

R. C. M. HASTINGS.
TELEPHONE SYSTEM.

APPLICATION FILED APR. 22, 1912.

Patented May 20, 1913.

4 SHEETS—SHEET 1.

1,062,004.

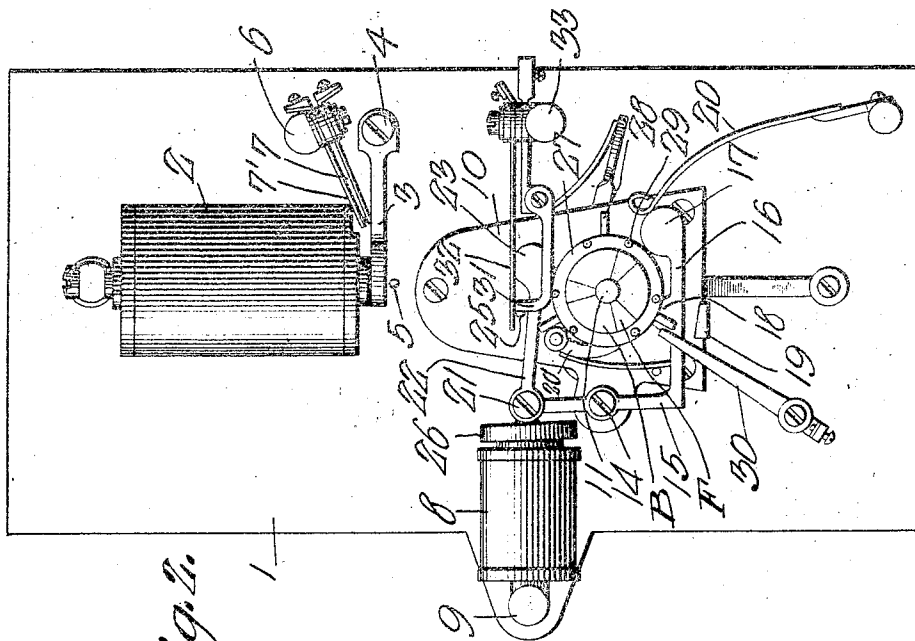


Fig. 2.

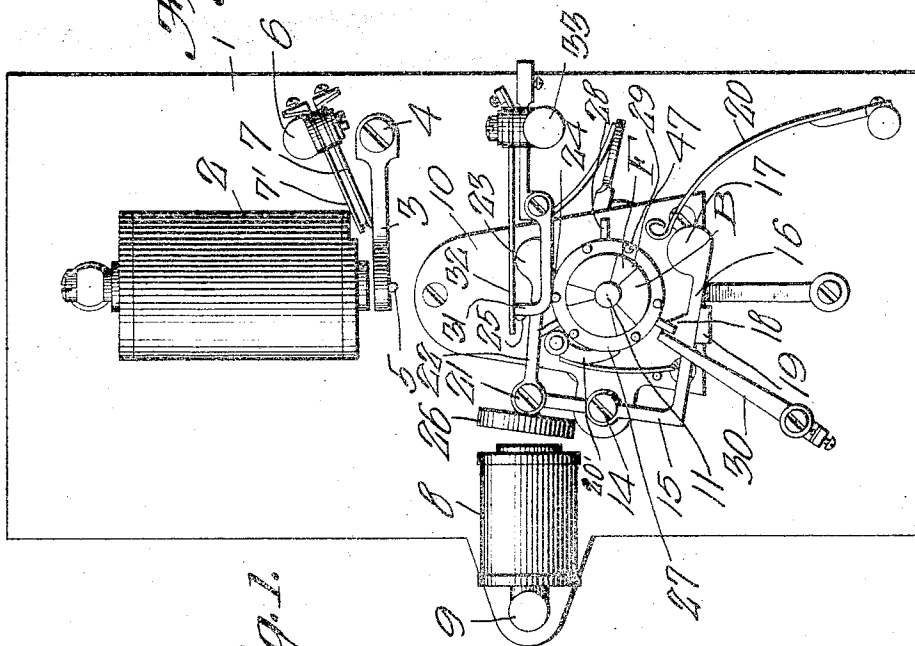


Fig. 1.

