G. W. LORIMER.

CONVERSATION METER FOR TELEPHONE SYSTEMS.

APPLICATION FILED APR. 13, 1906.

989,529.

Patented Apr. 11, 1911.

6 SHEETS—SHEET 1.

Fig. 1.

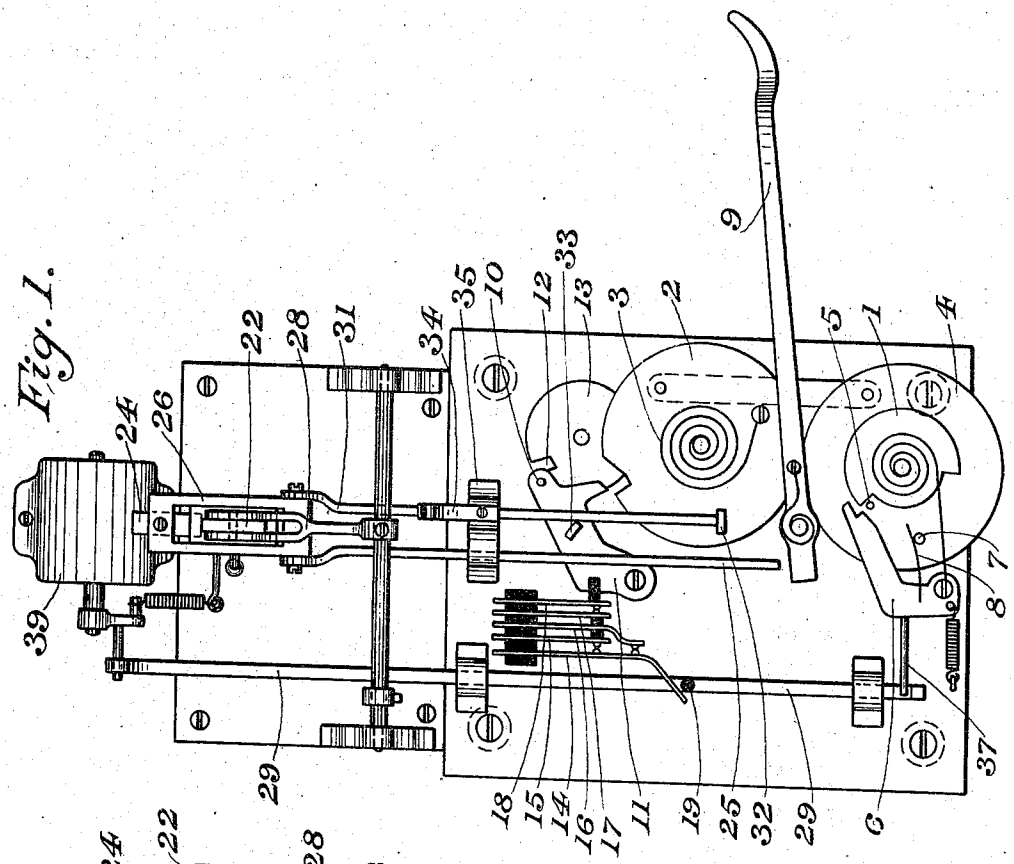
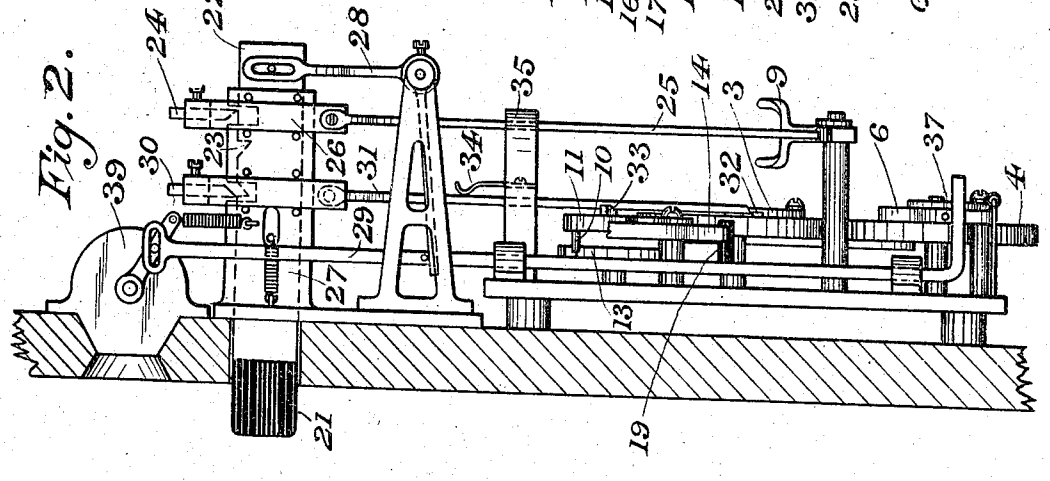


Fig. 2.



