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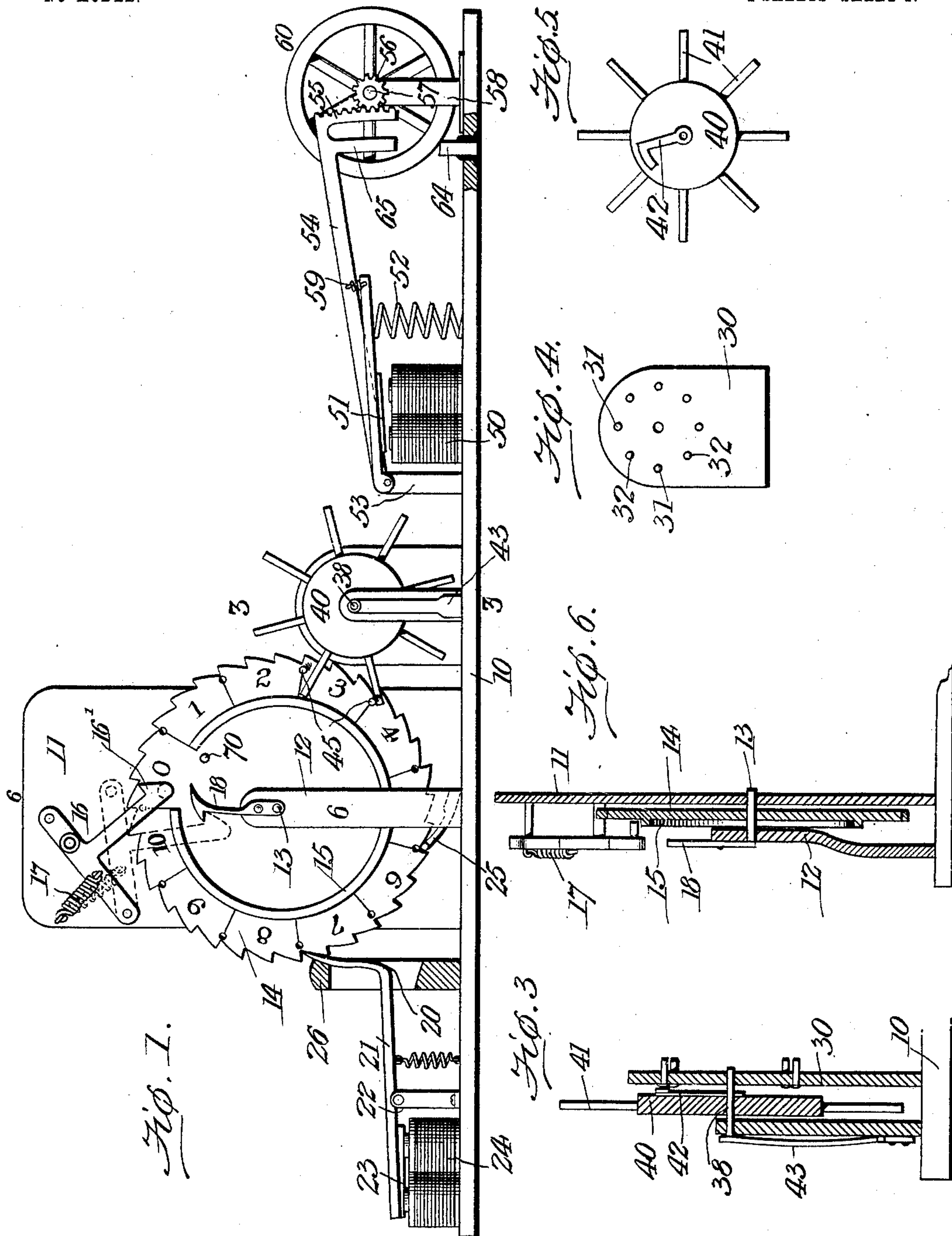
PATENTED APR. 12, 1904.