Witnesses

J. P. Tomlin
L. H. Wilcox

R. C. M. Hastings Inventor

by *C. A. Snow & Co.*
Attorneys

1,062,004.

R. C. M. HASTINGS.
TELEPHONE SYSTEM.
APPLICATION FILED APR. 22, 1912.

Patented May 20, 1913.

4 SHEETS—SHEET 2.

Fig. 5.

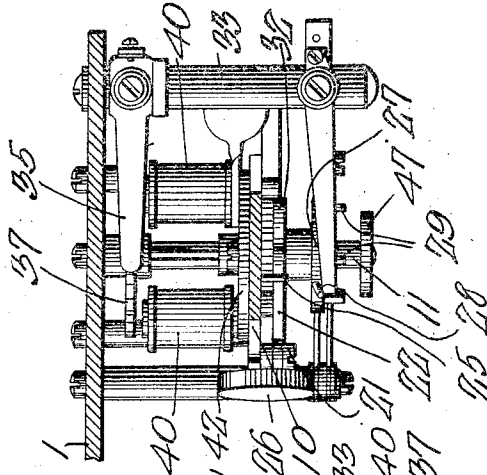


Fig. 4.

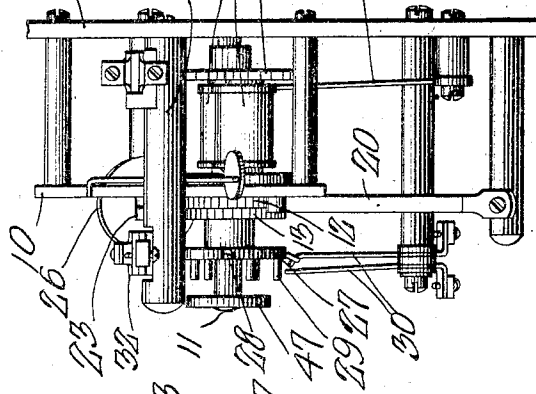
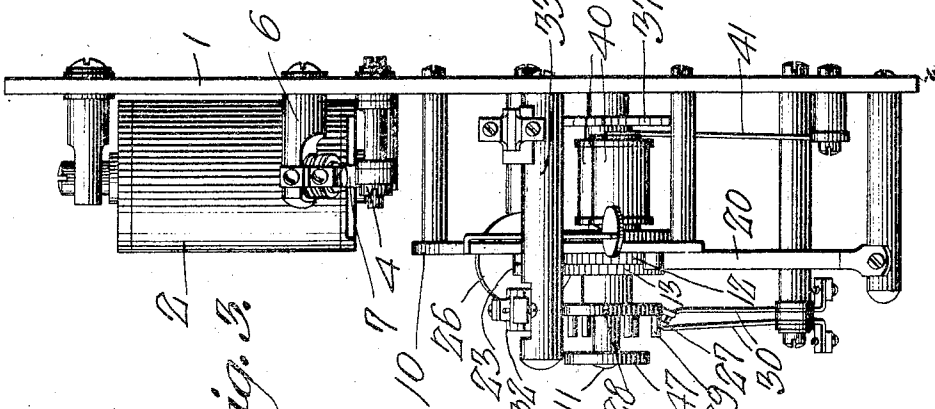


Fig. 3.



Witnesses
J. R. Towne
L. H. W. Chow

R. C. M. Hastings Inventor
by *C. A. Snow & Co.* Attorneys

R. C. M. HASTINGS.
TELEPHONE SYSTEM.
APPLICATION FILED APR. 22, 1912.

1,062,004.

Patented May 20, 1913.

4 SHEETS—SHEET 3.

Fig. 8.