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6 SHEETS—SHEET 2.

Fig. 3.

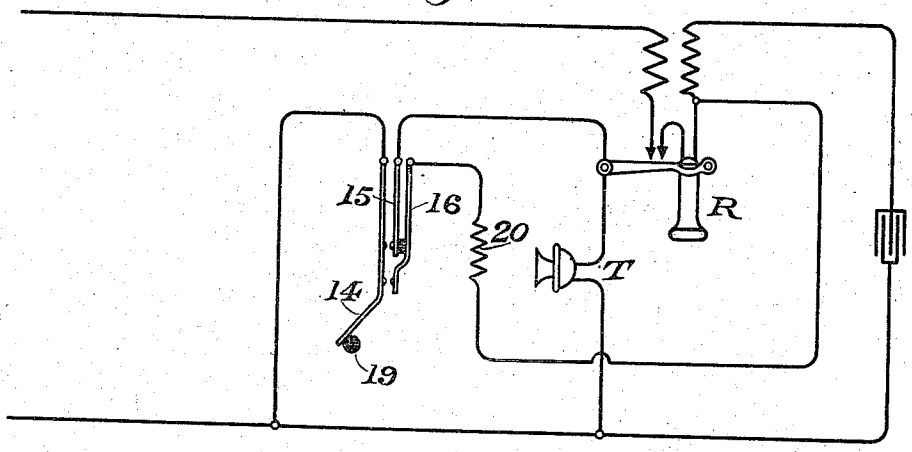
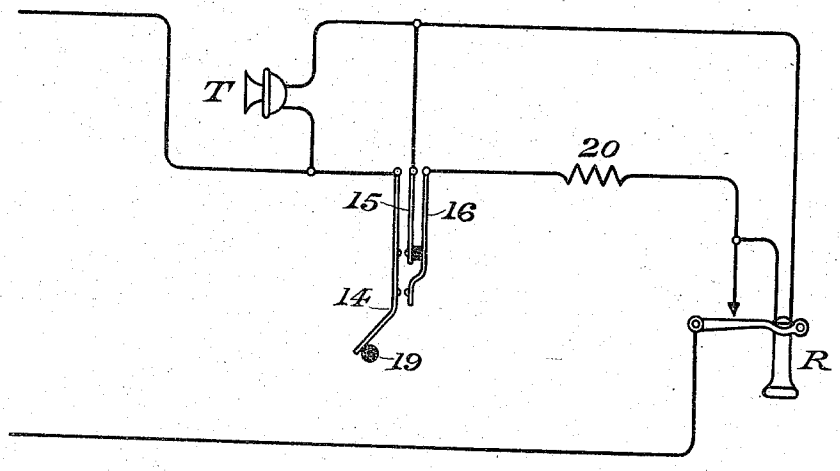


Fig. 4.



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6 SHEETS—SHEET 3.

Fig. 5.

