S. S. STOLP.

MEASURED SERVICE TELEPHONE SYSTEM.

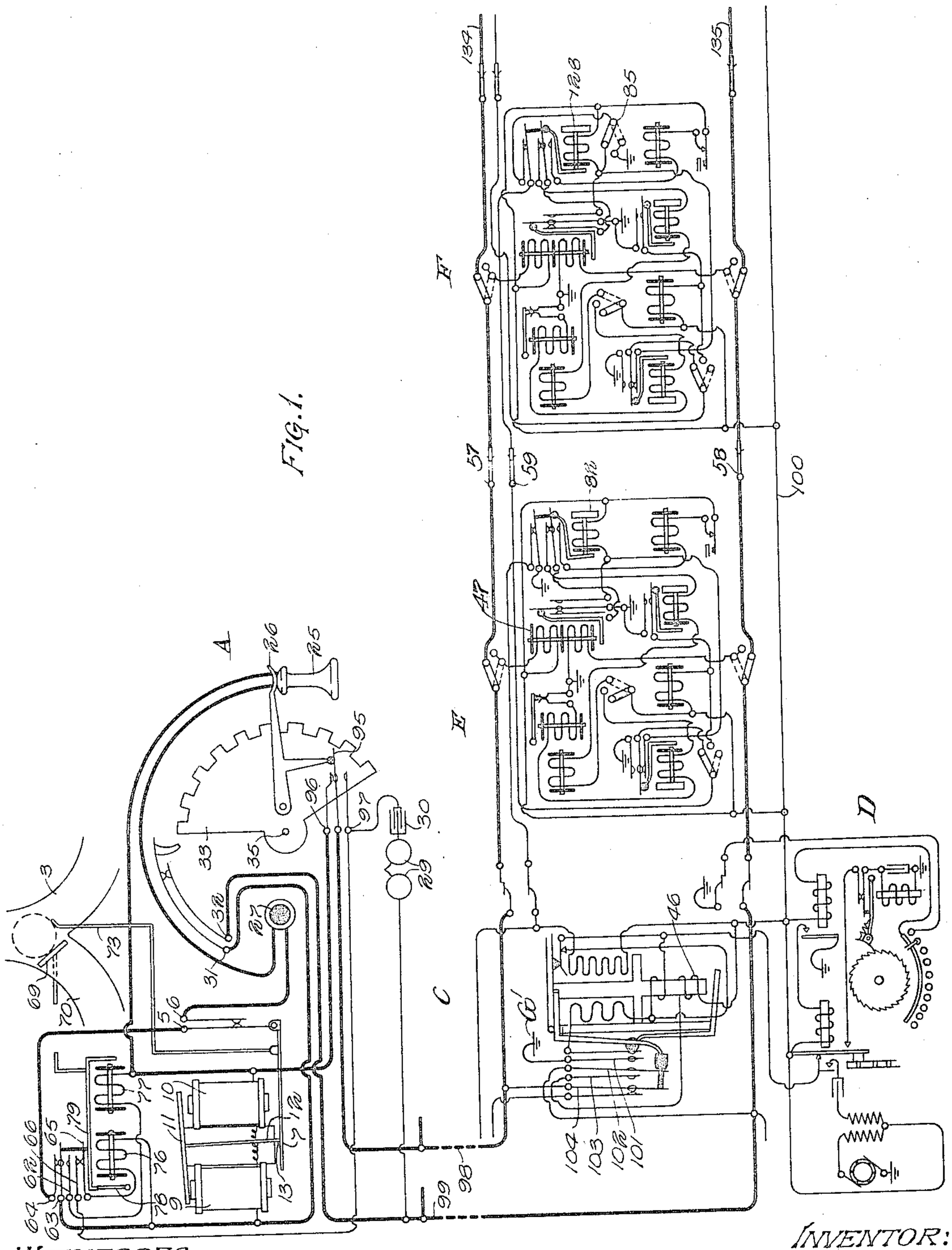
APPLICATION FILED FEB. 29, 1912.

1,254,083.

Patented Jan. 22, 1918.