L. E. BROCK.  
TELEPHONE SELECTING DEVICE.

APPLICATION FILED MAY 13, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



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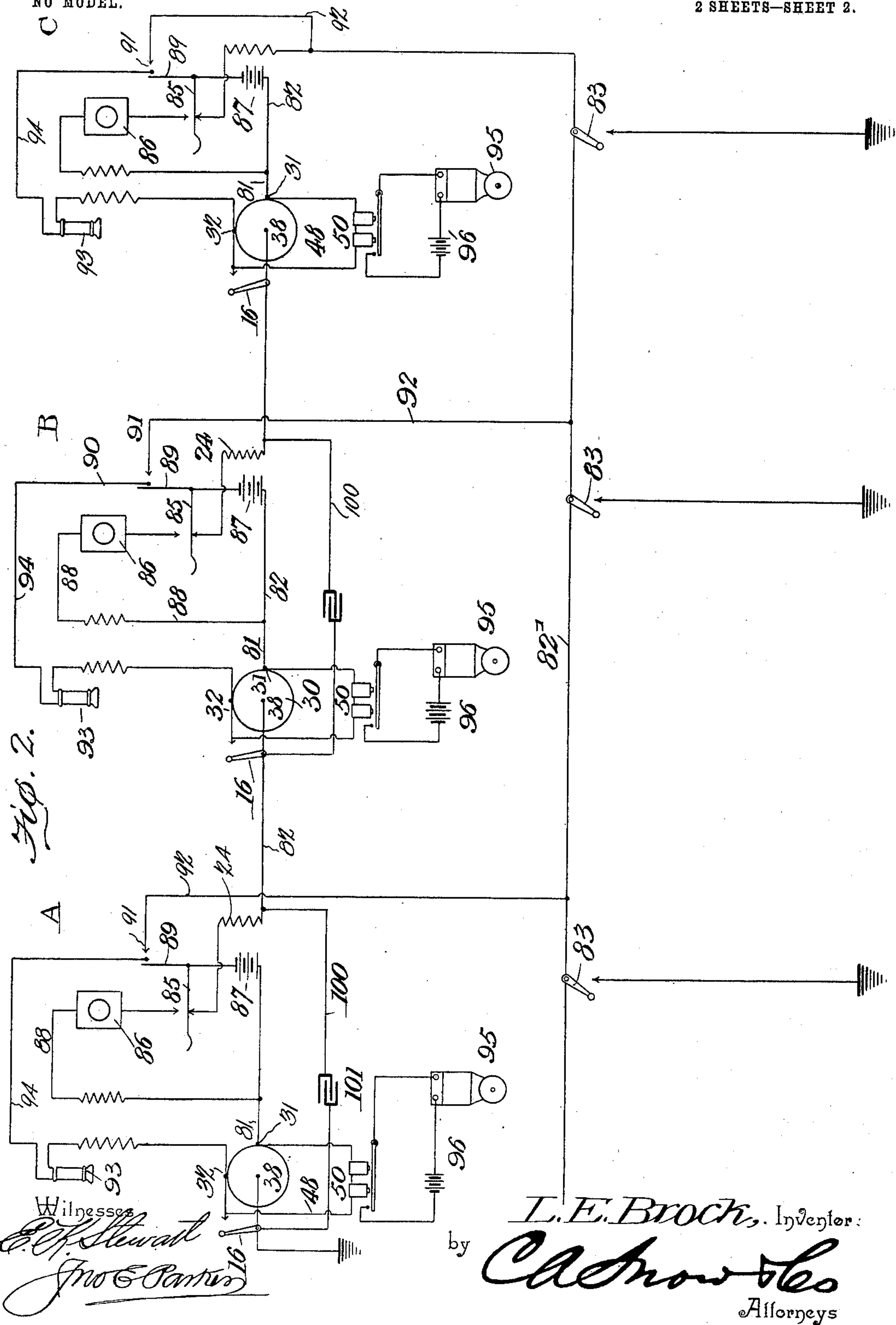
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# UNITED STATES PATENT OFFICE.

LAWRENCE E. BROCK, OF CELINA, OHIO.

## TELEPHONE SELECTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 756,824, dated April 12, 1904.

Application filed May 13, 1902. Serial No. 107,153. (No model.)

*To all whom it may concern:*

Be it known that I, LAWRENCE E. BROCK, a citizen of the United States, residing at Celina, in the county of Mercer and State of Ohio, have  
5 invented a new and useful Telephone Selecting Device, of which the following is a specification.

This invention relates to certain improvements in selecting devices for telephones and  
10 signaling systems of that class in which any subscriber on a party-line may signal any other subscriber on such a line without ringing the call-bells of the remaining subscribers or an operator at a central station is enabled to ac-  
15 complish the same result on any of the party-lines leading to the station.