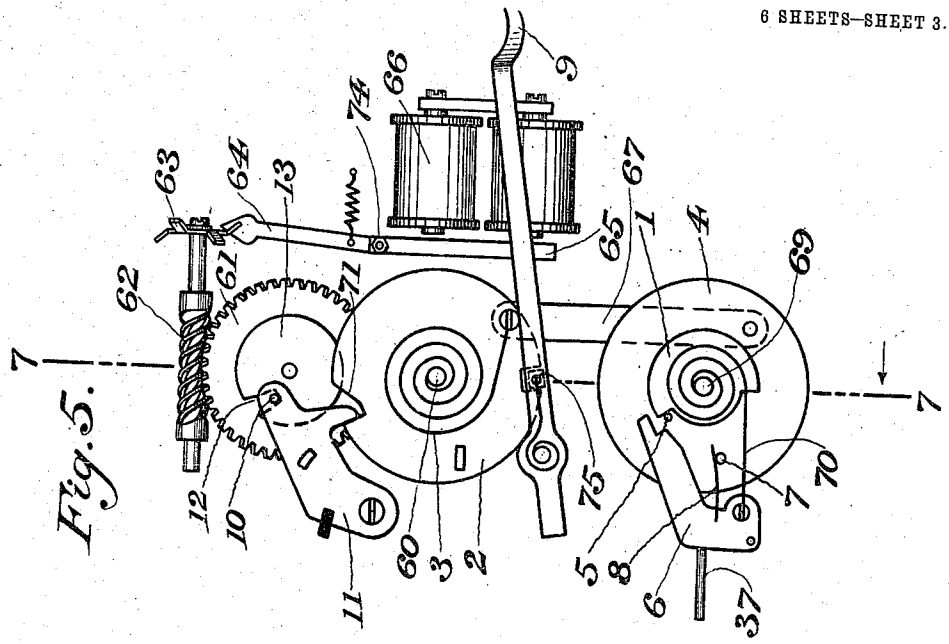
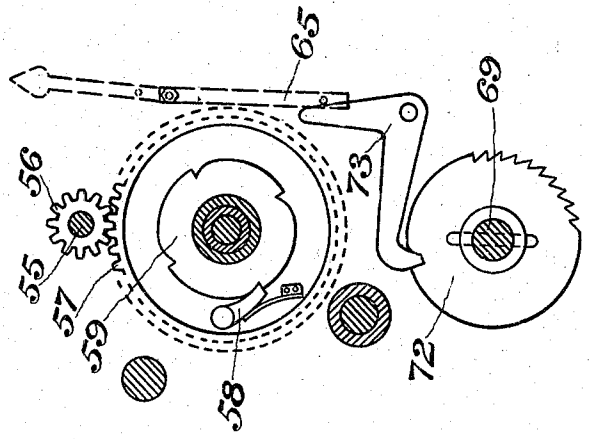


Fig. 6.



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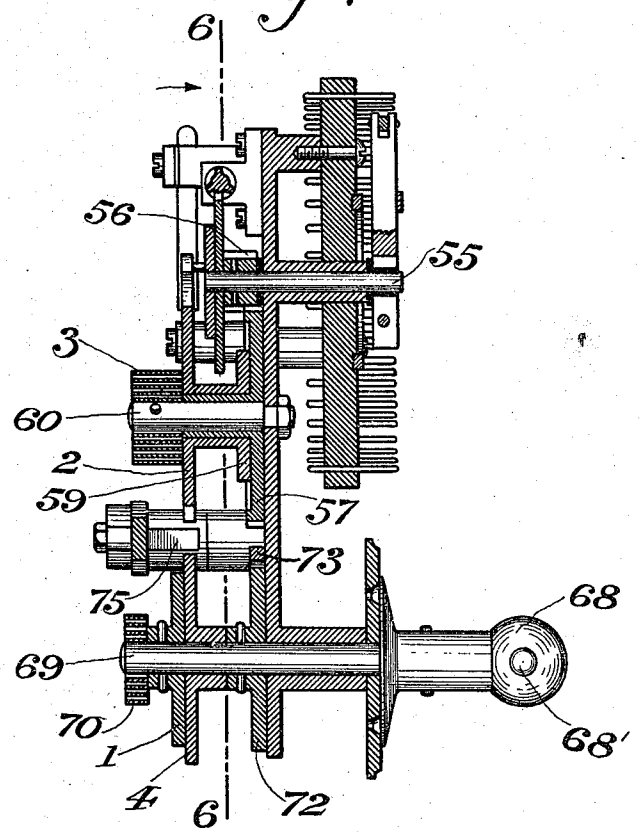
CONVERSATION METER FOR TELEPHONE SYSTEMS.

APPLICATION FILED APR. 13, 1906.

989,529. Patented Apr. 11, 1911.

6 SHEETS—SHEET 4.

Fig. 7.



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CONVERSATION METER FOR TELEPHONE SYSTEMS.

APPLICATION FILED APR. 13, 1906.

989,529. Patented Apr. 11, 1911.