3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES

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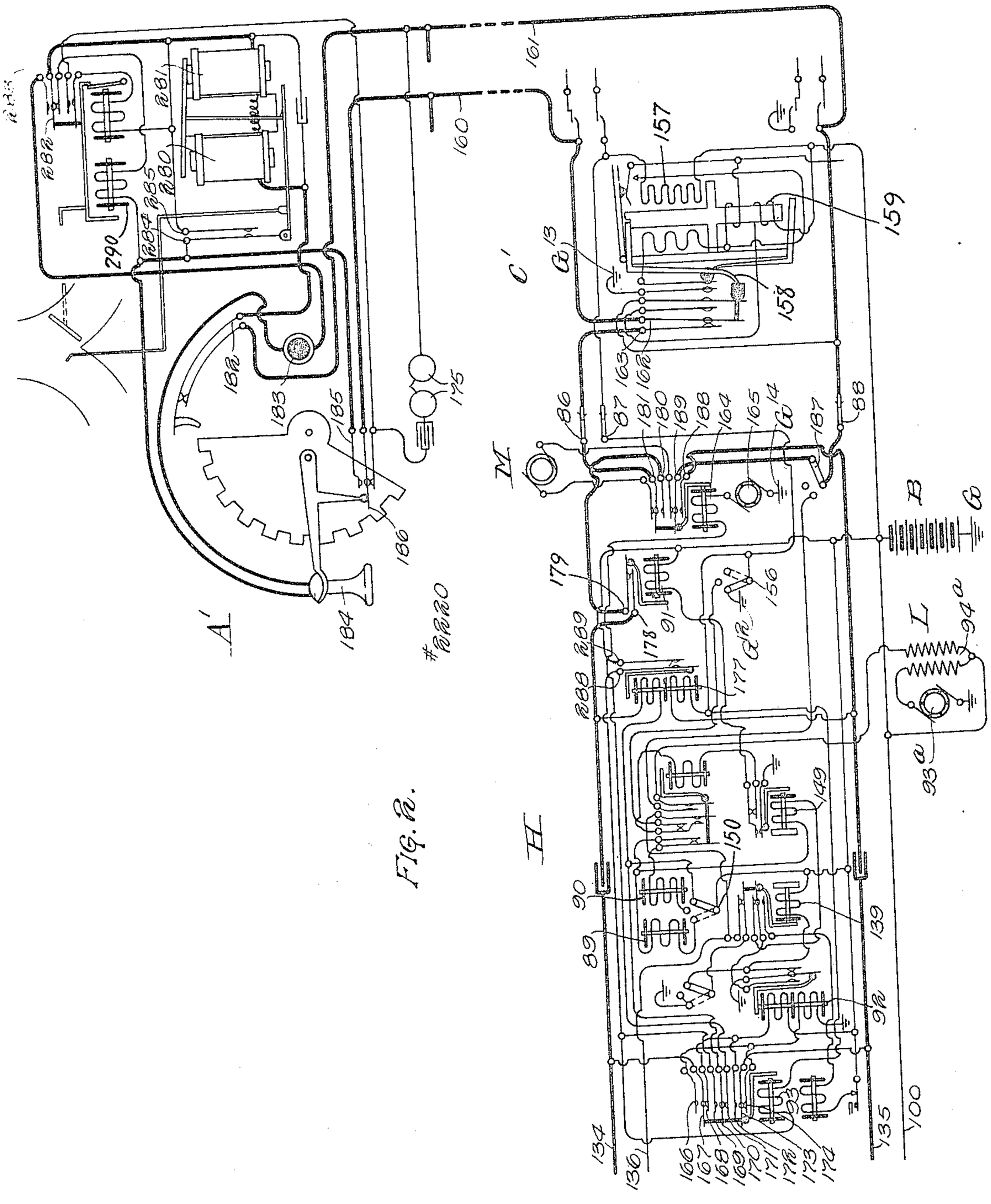

Fig. 2.

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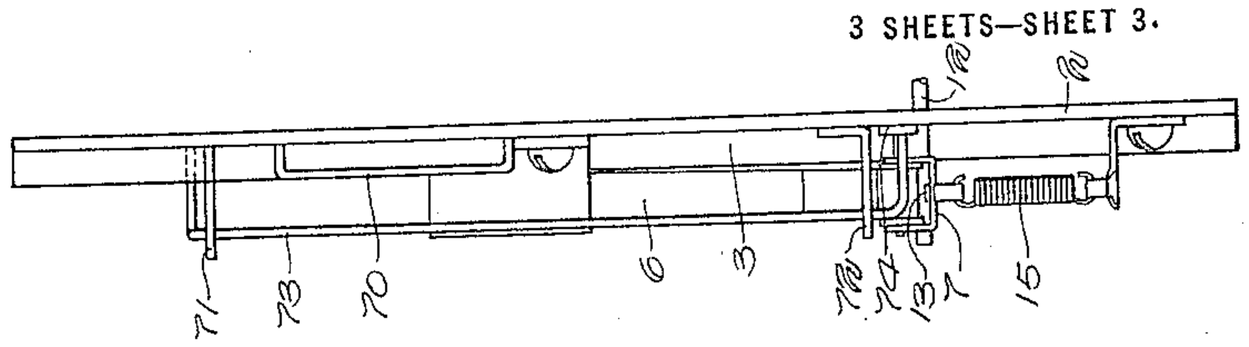


FIG. 6.

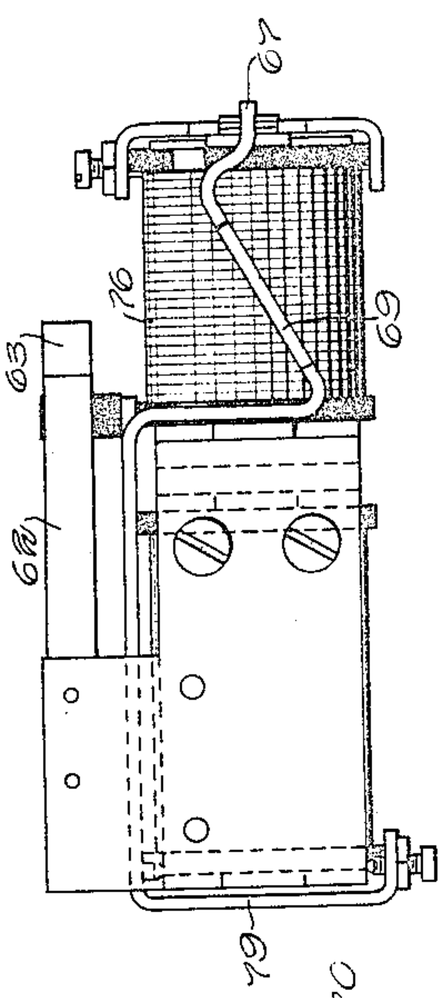


FIG. 5.