The principal object of the invention is to provide a simple form of mechanism which will effectually accomplish this result and will  
20 close the local circuit of only the selected subscriber.

A further object is to so arrange the mechanism as to inform any subscriber intending to call that the line is in use or is open; and a  
25 still further object is to so construct the device as to prevent a subscriber from cutting in on the line when the latter is in use.

With these and other objects in view the invention consists in the novel construction and  
30 arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings, Figure 1 is an elevation, partially in section, of the selecting and current-closing mechanism placed in each local station along the line. Fig. 2 is a diagram illustrating a portion of the main and one of the local circuits. Fig. 3 is a transverse sectional elevation of a portion of the mechanism on the line 3 3 of Fig. 1. Figs. 4 and 5  
40 are views of details of construction more specifically referred to hereinafter. Fig. 6 is a transverse sectional elevation of a portion of the mechanism on the line 6 6 of Fig. 1.

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

The mechanism forming the subject of the  
50 present invention is intended for use in con-

nection with a single-wire main line connecting any desired number of subscribers on a party-line, and each subscriber is provided with the selecting and circuit-closing mechanism illustrated in Fig. 1, these devices be-  
55 ing placed at a point adjacent to the telephone and serving as a means for connecting the local telephone, battery, and call-bell to the main line.

10 designates a suitable base to which are  
60 secured a switchboard 11 and standard 12, the switchboard and standard forming bearings for the support of a spindle or shaft 13, on which is mounted a ratchet-wheel 14, having on one face a number of spaces corre-  
65 sponding to the number of telephones on the line and bearing designating-marks, such as numerals, to correspond to the numbers of the various subscribers. On the ratchet-wheel is also an additional space representing the  
70 zero position, at which all of the disks stand when the line is not in use, and said disks are so arranged as to be visible in order that the subscribers may readily ascertain whether or  
75 not the line is in use.

On the outer face of the ratchet-wheel 14 is an annular rib 15, which is interrupted or cut away opposite the zero-mark to permit the passage of a pin projecting laterally from the end portion of a handled switch-lever 16, the  
80 pin being so arranged as to pass over the face of the disk and inwardly beyond the line of the rib 15 when the disk is in the position shown in Fig. 1. This switch serves to connect and disconnect the local telephone from  
85 the main line, the position shown in full lines being that which the switch assumes when the local telephone is cut out and the dotted-line position showing the switch as connecting the local telephone to the main line. Normally  
90 the switch is held in the full-line position by a tension-spring 17 when the disk is at zero, and to connect his telephone in the main line a subscriber must move the switch against the stress of the spring 17 until the dotted-  
95 line position is assumed, at which time the lower arm 16' of the switch will be engaged and held by a spring-catch 18. The switch can only be moved to the dotted-line position when the disk is in the position shown in Fig. 100



1 with the zero-mark indicating that the line is not in use. When other subscribers are using the line, all of the disks are moved until one or other of the numbers on the faces of the disks occupy the position of the zero-mark, and in such cases the annular rib 15 will prevent the movement of the switch to closed position, so that a subscriber cannot cut into the line when the latter is in use and no subscriber can call another until all of the disks are at zero and closing movement of the switch is permitted. The teeth on the periphery of the ratchet-disk are so arranged that two or more teeth will come opposite each of the numeral-bearing spaces, and engaging with said teeth is a pawl 20, carried by an armature-lever 21, fulcrumed on a standard 22 and carrying an armature 23 within the field of force of an electromagnet 24, a pair of such magnets being situated at each subscriber's station and connected in series in the main line, so that each time a current is sent through the main-line wire all of the magnets will be energized and each pawl will be moved to advance its ratchet-disk to the extent of one tooth. Backward movement of the ratchet-disks is prevented by one or more stop-pawls 25 of the usual construction. To prevent a movement to an extent greater than that represented by a single tooth and prevent any whirling movement of the ratchet-disk, the pawl 20 at the limit of its upward movement comes into contact with the inclined face of a stop-block 26, the pawl being gradually jammed between the face of the block and the surface of the tooth with which it is in contact and effectually preventing any movement of the ratchet-tooth to an extent greater than a single tooth. In making a connection the calling subscriber first depresses his switch 16 to connect the secondary of his telephone and local battery to the main line and then by means of a suitable circuit-breaker sends a number of impulses from his local battery along the line and through all of the electromagnets 24, moving all of the ratchet-disks until they are stopped with the numeral corresponding to the number of the called subscriber in the position occupied by the zero-mark in Fig. 1.