6 SHEETS—SHEET 5.

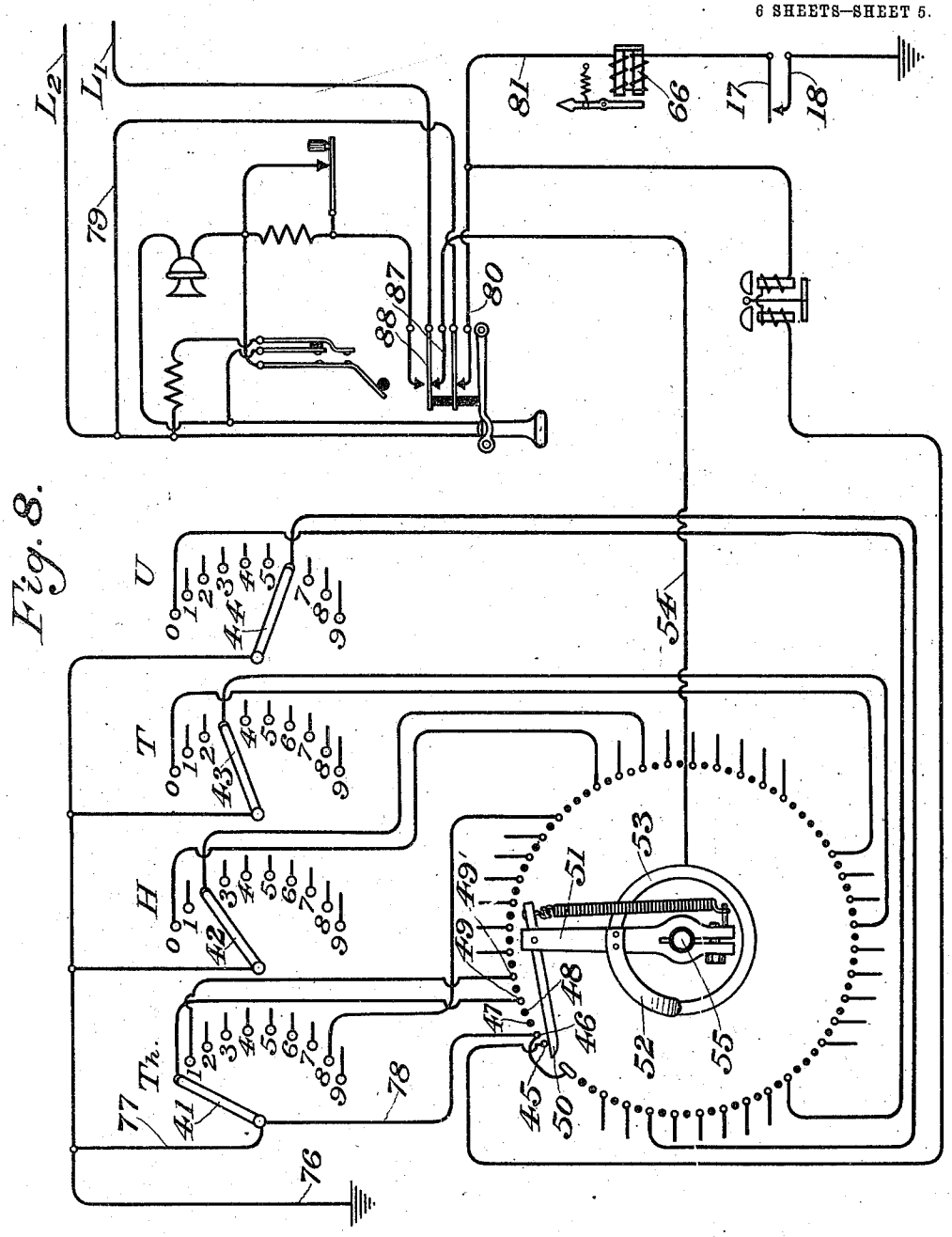

Fig. 8.

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CONVERSATION METER FOR TELEPHONE SYSTEMS.

APPLICATION FILED APR. 13, 1906.

989,529. Patented Apr. 11, 1911.

