin-hole intervals in the pin wheel 11 through which the pin wheel has been moved.

The operation of the entire device upon a private party line equipped with the number of stations now may be understood and is as follows; reference being made particularly to Fig. 6. The line conductors are 22 and 23 which connect in series a line battery 15'', magnets 2 at each station, contacts 15 and 15', and impedance coils I, I located at each end of the line. The telephone set 24 of the substation is connected in series with

which is the position in which the wheel 4 of station B, and his associated mechanism will ring his own bell and unlock his own hook switch. This, however, will notify station A and station C that station B has come upon the line, and further use of the line may be arranged as agreed by them. In order, however, that the parties using the line may not be unnecessarily interrupted, proper directions are given to all subscribers that they should, when through with the line, return the dials to zero, so as to inform all other subscribers that the line is free.

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

1. In a telephone selecting device, a rotatable shaft; means for changing the moving position of the axis of the said shaft; means for causing the rotation of said shaft in any one of a plurality of the possible positions of its axis; a fixed electrical contact member; and an electrical contact member carried by said shaft, said two members comprising an electric switch and adapted to engage each other in electrical contact during a portion of the movement of said shaft when its axis is in one of its possible positions.

2. In a telephone selecting device, a conducting brush; a rotatable shaft upon which said brush is mounted; movable journals upon which said shaft is mounted; and a fixed contact member which said electrical brush may engage when rotated with its shaft and journals in one of the possible positions of said journals.

3. In a telephone selecting device, an electric switch; a rotatable shaft adapted to close said switch; movable journals for said shaft; a stepping mechanism to move said journals; means for causing the beginning of rotation of said switch controlling shaft at a predetermined point in the movement of

said journals and retarding mechanism for said shaft and operative when the shaft is rotating to close the switch whereby the closing of said switch is delayed until said stepping mechanism may step the journals of the shaft beyond the switch closing position of the shaft when so desired.

4. In a telephone selecting device, a main movable member; stepping means for moving said member and adapted to step said main movable member at a predetermined speed; a sub-member movable upon said main member; means for causing said sub-member to move in a predetermined direction when said main member rotates to a predetermined position and for a short period of time subsequent thereto; an electric switch operable by said sub-member in the latter part of its possible predetermined movement when said main member is in its predetermined position, the interval between the instant of reaching the critical position and the instant of leaving the critical position being less than the interval between the beginning of movement of said sub-member and the closing of said switch by said sub-member.

5. In a telephone selecting instrument, a ratchet wheel impelled by a magnet controlled by a succession of electrical impulses and provided with means for limiting its movement to one step at each electrical impulse and having mounted upon its surface, in an eccentric position, a small gear wheel with a coil spring attached thereto, in combination with a partially toothed gear segment mounted in a fixed position concentric with said ratchet wheel, with the teeth of which segment the teeth of the small gear wheel will engage as it is being carried around upon the ratchet wheel, said partially toothed gear wheel having a sufficient number of teeth to wind up the coil spring sufficiently to furnish the power to do the work required, and an idler train having its low speed pinion adjacent to the end of the series of teeth upon said fixed segment and with which said small gear wheel meshes after leaving said segment and whereby the speed of said small gear wheel in unwinding said coil spring is retarded.

6. In a telephone selecting instrument, a ratchet wheel impelled by a magnet controlled by a succession of electrical impulses and provided with means for limiting its movement to one step at each electrical impulse and having mounted upon its surface, in an eccentric position, a small gear wheel with a coil spring attached thereto, in combination with a partially toothed gear segment mounted in a fixed position concentric with said ratchet wheel, with the teeth of which segment the teeth of the small gear wheel will engage as it is being carried around upon the ratchet wheel, said par-

tially toothed gear wheel having a sufficient number of teeth to wind up the coil spring sufficiently to furnish the power to do the work required, and an idler train having its low speed pinion adjacent to the end of the series of teeth upon said fixed segment and with which said small gear wheel meshes after leaving said segment and whereby the speed of said small gear wheel in unwinding said coil spring is retarded, and with the slow speed pinion of which said small gear wheel is meshed for a plurality of its positions as determined by said magnet.

7. In a telephone selecting device, an electric switch comprising a fixed member and a movable member movable angularly about a translatable axis and adapted to close the switch only when said axis is in one of its possible positions of translation.

8. In a telephone selecting instrument, a signaling circuit including a switch adapted to be closed during the progressive movement of one of its parts, said movable part being movable angularly about a translatable axis and said movable part being adapted to close said switch when its axis is in but one of its possible positions; means controllable electrically from a distance by electric impulses for preparing said movable element to move to close said switch and to carry said translatable axis into and then out of its critical position.

9. In a telephone selecting instrument, a signaling circuit including a switch adapted to be closed during the progressive movement of one of its parts, said movable part being movable angularly about a translatable axis and said movable part being adapted to close said switch when its axis is in but one of its possible positions; means controllable electrically from a distance by electric impulses for preparing said movable element to move to close said switch and to carry said translatable axis into and then out of its critical position, and means located at a distance and adapted to control the number of electric impulses whereby said axis is moved, whereby said axis may be permitted to remain in its critical position when so desired.