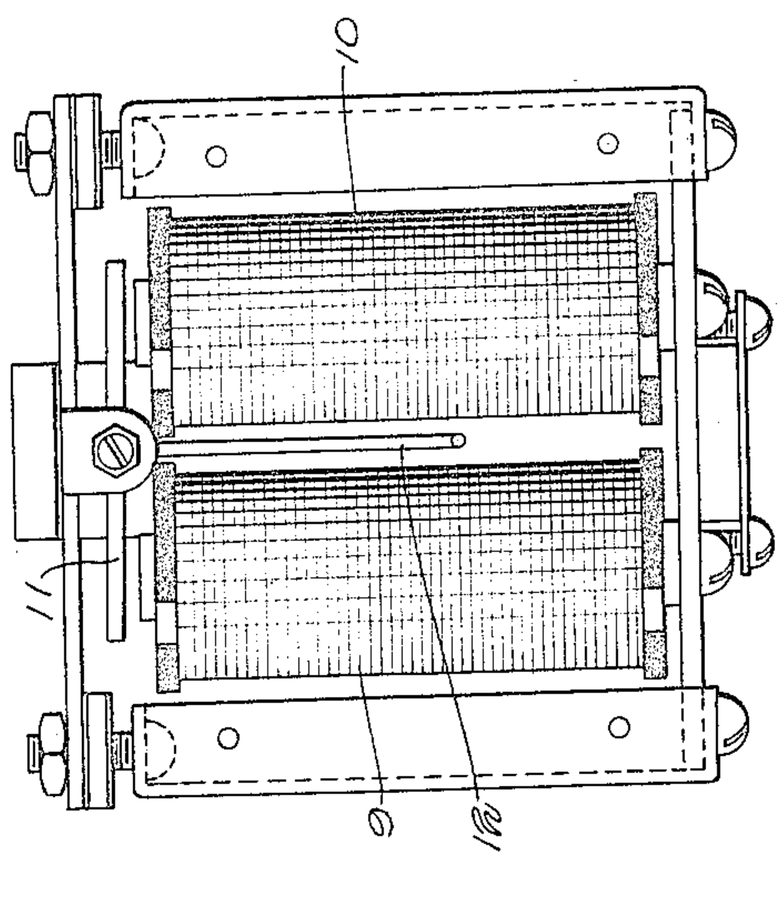
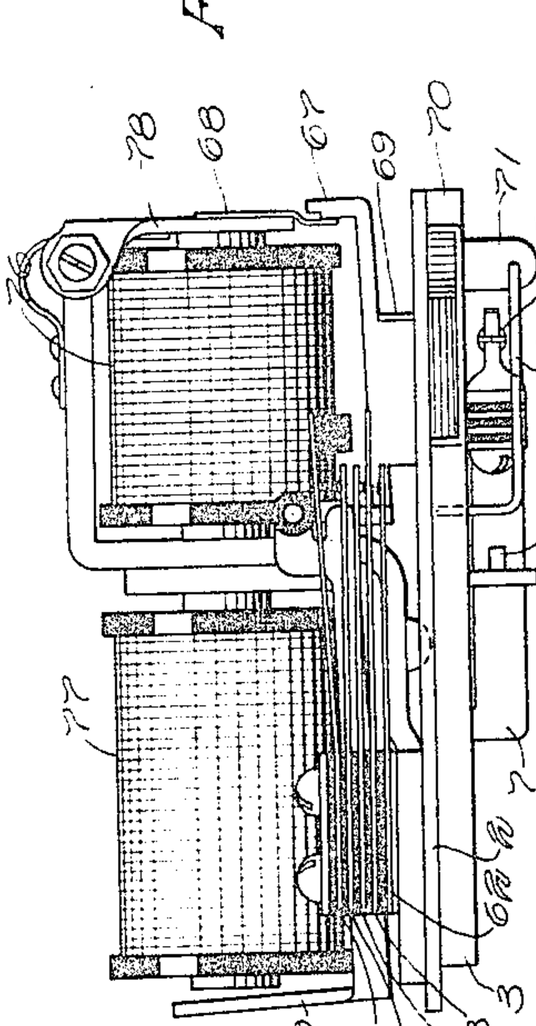


FIG. 4.