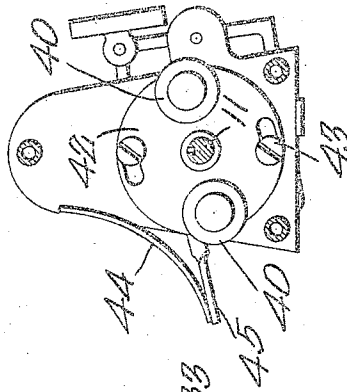


Fig. 10.
34
35
36

Fig. 7.

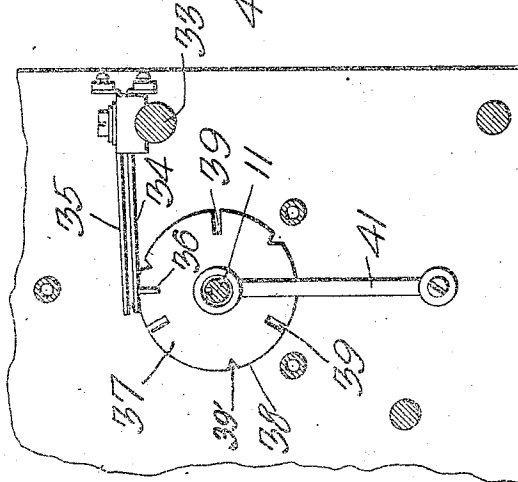


Fig. 6.

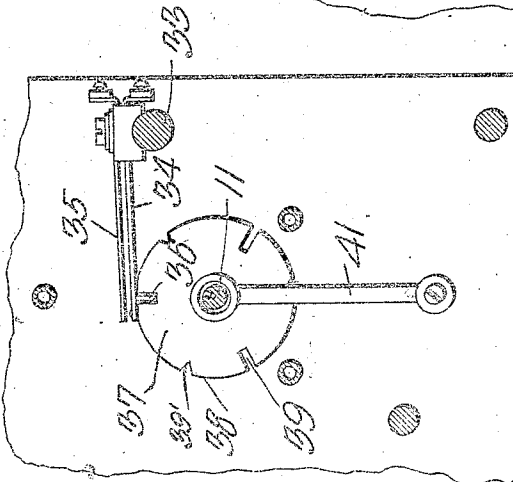
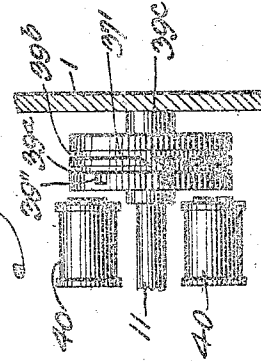


Fig. 11.