10. In a telephone selecting device, a mechanism mounted upon a movable support, and means adapted to be controlled by electric impulses for moving said support; further means for moving said mechanism in one direction while said support moves through a predetermined angle and to operate said mechanism in the reverse direction and at a predetermined speed subsequently thereto.

11. In a telephone selecting device, a mechanism adapted to close an electric circuit when operated in a predetermined manner and in a predetermined position, means for carrying said mechanism into and out

of said predetermined position and further means for retarding the speed of operation of said mechanism to such an extent that the electric circuit will not be closed by the mechanism in the period of passage into and out of the critical position unless pause is made in that position.

12. In a telephone selecting device, means controllable electrically from a distance for winding up a spring and permitting the same to run down under a speed-retarding influence; an electrical contact device forming a part of a signal circuit and controlling other devices to give a signal, one member of said contact device being mounted upon a part movable by distant selection control, said contact device being operated to cause a signal when said spring is permitted to run down with said selectively movable part in only one of its possible positions.

13. In a telephone selecting device, a directory dial associated with the selecting mechanism of the device, and indicating at all times the directory number of the station last called upon the line with which said connecting device is connected; an impulse transmitting device having a number-setting wheel concentric with said dial, said dial indicating, when at rest, the angle through which said number-setting wheel must be advanced to effect the signaling of any desired station.

14. In a telephone selecting device, a directory dial associated with the selecting mechanism of the device and indicating at all times the directory number of the station last called upon the line with which said connecting device is connected; an impulse transmitting device having a number setting wheel concentric with said dial, said dial indicating, when at rest, the angle through which said number setting wheel must be advanced to effect the signaling of any desired station; and an electrical impulse-giving mechanism associated with said number-setting wheel and adapted to produce electrical impulses as a result of the setting of said number wheel, said impulses being properly numbered to advance said dial through an angle equal to the angle through which said number wheel has been advanced.

15. In a telephone selecting device, a directory dial associated with the selecting mechanism of the device and indicating at all times the directory number of the station last called upon the line with which said connecting device is connected, an impulse transmitting device having a number setting wheel concentric with said dial, said dial indicating, when at rest, the angle through which said number setting wheel must be advanced to effect the signaling of any desired station, and electrical impulse-giving mechanism associated with said num-

ber setting wheel and adapted to produce electrical impulses as a result of the setting of said number wheel, the produced impulses being in number proportional to the angle through which said number-setting wheel has been advanced.

16. In a telephone system, a plurality of stations, each station equipped with a directory dial and impulse-sending device and a stepping selective signal device, said dial indicating at all times the directory number of the station last signaled and indicating also the numbers of electrical impulses which must be sent to call any other specific station, and said dial being associated with said selective signal device directly, and said stepping devices and said dials all moving in unison; a controlling wheel upon said impulse-sending device and adjacent to said directory dial whereby said directory dial may indicate directly upon said controlling wheel the angle through which said wheel must be turned to secure the selection of any desired station.

17. In a telephone system, a line having a plurality of stations, each station equipped with a directory dial, an impulse sender and a stepping selective signal device; said dial being associated with said selective signal device directly and said stepping devices and dials all moving in unison; a controlling wheel upon said impulse-sending device and adjacent to said directory dial whereby said directory dial may indicate directly upon said controlling wheel the angle through which said wheel must be turned to secure the selection of any desired station.

18. In a telephone system, a line having a plurality of stations, each station equipped with a directory dial and impulse sender and a stepping selective signal device, said dial being associated with said selective signal device directly and said stepping devices and dials all moving in unison; a controlling wheel upon said impulse sending device and adjacent to said directory dial whereby said directory dial may indicate directly upon said controlling wheel the angle through which said wheel must be turned to secure the selection of any desired station; and mechanism in said impulse-sending device and constituting essential parts thereof and adapted to send impulses of current proportional in number to the angle through which said controlling wheel is moved.

19. In a party line telephone system, the combination of a station-selecting and call receiving apparatus, comprising a source of energy; an annunciator dial; a pin disk; a pin stop and holding pawl for controlling the position of said pin disk; an impulse-making disk associated with said pin disk and limited in its action by the movement of said pin disk; an electro-magnet, operat-

ing a ratchet wheel; a small toothed wheel mounted pivotally upon said ratchet wheel; a fixed toothed rack, upon which said toothed wheel rolls against the spring tension; an electrical contact maker, carried on the pinion of said small toothed wheel, and means for controlling the position, in space, of said toothed wheel and its rotative speed when it is permitted to run down under tension of its spring, the operation of said contact maker to make a contact being dependent upon the position in space of the axis of said small toothed wheel.