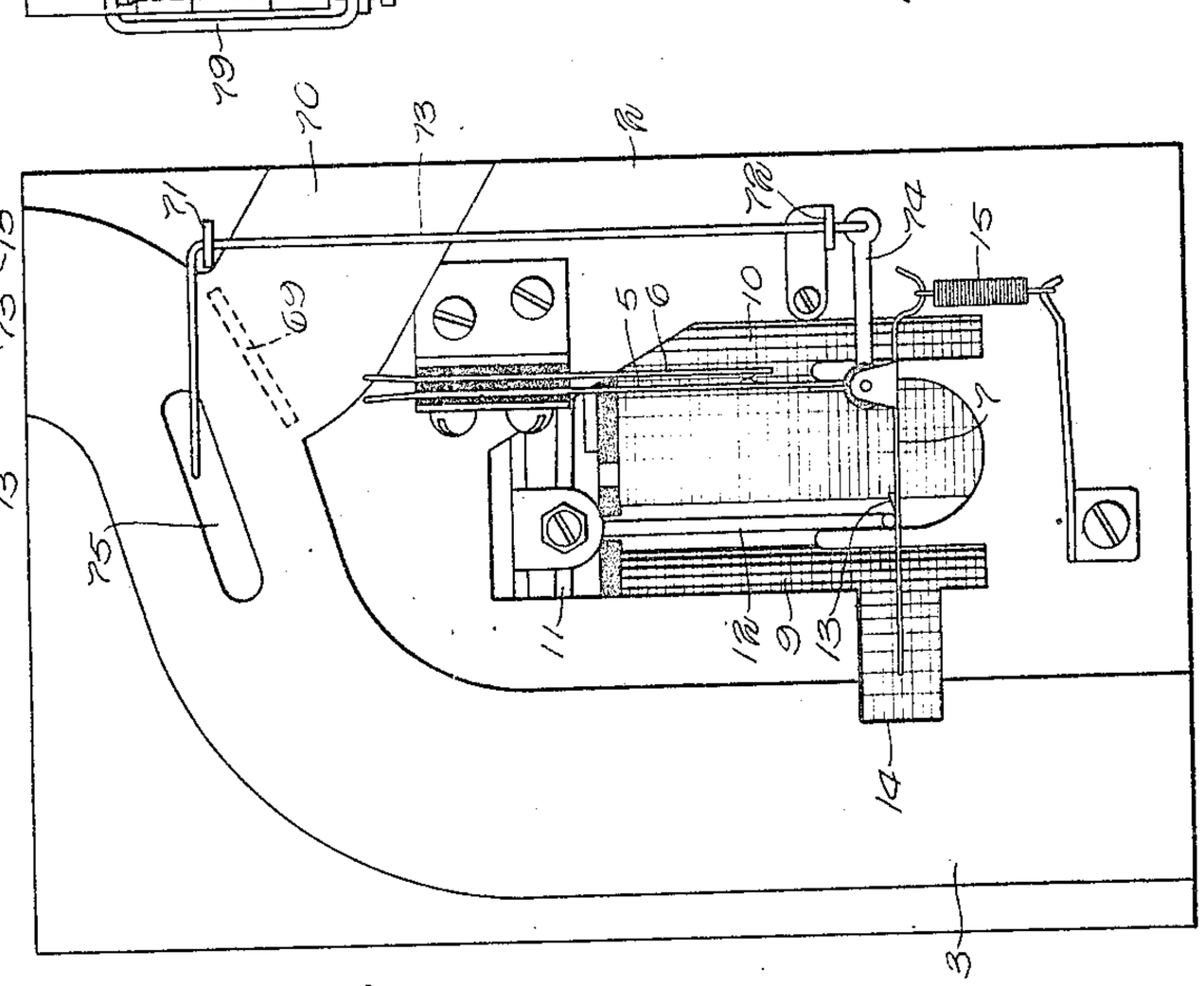


FIG. 3.

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MEASURED-SERVICE TELEPHONE SYSTEM.

1,254,083. Specification of Letters Patent. Patented Jan. 22, 1918.

Application filed February 29, 1912. Serial No. 680,691.

To all whom it may concern:

Be it known that I, SAMUEL S. STOLP, a citizen of the United States of America, and resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Measured-Service Telephone Systems, of which the following is a specification.

My invention relates to a measured service telephone system, and more particularly to a party-line measured service system in which means are provided for preventing one subscriber from coming in on the line when such line has been taken for use by another subscriber upon the same line.

One of the objects of my invention are to provide an improved coin-controlled device which is operated by reversal of current in the calling line upon the response of the called subscriber, and which coin-controlled device is provided with a return chute whereby the coin, if deposited before the call is completed, will be held in suspense either until the called subscriber answers, or until the receiver at the calling substation is hung up. If the called subscriber answers, the coin is collected. If the receiver of the calling subscriber is hung up before the called subscriber answers, the coin is returned to the calling subscriber through the return chute.

A further object of my invention is to provide a combined lock-out and coin-collecting device for use in giving measured service upon party-lines—that is, I provide a coin-collecting device in which the operating magnets thereof control means for locking out or preventing other subscribers on a party-line from coming in on said line while the same is in use.

These and other objects of my invention will be more readily understood by reference to the accompanying drawings, in which—

Figures 1 and 2 taken together represent a complete connection between a calling substation A (Fig. 1) and a called substation A′ (Fig. 2) in a system embodying the principles of my invention. In Fig. 1 there is represented an automatic substation A to the line conductors of which there is connected at the central office an individual or line switch C. At D there is shown a master switch for controlling a group of line switches C. The line switches of this group have common access to a number of trunk lines which lead to first selectors E. A number of first selectors have common access to a number of second selectors F, which in turn have access to connector switches H (Fig. 2) by means of which connection may be completed with subscribers' lines.

Fig. 3 is a front view of my improved substation coin-collecting and lock-out device.

Fig. 4 is a top view of the same.

Fig. 5 is a front view with the plate 2 (Fig. 3) removed.

Fig. 6 is a side view of the base plate 2 (Fig. 3), together with the apparatus mounted on the front thereof.

The system represented herein is a polystation line system—that is, a system in which a plurality of substations is connected to each line. There is shown herein only one substation (A and A′) upon each line, but it will be understood that any desired number of substations may be connected to each line in multiple with the station shown. For the broader purposes of my invention these lines may be considered either as so-called extension lines or party-lines. By an "extension line" is meant a line to which there is connected a plurality of substations, all the substations, however, belonging to the same subscriber and any call to the line being adapted to be answered at any substation. By a "party-line" is generally meant a line to which there is connected a plurality of substations, each substation, however, belonging to a different subscriber and the calls over said line being directed to some particular station. There are in use several well-known methods of signaling the subscribers on a party-line selectively in a system of the kind represented herein, any one of which may be used without departing from the spirit of my invention. The most generally known and used method of signaling the subscribers selectively is that shown in British patent to T. G. Martin, No. 1,299 of 1910, in which each line is accessible through as many groups of connector switches as there are subscribers on each line, each group of connectors being supplied with ringing current of a different character, and the ringers of the substations being each tuned or otherwise adapted to respond to a different character of ringing current.