Witnesses

J. H. Wilson
L. H. Wilson

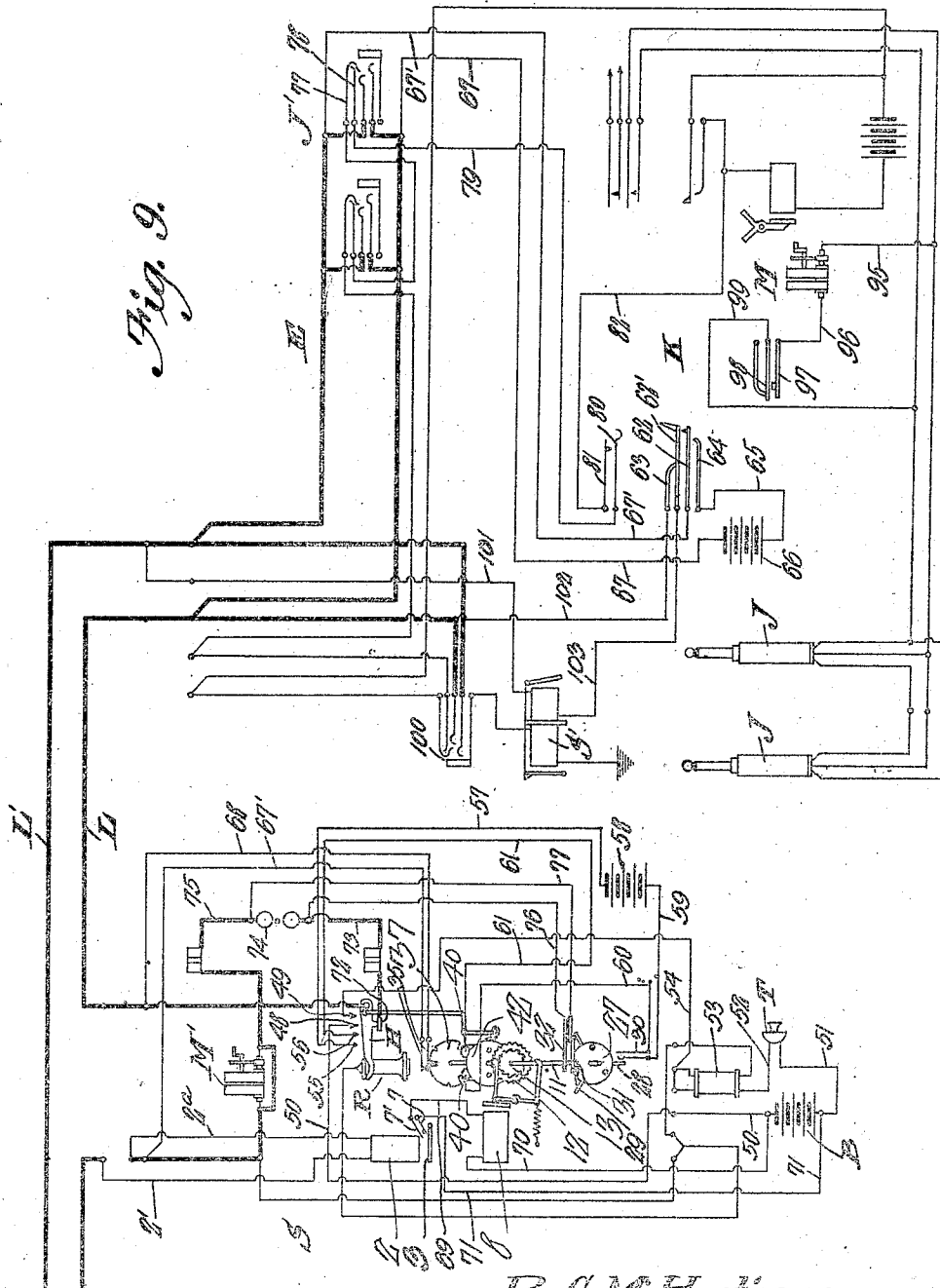
R. C. M. Hastings Inventor
by *C. A. Snow & Co.* Attorneys

1,062,004.

Patented May 20, 1913.

4 SHEETS-SHEET 4.

Fig. 9.



Witnesses

J. R. Tomlin
L. H. Wilcox

R. C. M. Hastings Inventor
 by *C. A. Snow & Co.* Attorneys

UNITED STATES PATENT OFFICE.

RUBEN C. M. HASTINGS, OF COLUMBUS, OHIO, ASSIGNOR TO THE INTERNATIONAL TELEPHONE CO., OF COLUMBUS, OHIO.

TELEPHONE SYSTEM.

1,062,004.

Specification of Letters Patent.

Patented May 20, 1913.

Application filed April 22, 1912. Serial No. 692,467.

To all whom it may concern:

Be it known that I, RUBEN C. M. HASTINGS, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Telephone System, of which the following is a specification.

The present invention relates to an improved device for locking out or shunting the instruments in a subscriber's set in a telephone system, the same being an automatic and synchronous device controlled by the manipulation of a selecting key mounted at the central or exchange of a telephone system, whereby only two subscribers may be placed in telephonic communication at a time, the other subscribers being shunted from the line, so that their instruments are "dead", a signal visually displayed indicating to such shunted subscribers that the line is "busy". This particular form of device is adapted to be used in lieu of the device shown and described in an application for a selective system of telephony filed August 29, 1911, Serial Number 646,697, and particularly set forth in an application filed on even date herewith, Serial Number 692,466 these devices being if desired interchangeable but being particularly desirable for use on party lines in hotels, offices, suburbs and outlying systems.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings—Figure 1 is a front elevation of the device in normal position. Fig. 2 is a similar view with the parts in locking out position, both electromagnets being energized. Fig. 3 is a view taken from the right as viewed in Fig. 1. Fig. 4 is a similar view with the main electromagnet and its support taken away, with the locking out mechanism in the position to permit the shunting disk to rotate a predetermined distance without actuating the shunting contacts. Fig. 5 is a top plan view thereof. Fig. 6 is a sectional view showing the shunting disk with the parts ready for