On the base 10 is secured a switchboard 30, formed of vulcanized fiber or similar insulating material, said switchboard having a series, preferably eight, of contact-blocks 31 and 32, all of the blocks 31, which alternate with the blocks 32, being connected through the wire 81 to the main-line wire, while all of the contact-blocks 32 are connected to a local line 86, Fig. 2, leading through the telephone instruments, as hereinafter described.

Rising from the base 10 is a standard 37, having a bearing for one end of a spindle 38, the opposite end of which finds a bearing in the switchboard 30. On the spindle 38 is secured a disk 40, preferably formed of insulat-

ing material and provided with a number of radially-projecting arms 41 equal to the number of contact-blocks 31 and 32. To the inner end of the metallic spindle 38 is secured a contact-spring 42, adapted to be moved into contact successively with the contact-blocks 31 and 32 as the disk 40 is rotated. With one end of the spindle engages a contact-spring 43, connected in the main-line circuit and so arranged that when the spring 42 is in contact with one of the blocks 31 the current will be short-circuited in the main line and when in contact with one of the blocks 32 a current will be established through the secondary of the local telephone-line. The radial arms 41 are engaged by pins 45, projecting from the face of the ratchet-disk 14, said disk being provided with an annular series of openings, of which two are formed in each of the numeral-bearing spaces and adapted for the reception of the pins 45, of which each disk carries two, the pins being placed in different positions in the disks of each of the selecting systems along the line, so that when the ratchet-disk is properly turned to correspond to the number of the called subscriber said projecting pins will engage with and turn the disk 40 through the medium of the arms 41. Normally the spring 42 is in contact with one of the contact-blocks 31, leading to the main line, and when the selecting-disk of a subscriber approaches a position to connect its local circuit to the main line one of the pins 45 will engage with one of the arms 41 and will shift the spring 42 to the extent of a single arm, thus shifting the spring to a contact-block 32 and connecting the local phone to the main line. A single further movement of the ratchet-disk will bring the second of the pins 45 into engagement with a following arm 41 and again shift the contact-spring to one of the contact-blocks 31, leaving the local telephone disconnected. This movement occurs in each of the telephones bearing a lower number than that which it is desired to call; but the said telephones are only momentarily placed in communication with the main line and immediately thereafter are cut out, the only telephone remaining in circuit with the main line being that selected by the calling subscriber. If the local call-bells and battery-circuits were placed in communication with the main line during the momentary closing of the circuits, each call-bell would be energized in succession, and to prevent annoyance from this fact I arrange the local call-bell and its energizing-battery in an auxiliary local circuit, which may only be closed by the calling subscriber holding the main line energized for a considerable length of time as compared to the momentary energizing which occurs under the usual make and break.

To the contact-blocks 32 is connected a shunt 48, leading to the wire 81, (see Fig. 2,) and in this shunt is placed a pair of electromagnets



50. Above these magnets is an armature 51, normally held elevated by a spring 52, the magnets being energized each time a circuit is established through the spring 42 and one of the contact-blocks 32 and serving to draw the armature down against the action of the spring. The armature 51 is pivoted on a stud 53, to which is also pivoted an arm 54, having at its outer end a segmental rack 55, adapted to be engaged by a pinion 56, mounted on a shaft 57, adapted to suitable bearings in one or more standards 58. The armature 51 and the pivoted arm 54 are connected together by a coiled tension-spring 59, through which the downward movement of the armature is transmitted to the arm 54, the movement being comparatively slow, so that while a momentary energizing of the electromagnets will result in the downward movement of the armature the arm 54 will be slow to yield and will not have completed its movement before the armature is released by the deenergizing of the magnet. To further retard the movement of the arm 54, there is arranged on the shaft 57 a balance-wheel 60, and as the rack at the outer end of arm 54 is in engagement with the pinion 56 said arm must overcome the inertia of the balance-wheel before the arm can move. The local call-bell and battery are included in a circuit of which the terminals are represented by the insulated post 64 and the arm 54, the latter having a downwardly-projecting finger 65, adapted to make contact with the post 64 when depressed, this movement occurring when the calling subscriber after a number of makes and breaks turns all of the ratchet-disks until the numeral-bearing space bearing the number of its selected subscriber is reached, the circuit being then held closed and energized for a sufficient length of time to draw the armature 51 to the magnets and to depress the arm 54 until its finger 65 has engaged with post 64 and completed the local calling-circuit, the calling-bell continuing to ring as long as the finger 65 and post 64 are held in contact with each other by the calling subscriber. After signaling a subscriber by the operation of a suitable circuit-closing device, as hereinafter described, and automatically connecting his telephone-line to the main circuit the line may be used for signaling or telephone purposes, as may be desired, it being only necessary to employ a single wire to connect any desired number of subscribers. After finishing a conversation the calling subscriber reenergizes the line for a number of times sufficient to restore all of the ratchet-disks to the initial or zero position. As the ratchet-disk of his selecting device approaches zero a pin 70, projecting from the face of the disk, comes into contact with the spring-catch 18, effecting the disengagement of the latter from the locking-arm 16' of the switch 16 and the spring 17 of said switch causing a movement of the