Referring to Figs. 3, 4, 5 and 6, the con-

struction of the coin-collecting and lock-out device is as follows: The mechanism is mounted upon a base plate 2. Upon the front of the plate 2 there is attached a coin chute 3 which leads downward into a coin receptacle of any desired form and a return chute 70 which leads to the outside of the inclosing case. Also upon the front of the plate, but insulated therefrom and from each other, there is mounted a pair of contact springs 5 and 6. The lower end of the spring 5 carries a swinging arm 7. Back of the plate 2 there is mounted a polarized electromagnet comprising two coils 9 and 10 and the armature 11. Secured to the armature 11 there is a downwardly projecting arm 12. The lower end of the arm 12 is bent forward above the arm 7. When the end of the armature 11 is attracted downward toward the coil 9, the lower end of the arm 12 is brought behind a small lug 13 on the arm 7. If, now, the armature 11 be tipped downward toward the coil 10, the end of the arm 12 engages the lug 13 and carries the arm 7 to the left. When the arm 7 is thus moved, its left end projects into an opening 14 in the side of the coin chute, while at the same time the spring 5 is disengaged from the spring 6. If a coin be dropped down the chute while the arm 7 is in this position, it will strike the end of said arm and release the lug 13 from the arm 12, whereby the spring 5 is permitted to return to its normal position in engagement with the spring 6. After the arm 7 has been released it cannot be drawn over again until the electromagnet has been energized in the reverse direction to again bring the arm 12 behind the lug 13. Upon the front of the plate 2 there are also two lugs 71 and 72 through which passes a bent rod 73. The lower end of the rod 73, after passing through the lug 72, is bent back horizontally toward the plate 2 and is connected with the lower end of the spring 5 by a link 74. The upper end of the rod 73, after passing through the lug 71, is bent horizontally to the left and then back toward the plate 2, so as to extend through the opening 75 into the coin chute 3. In the normal position of the apparatus, as shown in Figs. 3 and 4, the upper end of the rod extends into the coin chute so as to prevent a coin from passing down it. When, however, the arm 7 is drawn over to the left by the polarized magnet, the rod 73 is rotated so as to withdraw its upper end from the chute.

Upon the back of the plate 2, and near the top thereof, there are two electromagnets 76 and 77 which control the armatures 78 and 79, respectively. The lever of the armature 79 extends alongside both magnets and at its end is provided with a right-angled hook 67 which normally extends down in front of the catch 68 on the armature 78. When the armature 79 is attracted by its magnet 77, the hook 67 is drawn back far enough to allow the armature 78 to drop back, so that the catch 68 on the end thereof engages the notch in the end of the hook 67 and thereby locks the armature 79 in its operated position. In the operated position of the armature 79, a lug 69 on said armature extends through an opening in the plate 2, so as to close the return coin chute 70. The armature 79 also controls the contact springs, 62, 63, 64, 65 and 66.

The automatic substations may be of any suitable or approved type. Those in connection with which I have chosen to illustrate my invention, and as shown at A in Fig. 1, comprise the usual receiver 25, switch hook 26, transmitter 27, ringer 29 and condenser 30. Being an automatic substation it must also be provided with a calling device of a character suitable to control the operation of the central office switches herein shown. This calling device may be of the type shown in British patent to S. G. S. Dicker, No. 29,654 of 1910. As shown herein, however, the calling device is represented diagrammatically by a pair of impulse springs 31 and 32 and a toothed impulse wheel 33. The impulse wheel is secured to a shaft 35 to which there is also attached a dial (not shown) provided with finger holes through the medium of which the impulse wheel may be rotated. As the impulse wheel is returned to normal position by a spring (not shown) after it has been rotated forward for any digit, the impulse springs are momentarily separated a number of times, corresponding to the digit called. Also associated with the substation A there is a coin-collecting and lock-out device of the type shown in Figs. 3 and 4, the mechanism, however, being represented only diagrammatically in Fig. 1.

The line switch C, which is individual to the line of the substation A, and the master switch D are modified forms of the general type of line and master switches disclosed in British patent to R. W. James, No. 26,301 of 1906, being of the particular type, however, shown in British patent to T. G. Martin, No. 1,419 of 1910.

The selector E is of the general type of selectors disclosed in United States Letters Patent No. 815,321, granted March 13, 1906, to Keith, Erickson and Erickson, being modified, however, as shown in said British patent No. 1,419 of 1910, above referred to, so as to operate in a two-wire system, *i. e.*, a system in which the central office apparatus is controlled from the calling substation over the two sides of the line in series.

The selector F is similar to the selector E, with the addition of the side switch wiper 85.

As the specific structure of these line

switches and first and second selectors forms no part of my present invention, it is not thought necessary to describe the same more in detail, as the construction and operation of the same are well known in the art.

The connector H is of the general type of connector switch disclosed in United States Letters Patent No. 815,176, granted March 13, 1906, to Keith, Erickson and Erickson, but, like the selectors, is modified in order to operate in a two-wire system. Like the selectors, the connector is provided with a shaft (not shown) carrying the wipers 86, 87 and 88, and is controlled by the vertical magnet 89 and the rotary magnet 90. The usual side switch is controlled by the private magnet 91 in the usual manner. The line relay 92 is connected with the line conductors through the springs of a reversing relay 93. The connector is provided with a so called back-bridge relay 177 through which the called substation is provided with talking battery current, and with a ringer relay through the medium of which ringing current may be applied to the called line after connection is completed therewith.

The substation A′ and the line switch C′ are similar to the substation A and the line switch C, respectively. At M there is shown a ringing current generator and at L a busy signaling machine comprising a current interrupter 93^a and an induction coil 94^a. For operating the central office apparatus and for furnishing talking current there is provided a battery B having one pole, preferably the positive, grounded at G.