locking out. Fig. 7 is a sectional view showing the shunting disk in front elevation with the contacts in shunt operating position. Fig. 8 is an elevation of the shunting disk operating electromagnets and their support. Fig. 9 is a diagrammatic view of a loop circuit telephone system with an exchange and subscriber's station, with the present lock out device shown in diagram therein. Fig. 10 is a detail sectional view of the shunting disk actuating cut-out and its pin and lug. Fig. 11 is a detail view showing a modified form of contact controlling disk.

Referring to the drawings, the numeral 1 designates the main supporting plate having mounted fixedly upon one side thereof near its upper end an electromagnet or relay 2, which is connected in the line and operable from the central or exchange through the medium of the selecting key set forth in detail in an application filed even date herewith, Serial No. 692,465 said relay 2 actuating the armature 3 which is pivotally mounted to the post 4, and is limited in its downward movement by the pin 5 disposed below and in line with the core of the relay, whereby upon the deenergization of the relay, the armature falls by gravity. Supported by the plate 1, to one side of the relay and above the armature's pivoting post 4, is a post 6, carrying the two spring terminal contacts 7 and 7', which are connected to the local battery circuit at the subscriber's set, and are disposed to have their terminals closed by the armature 3 when attracted by the energization of the relay, this action closing a battery circuit including the electromagnet 8, carried by the post 9, intermediate of the length of the main plate 1, and to one side of and below the relay 2.

Connected in spaced relation to the main plate 1 and mounted to retain and support the main apparatus of the device is a frame 10, a shaft 11 being journaled therein and to the main plate 1, its outer end extending exteriorly of the frame and carrying thereon adjacent the frame the two ratchet wheels 12 and 13, the inner one 12 being the operating ratchet and the outer one 13 the arresting or retrograde movement preventing ratchet. Pivoted at 14 to the frame 10 is a double lever 15, having formed integral therewith at its lower end an arm or pawl 16, having the weighted outer end 17 and the tooth 18 which is adapted to engage the

ratchet 13 and prevent overrun movement and to also prevent a retrograde movement thereof. The lug 19 carried by the frame 10 limits the downward movement of the pawl 16, while the flat spring 20 assists in returning the same against the lug 19. Pivoted at 21 to the upper end of the lever 15 is an arm or pawl 22, having the weighted terminal 23 and the ratchet engaging tooth 24, the pin 25 limiting the upward movement of the pawl and retaining it in such position as to also be in operable relation to the ratchet 12. A pawl 20' prevents the shaft 11 from slipping when not actuated by the pawl 22.

In order to electrically control the pawls 15 and 22 to actuate the ratchets 12 and 13 and consequently rotate the shaft 11, an armature 26 is attached to the lever at 21, and in line with the core of the electromagnet 8, which when energized attracts said armature and simultaneously operates the two pawls to rotate the shaft the distance of one tooth of the ratchet upon each energization of the electromagnet 8. Carried upon the shaft 11, beyond the ratchets, is a disk 27 having the peripheral pins 28 and the facial pins 29, the peripheral pins being in the path of and to engage and close the pair of spring terminal contacts 30, while the facial pins are adapted to engage the pivoted arm 31 to raise the same to engage the spring terminal contact 32 and close its circuit, this construction being identical with that shown in application Serial No. 692,466 above referred to.