latter to break the circuit between the local telephone and the main line. The pin 70 in traveling toward the right engages with the upper portion of the catch 18 and bends the latter backward until the pin is free to slide over the inclined top of the catch.

In Fig. 2, A, B, and C represent a number of local stations connected to a main-line wire 82, one end of which is grounded beyond the station A, while beyond the station C the main line is connected to a return 82', and in said return 82' there is located at each station a circuit-closing key 83, by which the return-wire may be connected to ground, and thus establish a ground-return to the line at station A. The key 83 is closed by the operator or subscriber for a number of times equal to the number of telephone with which he wishes to be connected. At each local station is a receiver-hook 85, from which the receiver is removed to establish a primary circuit through a transmitter 86 and local battery 87 and wire 88, connected to the primary of the induction-coil. The receiver-hook is provided with a vertically-disposed arm 89, which when the receiver is raised forces the contact-spring 90 into engagement with the contact 91, the latter forming a terminal of a wire 92, which is connected to the return-wire 82'. At each local station is a receiver 93, connected to a secondary line 94, of which the spring 90 forms a terminal, so that when the receiver is removed from the hook the secondary line will be connected by contact 91 and a wire 92 to the return-wire 82'. The opposite terminal of the secondary line 94 is formed by the several contacts 32, and under normal conditions the secondary is entirely disconnected from the line. A calling subscriber may place a portion of his secondary or circuit by means of the switch 16; but it will be remembered that this operation may be accomplished only when the disks are in zero position, the rib preventing this closing movement during any other position of the disk, so that after the line is in use no subscriber may close his switch and place his receiver in circuit. The several contacts 31 of the disk 30 are connected by the wire 81 to the main-line wire 82, and this main line is connected to the battery 87 and thence through the receiver-hook 85 to the electromagnet 24, which operates the ratchet-disk of the selecting mechanism, the line being thence continued to the next subscriber and being connected to the contact-spring 43 at said subscriber's station. The electromagnet 50 is connected in a shunt 48, leading from the contacts 32 to the main lines, and said electromagnets control local call-bells 95, which in the present instance are shown in separate circuit, having an independent battery 96, although, if desired, they may be connected to the local battery. Under ordinary circumstances the circuit may be traced from ground at station A