20. In a party-line telephone system, comprising a plurality of instruments on one line, a station-selecting and call receiving apparatus consisting of main movable members bearing upon their surface signal-controlling sub-members, the angular displacement of the sub-members from a prearranged starting point being different in each instrument; a means for moving said main members one step for each electrical impulse sent over the line; means for rotating said sub-members against a spring tension, and for releasing the sub-member when at a predetermined point and means for determining and controlling the position, in space, of said sub-member, with regard to its movement about the axis of said main member, and its position in space while rotating after release.

21. In a telephone station-selecting and call receiving device, the combination of a source of energy; an annunciator dial; an impulse making disk; the number of impulses made by said disk being controllable by angular distance through which said disk is moved; a ratchet wheel fixed to same shaft as said annunciator dial; a gear wheel mounted on the surface of said ratchet wheel, in such a manner that its angular displacement from a prearranged starting point is different in each instrument on the line; an electrical wiper, carried on the pinion of said gear wheel, arranged to make electrical contact, with a fixed contact member, during the rotation of said gear wheel in one of its possible positions in space; a means of winding up and releasing said gear wheel against the spring tension; and means for giving a signal by the rotation of said gear wheel after its release if such rotation is permitted in one of its possible positions in space.

22. In a telephone selecting device, a ratchet wheel, impelled by a succession of electrical impulses received by an electromagnet provided with a means of regulating its movement and limiting it to one step for one impulse; a gear wheel mounted pivotally upon the surface of said ratchet wheel, in such a manner that it may have as many positions in space as there are teeth in said ratchet wheel; a fixed toothed rack, upon

which said gear wheel rolls, against a spring tension; and an electrical wiper or contact maker, carried on the pinion of said gear wheel and arranged to make electrical contact with a fixed contact member during the period of reverse rotation of said gear wheel in its first position of rest, in space, after its release from said toothed rack.

23. In a telephone selecting device, a ratchet wheel, impelled by a succession of electrical impulses received by an electromagnet; provided with a means of regulating its movement and limiting it to one step for one impulse; a gear wheel mounted pivotally upon the surface of said ratchet wheel, in such a manner that it may have as many positions in space as there are teeth in said ratchet wheel; a fixed toothed rack, upon which said gear wheel rolls, against a spring tension; and signal producing means operated by the shaft of said gear wheel during its reverse rotation subsequent to its release from said toothed rack if during such rotation said shaft is permitted by said ratchet wheel to occupy a predetermined position.

24. In a telephone system, a telephone-selecting and call-receiving device comprising a manually operated circuit closing device, arranged to transmit electrical impulses to the line; and an electrically operated signal controlling switch consisting of a fixed member and a movable member, movable about an axis translatable through the medium of electrical impulses received from a distance and adapted to close said switch only by rotation through a predetermined angle when said axis is in one of its possible positions of translation.

25. In a telephone selecting and call receiving device, a means controllable, electrically, from a distance, for winding up a coiled spring to which is attached a gear wheel, and permitting the said coiled spring to unwind, thereby turning said gear wheel about its axis, under a speed retarding influence, in one of the distantly controlled positions, in space, of the said axis; and an electrical contact device, depending in its operation upon the position in space of said axis of said gear wheel and its rotation about said axis.

26. In a telephone selecting and call receiving device, a means controllable, electrically, from a distance, for winding up a coiled spring to which is attached a gear wheel, and permitting the said coiled spring to unwind, thereby turning said gear wheel about its axis, under a speed retarding influence, in one of the distantly controlled positions, in space, of the said axis; and a signal-producing device, depending in its operation upon the position in space of said axis of said gear wheel and its rotation about said axis.

27. In a telephone selecting device, a main wheel; a sub-wheel carried upon said main wheel; means for rotating said main wheel; means for rotating said sub-wheel, actuated
5 by the movement of said main wheel, to rotate said sub-wheel first in one direction, and subsequently in the reverse direction; and signal producing means operable by
10 said sub-wheel, in its reverse movement, if said main wheel occupies a predetermined position.

28. In a telephone selecting device, a main selector; a sub-selector; means for storing
15 energy in said sub-selector, by movement of said main selector and for releasing the same at a predetermined position of said main selector; an electrical contact making device
20 constituting a part of said sub-selector and operated during the dissipation of the stored energy, the predetermined position being the only one of a plurality of posi-

tions of said main selector in which said electrical contact maker may operate to complete a circuit.

29. In a telephone selecting device, a main
25 selector; a sub-selector; means for storing energy in said sub-selector, by movement of said main selector and for releasing the same at a predetermined position of said main
30 selector; a signal producing device operated during the dissipation of the stored energy, the predetermined position being the only one of a plurality of positions of said main
35 selector in which said signal producing device may operate to produce a signal.

Signed by me at Aberdeen, county of
Brown and State of South Dakota, in the
presence of two witnesses.

FRANK E. GRANGER.

Witnesses:

E. ODERKIRK,

M. G. STEPHENS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."