Mounted upon the post 33 near the plate 1 is the pair of spring terminal contacts 34 and 35, the free end of the contact 34 being provided with a lock pin 36 and a lug 36', which normally lie near the face and upon the periphery of the disk 37, which is slidably mounted upon the shaft 11 near the plate 1, but is keyed thereon for rotation therewith, the periphery 38 of this disk being provided at equi-distant points with the slots 39 of sufficient size to permit the lock pin 36 to fit therein. Thus when the two electromagnets 40 are energized to attract the disk 37 against the tension of the flat spring 41, so that the disk 37 is held against this pin 36, at the very instant that the disk 37 has been rotated a sufficient distance to cause the slot 39 to align with the pin 36 at what is termed zero position, the disk then moves, to throw the pin 36 within the slot 39 and thereby permits the pin 36 to pass upon the other side of the disk so that the toothed periphery of the disk can rotate and not affect the contacts 34 and 35.

When the disk 37 has rotated a sufficient distance to bring the next slot 39 to align with the pin 36, and the electromagnets 40 are deenergized, the spring 41 will cause the disk 37 to be moved so that the pin 36

passes through the slot 39 upon the opposite side of the disk, the lug 36' of the contact 34, now resting upon the peripheral teeth of the disk 37, so that as the disk is rotated until it reaches the next zero position, the contacts 34 and 35 are opened and closed and the various instruments shunted.

The electromagnets 40 are carried upon the disk 42 mounted so as to be capable of a slight oscillatory movement upon the shaft 11 within the frame 10, the slot-and-pin connection 43 limiting the movement of the disk 42 and its electromagnet 40, because the attracting or contact between the cores and the disk 37 is sufficient to produce an adherence of them to the disk, the electromagnets are permitted to be moved a slight distance without impeding the operation of the shaft 11, the spring 44 and arm 45 returning the disk 42 and the electromagnets 40 to the initial position at each deenergization thereof.

The disk 37 and the terminal contacts 34 and 35 and the subscriber's instrument form shunting means, and when the contacts are closed, the transmitter and receiver of the respective sets are shunted or locked out of the line, being cut off from all battery source so as to be what is termed "dead."

In order to indicate to the respective subscribers the condition of their instruments and whether the line is free or busy, a disk 47 is mounted upon the extreme outer end of the shaft 11 and visible to the subscriber to indicate visually the signals F and B, through an aperture in the instrument not shown. By this means it is evident that this shunting or locking out device may be applied to systems now in use, or in the particular system set forth in the copending application, Serial No. 646,697, and that its operation will be controlled synchronously with the selecting apparatus mounted at the exchange or central station, and that when a calling and called subscriber are in telephonic communication, all the remaining subscribers are locked out, and better still, are shunted entirely from the line, the removal of the receiver from the hook in the locked out instruments not in any way affecting the line. In other words, the transmitter and receiver at the locked out subscribers' sets are "dead."

In order that the complete operation of the present device may be fully understood and its advantages appreciated, the diagram as shown in Fig. 9, will be traced in detail from the calling of the exchange to the completion of the conversation of the calling and called subscribers.

With the parts in the position as shown in Fig. 9, and assuming that a subscriber desires to call the exchange to be placed into communication with another subscriber, the magneto M' is operated and in turn actu-