Having given a general description of the apparatus, I will now explain the operations by which one subscriber establishes connection with another in a system embodying the principles of my invention. It will be explained how the subscriber at substation A may obtain connection with the substation A′, the number of which latter is assumed to be 2220. When the calling subscriber removes his receiver preparatory to making a call, the switch hook rises, permitting the spring 95 to pass out of engagement with the spring 97 and into contact with the spring 96. This closure of the springs 95 and 96 does not complete the talking circuit of the telephone, as is usually the case, because said talking circuit is normally open at the springs 63 and 64 of the lock-out relays 76 and 77. The closure of the springs 95 and 96, however, bridges the relay 77 across the line, whereby a circuit is closed extending from ground G′ at the central office through the springs 101 and 102, line conductor 99, substation impulse springs 32 and 31, relay springs 63 and 62, relay winding 77, hook switch springs 96 and 95, line 98, springs 104 and 103 and the line winding 46 of the line switch C to the battery lead 100, and thence through the battery B to ground G. The relay 77, upon energizing, attracts its armature 79, whereby the springs 66 and 65 are closed and the spring 63 is shifted out of engagement with the spring 62 and into contact with the spring 64. The disengagement of the springs 63 and 62 breaks the circuit of the relay 77, but the armature 79 remains locked in its operated position by the armature 78. The engagement of the springs 63 and 64 completes the bridge across the line through the transmitter and receiver of the substation, said bridge extending from the line conductor 98 through the hook switch springs 95 and 96, receiver 25, transmitter 27, springs 6 and 5, springs 64 and 63 and impulse springs 31 and 32 to the line conductor 99. It will thus be seen that the closure of the talking circuit at the substation is dependent upon the energization of the relay 77. It will also be seen that if the line is in use by some other subscriber at the time the receiver at the substation A is removed, the relay 77 at the substation A will be bridged across the line in multiple with the talking circuit at the first substation. The resistance of the relay 77 is high compared with that of the talking circuit, so that sufficient current would be shunted away from the relay 77 at the substation A to prevent it from being operatively energized, and therefore the talking circuit at the substation A would not be closed. It will thus be seen that it is impossible for one subscriber to get in on the line while it is in use by another subscriber. The relay 77, upon energizing, also closes the upper end of the return coin chute 70. The calling subscriber may then deposit a coin in the coin chute and it will be held by the rod 73 and the lug 69, so that it will neither pass out through the return chute or down the chute 3 into the coin box. The coils 9 and 10 of the coin-collecting device are also bridged across the line at the instant the receiver is removed from the switch hook. The direction of current through the coils 9 and 10 at this time is in the proper direction to attract the armature 11 toward the coil 9, whereby the arm 12 is brought behind the lug 13.

It will be remembered that the circuit which was traced through the substation included the line winding of the line switch C. The winding 46, upon energizing, serves to operate the line switch in the usual and well-known manner to connect the calling line with an idle trunk line extending to the first selector F.

The calling subscriber now operates his calling dial in the usual manner for the first digit 2 of the desired number. As the impulse wheel 33 returns to normal position after being rotated for this digit, the impulse springs 31 and 32 are separated twice

momentarily. Each time the springs 31 and 32 are separated the energizing circuit of the line relay 47 of the selector E is broken, allowing said relay to be momentarily deenergized. This operation of the line relay 47 operates to raise the switch wipers 57, 58 and 59 to a position opposite the second level. These wipers are then rotated automatically to select the first idle trunk in this second level, which trunk leads to one of the second selectors F. Connection is thus extended to the second selector. The calling subscriber now operates his calling device for the second digit 2. The second selector F operates in response to the impulses for this digit in the same manner as the selector E and extends connection to an idle connector H over the trunk lines 134 and 135.

The calling subscriber now operates his dial for the third digit 2, momentarily separating the impulse springs 31 and 32 in the same manner as described for the first digit. Each time the impulse springs are separated for the third digit the energizing circuit for the connector line relay 92 is broken momentarily. This operation of the line relay operates the connector in the well-known manner to raise it up to the second level. The connector is then in position to receive impulses for the last digit 0. The operation of the substation calling device for this digit breaks the energizing circuit of the relay 92 ten times. The rotary magnet 90 then receives ten impulses and operates to rotate the wipers ten steps onto the contacts of the line No. 2220. The private magnet relay 149 is energized by the first impulse to the rotary magnet and again closes the circuit of the private magnet 91. The circuit of the relay 149 is not opened long enough to permit it to deënergize until after the last impulse has been delivered to the rotary magnet. The relay 149 then deenergizes and breaks the circuit of the private magnet 91, which, if the called line is not already busy, in turn deënergizes and permits the side switch to pass to third position, whereby connection is completed between the calling and the called lines. The side switch wiper 156 (in third position) extends the guarding potential from ground G^{12} through the private wiper 87 to the connector private bank contacts of the called line, and also provides an energizing circuit for the cut-off winding 157 of the line switch C'. The winding 157, upon energizing, attracts the armature 158, which operates to disconnect the line winding 159 and ground G^{13} from the called line, and to extend the line conductor 160 through the springs 162 and 163 to the connector bank contact which is engaged by the wiper 86. When the side switch wiper 150 of the connector reaches third position, the energizing circuit is established for the ringer relay 164. This circuit extends from ground G^{14} through the interrupter 165, relay 164, springs 171 and 170 and the side switch wiper 150 to the battery lead 100. Since this circuit includes the interrupter 165, the relay 164 is energized only intermittently. Each time the relay 164 is energized it operates to disconnect the calling line from the called line and to bridge the generator M across the called line to ring the bell 175. When the called subscriber removes his receiver, or as soon thereafter as the relay 164 deënergizes, if it happens to be energized at the time, the called substation is provided with talking battery current from the central office. The circuit over which this talking current flows extends from ground G^{12} through the side switch wiper 156, lower winding of the relay 177, ringer relay springs 188 and 189, side switch wiper 187, shaft wiper 88, line 161, impulse springs 182, coils 280 and 281 of the coin-collecting device, springs 282 and 283, transmitter 183, receiver 184, hook switch springs 185 and 186, line 160, springs 162 and 163, shaft wiper 86, ringer relay springs 181 and 180, private magnet springs 179 and 178, upper winding of the back-bridge relay 177 and the side switch wiper 150 to the battery lead 100. The contact between the springs 282 and 283 in the above circuit is closed by the energization of the magnet 290, which is bridged across the line upon the removal of the receiver from the switch hook and operates in the same manner as the magnet 77 at the calling substation A in Fig. 1. The current through the coils 281 and 280 of the coin-collecting device at the substation A' is in such direction at this time as to attract the armature toward the coil 281. When the connector back-bridge relay 177 is energized by the talking current it operates to close the circuit through the relay 93. This circuit extends from ground G^{12} through the side switch wiper 156, relay 93 and springs 288 and 289 to the battery lead 100. The relay 93, upon energizing, operates to break the circuit of the ringer relay 164 at the springs 171 and 170, and to complete a locking circuit for itself through the springs 170 and 169 and the side switch wiper 150. This locking circuit is independent of the springs 288 and 289 of the back-bridge relay 177. Consequently, the relay 93 will not deënergize and close the circuit of the ringer relay 164 again in case the called subscriber should hang up his receiver and break the circuit of the back-bridge relay 177 before the calling subscriber has hung up his receiver. When the relay 93 is energized it also operates to shift the springs 167 and 173 out of engagement with the springs 168 and 174 and into contact with the springs 166 and 172, respectively. By this operation the con-