through the spindle 38 to one of the contacts 31, wire 81 to main line 82, battery 87, receiver-hook 85, magnet 24 to main line, and thence to the next subscriber, it being observed that the circuit is not closed to ground by any of the keys 83. When the subscriber A wishes to call subscriber C, he closes switch 16 and then operates the circuit-closing switch 83 the required number of times. At the first closing movement of the switch a circuit will be established from ground through main line, spindle 38, wire 81, main line 82, battery 87, receiver-hook 85, electromagnet 24 to main line, and thence following a similar course through the several local stations, returning by wire 82' to the key and thence to ground. This energizes the electromagnet 22 and the ratchet-disk is moved one tooth, bringing the contact-spring 42 into engagement with one of the contacts 32 at one station. When the circuit is again established by closing the key 83, it may be traced from ground through spindle 38, contact 32, the shunt 48, electromagnet 50 to main line, the remaining portion of the circuit being as previously described and again energizing the electromagnet 24 to move the ratchet-disk another tooth. It will be remembered that at the beginning of the operation the calling subscriber closes the switch 16 and that after the calling operation has commenced and the ratchet-disks have been moved from zero position no other subscriber may move his switch and connect the main line. The calling subscriber ceases operating the key when the ratchet-disk indicates that the number of the called subscriber occupies the zero position. At this time the contact-spring 42 of the called subscriber is in engagement with one of the contacts 32, while the contact-springs of all of the remaining subscribers are in engagement with the contacts 31, the disks being properly adjusted for this purpose. At the last closing operation the circuit is held closed for a considerable length of time, so as to keep the electromagnets 50 energized at the station of the called subscriber and allow sufficient time to overcome the inertia of the balance-wheel 60, after which the calling-circuit of the subscriber will be closed and the call-bell sounded. The momentary impulses of the electromagnets 50 at the different stations due to the closing of the key 83 will not effect the electromagnets 50 to an extent sufficient to overcome the inertia of the balance-wheels, so that the calling-circuits will not be closed until the circuit is held closed for a considerable length of time. Both receivers are now lifted from their hooks, and the arm 89 forces the spring 90 into engagement with the contact 91 of wire 92. A circuit may now be traced through the primary, transmitter, and battery at each local station, and starting, for convenience, at the switch 16 the line-circuit will be found through a branch 100, (in which may be placed a condenser 101,) main line 82, the

similar branch 100 of local station B, main line 82, the spindle 38 of station C, contact 32, secondary of station C, receiver 93, wire 94, contacts 90 and 91, wire 92, return-wire 82', wire 92 of station A, contacts 91 and 90, wire 94, receiver 93, secondary of station A to switch 16, it being observed that the contact of the calling subscriber is made through the switch 16, while the contact of the called subscriber is made through the contact 32.

The device forming the subject of the present invention may be used on various systems by suitable modifications in the wiring, such as will readily suggest themselves to persons skilled in the art.

Having thus described my invention, what I claim is—

1. In a telephone selecting device, the combination with the main and local telephone-lines, of a step-by-step ratchet-disk and means for operating the same, an auxiliary disk operable by the ratchet-disk and having a plurality of contacts for alternately closing the circuit through the main line and through the local telephone-line to thereby insure the proper closing of the circuit after an incomplete rotative movement of said auxiliary disk.

2. In a telephone selecting device, the combination with a step-by-step ratchet-disk and means for operating the same, an auxiliary circuit-closing disk, and an adjustable means for transmitting a definite rotative movement to the auxiliary disk by a greater or less rotative movement of the ratchet-disk.

3. In a telephone selecting device, a step-by-step ratchet-disk and means for operating the same, of an auxiliary circuit-closing disk having radially-disposed arms, and projecting pins carried by the ratchet-disk for engagement with said arms.

4. In a telephone selecting device, the combination with the main and local telephone-lines, of a ratchet-disk and means for operating the same, an auxiliary circuit-closing disk having a contact-spring connected in the main line, means for connecting the ratchet-disk and the circuit-closing disk to operate the latter, and a plurality of contact-blocks connected alternately in the main line and in the local telephone-line, said contact-blocks being disposed in the path of movement of the contact-spring carried by the disk.

5. In a telephone selecting device, the combination of the disk having an annular flange projecting from one face thereof and provided with an interrupted portion at the zero-mark of the disk, a switch for opening and closing the circuit between the main and the local telephone-lines, said switch having an arm movable across the path of said annular flange when the disk is in zero position, means for locking said switch in closed position, and means for automatically opening the switch on the return of the disk to zero position.



6. In a telephone selecting device, the combination of the main and local lines, of an annular series of contact-blocks connected alternately to the main and the local telephone-  
5 lines, a contact-spring carried by the disk and forming a terminal of the main line and means for rotating said disk to bring the contact-spring successively into contact with said blocks.

10 7. The combination with a selecting device, of a pair of electromagnets arranged in the local telephone-circuit controlled by the selecting device, an auxiliary normally open circuit including a call-bell and means for op-  
15 erating the same, a fixed post forming one

terminal of said circuit, a pivoted arm having a finger forming the opposite terminal of said circuit, a segmental rack carried by said arm, a pinion intermeshing with the rack, a balance-wheel movable with the pinion, an arma- 20  
ture arranged within the field of force of the electromagnets, and a spring connecting said armature to said pivoted arm.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in 25  
the presence of two witnesses.

LAWRENCE E. BROCK.

Witnesses:

CHARLES S. YOUNGER,  
ALBERT METZNER.