ates the signal device S', at the exchange E, through the following circuit: the receiver hook H, the contact point 72, the conductor 73, the subscriber's call-up alarm 74, the conductors 75 and 2', the relay 2, the conductor 2', the line L', the conductor 101, the signal device S', the conductor 103, the contact 62', the contact 63, controlled by the selecting key K, and the conductor 102. Thus the exchange will be notified that a subscriber is calling and one of the jack plugs J is inserted in the jack socket 100 and the exchange is placed in communication with the calling subscriber, who after operating the magneto has removed the receiver R, from the hook H. The receiver hook H rising opens the contact at 72 and connects the local battery circuit to the line as follows: the hook H, the contacts 48—49, the conductor 50, the local battery B, the conductor 51, the transmitter T, the conductor 52, the coil 53 and the conductor 54. After the subscriber has requested the exchange to connect him with a selective subscriber, the exchange operator places the other jack plug J in the calling socket J', and then manipulates the key K. The contacts 62—62', are moved in the opposite direction so that contacts are alternately made at 62—64, and 62'—63, thus permitting the contacts 62—64 to close an intermittent circuit to the line as follows: the contact 64, the conductor 65, the batteries 66, the conductor 67, the line L, the receiver hook H, the conductor 73, the call alarm 74, the conductor 75, the conductor 2' in all subscribers' sets S, the relay 2, the conductor 2', the line L', the conductor 67', and the contact 62. Thus the relay 2 is intermittently energized in all sets and actuates the armature 3. The armature 3 in each set closes the contacts 7—7', and closes the following circuit: the contact 7', the conductor 69, the electromagnet 8, the conductor 70, the battery B, the conductor 71, and the contact 7. By this circuit all electromagnets 8 are intermittently energized and deenergized, to actuate the pawls 15 and 22 and thus rotate the shafts 11 in all sets.

In all sets, but the calling and called sets, the disk 37 will close contacts 35, and thus shunt the uncalled sets from the lines L—L', through the conductors 67', the contacts 35 and the conductor 68, which as shown is bridged across the line and isolates the uncalled local battery circuits from the line. At the same time, the indicators F—B, will visually advise the uncalled sets by displaying the segment B to indicate that the line is busy.

When the disk 37 was at zero position with all pins 36 in line with the radial slot 39, as shown in Fig. 6, the lifting of the hook in the calling set bridged the contacts 55—56, so that the energization of the relay

2 and the electromagnet 8 in the calling set due to the manipulation of the key K, rotates the shafts 11, to cause the pins 28 to close the contacts 30, but as the hooks in all but the calling sets were down, the electromagnets 40 are not affected. In the calling set, however, the electromagnets 40 were energized through the following circuit: the receiver hook H, the contacts 55—56, the conductor 57, the battery 58, the conductor 59, the contacts 30, the conductor 60, the electromagnet 40, and the conductor 61. The electromagnet 40 being energized attracted the disk 37 and moved the same against the tension of the spring 41, and so that the pins 36 in the calling set passed through the slot 39 and as the disk 37 was also rotated with the shaft 11, the pin 36 passed upon the rear face of the disk 37, so that the lug 36' was placed out of contact with the periphery of the disk 37.

In all other sets, the lug 36', rode upon the periphery, and when the notch 39', of the called set arrived in line with the lug 36', the lug 36' seated therein and thus opened the shunt connection 67—68 at contacts 35, while the contacts 35 in all uncalled sets remained closed, due to the periphery of the disk 37 holding the lug 36' raised and consequently the contacts 35 closed. The call-up machine M at the exchange is now manipulated, and as it is connected to the main conductor of the jack plug J, through the conductor 95, the conductor 96, the contacts 97 and 98, and the conductor 99, the call-up alarm 74 in the called set is actuated, while the call-up alarm in the uncalled set due to the shunt conductors 76—77 and contacts 32, now closed by the pin 29, are shunted from the line and are not affected.

At the end of the conversation, the placing of the calling and called receivers upon the hooks H, lowers them, opening contacts 48—49 and 55—56 and as the exchange knows that the conversation is at an end, the jack plugs J are removed from the socket 100 and J', to permit the selecting key K to return to initial position and actuate the contacts 62, 64, to step the shaft 11, in all sets to initial position, thus connecting all shunted sets to the line as well as the called and calling sets.

In Fig. 11, the disk 37', is employed in lieu of the disk 37, the same having the two circumferential grooves 39^a and 39^b, which correspond to the two faces of the disk 37 for the guidance of the pin 36, the notches 39'', corresponding to the notches 39' of the disk for the reception of the lug 36', while the spaces 39^c correspond and act similarly to the slots 39, for the guidance of the pins 36, in the calling set.