nections between the windings of the relay 92 and the trunk conductors 134 and 135 are interchanged. By this shifting of the connections of the relay 92 the current in the calling line is reversed. This reversal of the current causes the polarized relay of the coin-collecting device at the substation A to attract its armature in the opposite direction—that is, toward the coil 10. When the armature is thus attracted, the arm 12 carries the arm 7 over so as to open the contact between the springs 5 and 6 and to cause the end of the rod 73 to be withdrawn from the coin chute 3. The opening of the springs 5 and 6 opens the talking circuit at the calling substation, so as to render said substation inoperative, but the removal of the rod 73 from the coin chute permits the coin to pass on down the chute 3 and release the arm 7 from the arm 12, whereby the springs 5 and 6 are permitted to restore to normal position to restore the talking circuit to operative condition. It will thus be seen that the calling subscriber cannot carry on a conversation unless he has deposited a coin in the device. It is also seen that he may deposit the coin before the call is completed, but the coin will not be deposited in the coin box, but will be held in suspense until the called subscriber answers. If the called subscriber does not answer, the coin will be returned to the subscriber through the coin chute 70 in a manner to be explained hereinafter. After the conversation is completed, the release of the central office apparatus is initiated by the hanging up of the receiver at the calling substation. When the receiver at the substation A is first hung up, the talking circuit and the circuit of the coils 9 and 10 is broken and the relay winding 76 is bridged across the line through the lower contact of the switch hook and through the springs 66 and 65. When the relay 76 is thus bridged across the line it attracts its armature 78, which releases the armature 79 and allows it to restore to normal position, whereupon the springs 65 and 66 are separated and the bridge across the line through the relay 76 is broken. The restoration of the armature 79 withdraws the lug 69 from the coin chute 70, and if the coin had not been collected upon the response of the called subscriber it would be returned through the chute 70 to the calling subscriber. The final breaking of the bridge across the line at the calling substation permits the connector line relay 92 to deënergize. The relay 92, upon deënergizing, breaks the holding circuits of the release relays 139, 128 and 82 of the switches H, F and E, respectively, whereby they are released in a well-known manner.

It will be seen that there is a slight difference in the circuit connections of the coin-collecting device in the substations A and A′. This is simply to show the two general ways in which the coin-collecting device may be applied to the substation circuit. In Fig. 1 the coils of the coin-collecting device are bridged across the line in multiple with the talking circuit and renders the telephone inoperative, when the called subscriber answers, by opening the talking circuit. In Fig. 2 the coils 280 and 281 of the coin-collecting device are bridged across the line in series with the transmitter and receiver, and the substation A′, when a calling substation, is rendered inoperative upon the response of the called subscriber by the short-circuiting of its transmitter and receiver by the springs 284 and 285.

While I have chosen to illustrate my invention in connection with one particular type of telephone system, it is to be understood that I do not wish to limit my invention in that manner. It is obvious that my combined measured service and lock-out device can be employed with many other automatic or semi-automatic telephone systems. Furthermore, I contemplate using my measured service or coin-collecting device independently of the lock-out device—that is, the employment of the measured service device on a single party-line where the lock-out feature is not necessary. Various other modifications and changes will readily suggest themselves to those skilled in the art and come within the broader aspects of my invention.

What I claim as my invention is:—

1. In a measured service telephone system, a calling and a called subscriber's line, means including automatic switches for establishing a connection between said lines, a coin-collecting device and an impulse-transmitting device at the calling station, means for operating said impulse-transmitting device independently of said coin-collecting device for operating said switches, means independent of said coin-collecting device for ringing on the called line, means allowing partial insertion of a coin in said device prior to the response of the called subscriber, means for collecting said coin when the called subscriber responds, a return chute, and means for returning said coin through said chute if the calling subscriber hangs up before the called subscriber answers.

2. In a measured service telephone system, a calling and a called subscriber's line, means including automatic switches for extending a connection between said lines, a coin-collecting device on said calling line, a magnet for controlling the operation of said coin-collecting device, means for collecting the coin deposited in said device upon the response of the called subscriber by reversing the current through said magnet, a re-

turn chute, and means operated by the calling subscriber for returning said coin through said chute if the calling subscriber hangs up before the called subscriber answers.

3. In a measured service telephone system, a calling and a called subscriber's line, means including automatic switches for extending a connection between said lines, a coin-collecting device on the calling line including a coin chute, a stop for preventing a coin from passing down said chute, a magnet for controlling said stop, means for removing said stop to permit the coin to pass down said chute and be collected when the called subscriber answers by reversing the current through said magnet, a return chute, and means operated by the calling subscriber for returning said coin through said chute if the calling subscriber hangs up before the called subscriber answers.