What is claimed is:

1. The combination, in a telephone substation, a receiver, a transmitter, a local bat-

tery circuit, and a shunting and lock-out device, said last device having a shaft rotatably supported, a pawl-and-ratchet device for operating said shaft, an electro-magnetically operated means for actuating said pawl-and-ratchet device to impart to the shaft a step-by-step movement, means controlled by the shaft to open the local battery circuit, and a line shunt for shunting the sub-station from the line, said shunt and local battery circuit being operated alternately to be connected and disconnected from the line by the movement of the shaft.

2. In a telephone system, a line controlled relay, and a sub-station having a local circuit, a transmitter and a receiver, a normally open shunt to, when closed, isolate the sub-station from the line, a pair of co-acting terminals in said shunt, and means for actuating said terminals controlled through the line control relay for opening and closing said shunt, said means comprising a rotatable shaft, a toothed disk carried by the shaft, and capable of a sliding movement thereon, one of said terminals being normally in contact with the toothed portion of the disk, a lock carried by said terminal engaging the disk, an electromagnet disposed to slide the disk to cause the disk to engage the lock of the terminal during the rotation of the shaft and disk, means actuated by the line relay for imparting to the shaft and disk a step-by-step movement, a circuit controlling the last electromagnet, and means operated by the shaft for alternately opening and closing the last circuit, the shaft during its rotation alternately opening and closing the shunt and the last circuit.

3. In a telephone system, an exchange station and a sub-station connected for the transmission of intelligence, a selecting device at the exchange station, a line relay at the sub-station and a normally opened shunt connection around the sub-station to the line; said sub-station having a transmitter, a receiver, a receiver hook, a local battery circuit, an electromagnet, an open circuit including said electromagnet, said circuit being controlled by the line relay from the exchange station, a rotatable mechanism controlled by the electromagnet to open and close the shunt connection, and an electromagnet and spring actuated means for controlling the shunt connection opening and closing mechanism.

4. In a telephone system, an exchange station and a sub-station connected for the transmission of intelligence, a selecting device at the exchange station, a line relay at the sub-station and a normally opened shunt connection around the sub-station to the line; said sub-station having a transmitter, a receiver, a receiver hook, a local battery

circuit, an electromagnet, an open circuit including said electromagnet, said circuit being controlled by the line relay from the exchange station, a rotatable mechanism controlled by the electromagnet to open and close the shunt connection, and having a slidable member thereon to regulate the opening and closing of the shunt connection, and a circuit including a battery, an electromagnet, and two sets of contacts controlled respectively by the receiver hook and rotatable mechanism to operate the sliding member to regulate the closure of the shunt connection.

5. In a telephone system, an exchange station and a sub-station connected for the transmission of intelligence, a selecting device at the exchange station, a line relay at the sub-station and a normally opened shunt connection around the sub-station to the line; said sub-station having a transmitter, a receiver, a receiver hook, a local battery circuit, an electromagnet, an open circuit including said electromagnet, said circuit being controlled by the line relay from the exchange station, a rotatable shaft controlled by the electromagnet, a disk slidable thereon and rotatable therewith to open and close the shunt connection, and an electromagnet and spring actuated means for sliding the disk to effect the opening and closing of the shunt connection.

6. In a telephone system, an exchange station and a sub-station connected for the transmission of intelligence, a selecting device at the exchange station, a line relay at the sub-station and a normally opened shunt connection around the sub-station to the line; said sub-station having a transmitter, a receiver, a receiver hook, a local battery circuit, an electromagnet, an open circuit including said electromagnet, said circuit being controlled by the line relay from the exchange station, a rotatable shaft controlled by the electromagnet, a notched disk slidably mounted upon and rotatable with the shaft, the terminals of the shunt connection normally engaging the periphery of the disk, and controlled thereby, and a circuit including a battery, an electromagnet, and two pairs of contacts controlled respectively by the receiver hook and shaft to operate the sliding disk to regulate the position of the disk, relatively to the terminals of the shunt connection.

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

RUBEN C. M. HASTINGS.

Witnesses:

L. A. KOONS,

E. C. WOODMONT.