4. In a measured service telephone system, a calling and a called subscriber's line, means for establishing a connection between said lines, a coin-collecting device on said calling line including a coin chute, a stop for preventing a coin from passing down said chute, an arm carrying said stop, an electromagnet for operating said arm, means operated upon the response of the called subscriber for reversing the current through said magnet to operate said arm to remove said stop and thus permit the coin to pass down said chute, means operated by said arm for short-circuiting the transmitter and receiver on the calling line, means operated by the coin passing down said chute for breaking said short-circuit to again render said transmitter and receiver operative, a return chute, and means for returning said coin through said chute if the calling subscriber hangs up before the called subscriber answers.

5. In a coin-controlled telephone system, a calling and a called subscriber's line, means for establishing a connection between said lines, means operated upon the response of the called subscriber for reversing the current on the calling subscriber's line to render the transmitter and receiver thereon inoperative, means controlled by the calling subscriber through the medium of a coin for thereafter rendering said transmitter and receiver again operative, and means for automatically returning the coin to the calling subscriber if the calling subscriber hangs up before the called subscriber answers.

6. In a coin-trolled telephone system, a calling and a called subscriber's line, means including automatic trunk-selecting switches for extending a connection between said lines, an impulse transmitter for transmitting impulses over two sides of the calling line in series for controlling the operation of said switches, means operated upon the response of the called subscriber for rendering the transmitter and receiver on the calling line inoperative, means under the control of the calling subscriber for thereafter rendering said transmitter and receiver operative, and means for returning the coin to the calling subscriber if the calling subscriber hangs up before the called subscriber answers.

7. In a telephone system, a party-line, a measured service device on said line, and means controlled by said device for preventing another subscriber on said line from coming in on said line when the same is in use.

8. In a telephone system, a party-line, a coin-collecting device on said line, operating magnets therefor, and means controlled by said operating magnets for preventing another subscriber from coming in on the line when said line has been taken for use by one of the subscribers on said line.

9. In a telephone system, a party-line, a measured service device on said line, means for operating said device by reversal of current in the calling line upon the response of the called subscriber, and means controlled by said device for preventing another subscriber from coming in on the line when said line is in use.

10. In a telephone system, a party-line, a combined lock-out and measured service device on said line for preventing a subscriber from coming in on said line when the same is in use and for rendering the talking circuit inoperative after response of the called subscriber until the calling subscriber has operated said device.

11. In a measured service telephone system, a coin-collecting device having a normally open coin-return chute, a magnet associated with said device, means for energizing said magnet upon the subscriber removing the receiver from the hook, and means controlled by the energization of said magent for closing the said coin-return chute.

12. In a measured service telephone system, a coin-collecting device having a normally open coin-return chute, a magnet associated with said device, means for energizing said magnet upon the subscriber removing the receiver from the hook, means controlled by the energization of said magnet for closing the said coin-return chute, a normally closed coin-collecting chute for said device, and means controlled by the called subscriber for opening said closed chute.

13. In a measured service telephone system, a party-line, a coin-collecting device at a substation on said line having a normally open return chute, a magnet at said substation controlling the talking circuit, means for energizing said magnet to close said talking circuit when a subscriber makes a call, means for preventing said magnet from

energizing if another subscriber on said line is making a call at the same time, and means controlled by the energization of said magnet for closing said normally open return chute.

14. In a measured service telephone system, a calling and a called subscriber's line, means including automatic switches controlled over two sides of a line circuit in series for establishing a connection between said lines, a coin-collecting device and an impulse-transmitting device at the calling station, means for operating said impulse-transmitting device independently of said coin-collecting device for operating said switches, means allowing partial insertion of a coin in said device prior to the response of the called subscriber, means for collecting said coin when the called subscriber responds, a return chute, and means for returning said coin through said chute if the calling subscriber hangs up before the called subscriber answers.

15. In a measured service telephone system, a calling and a called subscriber's line, means including automatic switches controlled over two sides of a line circuit in series for extending a connection between said lines, a coin-collecting device on said calling line, a magnet for controlling the operation of said coin-collecting device, means for reversing the current through said magnet upon the response of the called subscriber to collect the coin deposited in said device, a return chute, and means operated by the calling subscriber for returning said coin through said chute if the calling subscriber hangs up before the called subscriber answers.

16. In a coin-controlled telephone system, a calling and a called subscriber's line, means including automatic trunk-selecting switches controlled over two sides of a line circuit in series for extending a connection between said lines, an impulse transmitter for transmitting impulses over two sides of the calling line in series for controlling the operation of said switches, means operated upon the response of the called subscriber for rendering the transmitter and receiver on the calling line inoperative, means under the control of the calling subscriber through the medium of a coin for thereafter rendering said transmitter and receiver operative, and means for returning the coin to the calling subscriber if the calling subscriber hangs up before the called subscriber answers.

17. In a telephone system, a party-line, means including automatic switches for extending a connection from said party-line, a measured service device on said line, and means controlled by said device for preventing another subscriber on said line from coming in on said line when the same is in use.

18. In a telephone system, a party-line, means including automatic switches for extending a connection from said party-line, a coin-collecting device on said line, operating magnets therefor, and means controlled by said operating magnets for preventing another subscriber from coming in on the line when said line has been taken for use by one of the subscribers on said line.

19. In a telephone system, a party-line, means including automatic switches for extending a connection from said party-line, a measured service device on said line, means for operating said device by reversal of current in the calling line upon the response of the called subscriber, and means controlled by said device for preventing another subscriber from coming in on the line when said line is in use.

20. In a telephone system, a party-line, means including automatic switches for extending a connection from said party-line, a combined lock-out and measured service device on said line for preventing a subscriber from coming in on said line when the same is in use and for rendering the talking circuit inoperative after response of the called subscriber until the calling subscriber has operated said device.

Signed by me at Chicago, Cook county, Illinois, this 20th day of February, 1912.

SAMUEL S. STOLP.

Witnesses:
ARTHUR J. RAY,
ALBERT ANDERSEN.