6 SHEETS—SHEET 6.

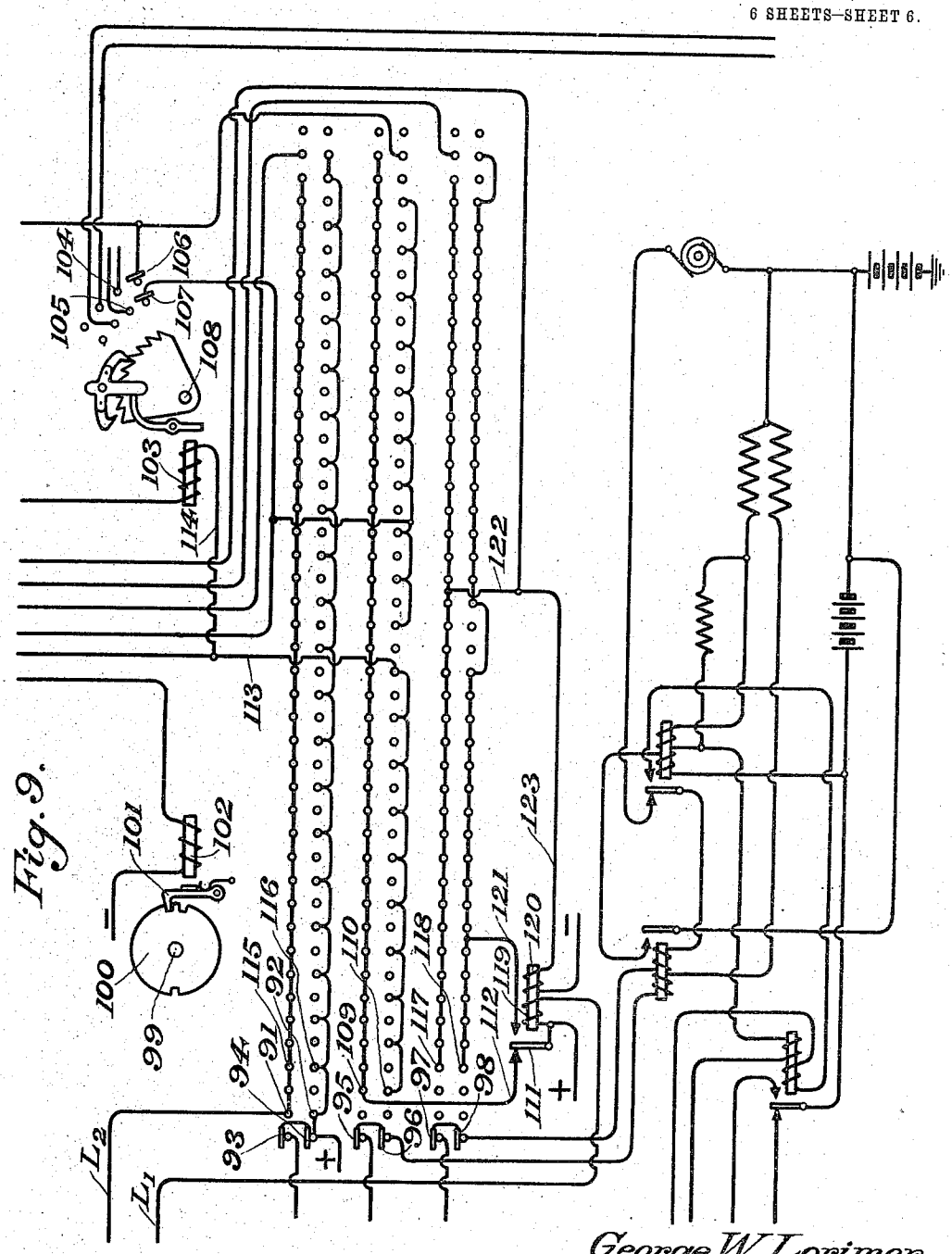

Fig. 9.

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UNITED STATES PATENT OFFICE.

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CONVERSATION-METER FOR TELEPHONE SYSTEMS.

989,529. Specification of Letters Patent. Patented Apr. 11, 1911.

Application filed April 13, 1906. Serial No. 311,468.

To all whom it may concern:

Be it known that I, GEORGE W. LORIMER, a citizen of the United States of America, and a resident of Piqua, county of Miami, and State of Ohio, have invented a new and useful Improvement in Conversation-Meters for Telephone Systems, of which the following is a specification.

My invention relates to conversation counters for telephone substations, and has for its object, in a message rate or measured service method of charging for telephone service, to provide means whereby the subscriber may be permitted to record at his station, one by one, the conversations which he holds from it; to compel such recording to be done as a means of securing the service, and to permit this recording only at such times as the securing of the service recorded is made certain.

My invention is specifically set forth herein as applied to a mechanical device for transmitting signals in an automatic telephone system, the signal transmitter herein shown and described being covered by my United States application No. 311,139, filed April 11, 1906, claims for the signal transmitter being carried by that application.

My invention is illustrated in the accompanying drawings, in which similar characters refer to similar parts throughout the several views, and in which—

Figure 1 is a rear view of the meter and the associated telephone mechanism; Fig. 2 is a side view of the same; Fig. 3 is a conventional view of the circuit as adapted to one system of transmitting and receiving speech. Fig. 4 is a conventional view of the circuit as adapted to another system of transmitting and receiving speech. Fig. 5 is a back view of the signal transmitting mechanism in greater detail than is shown in Fig. 1. Fig. 6 is a section of signal transmitting mechanism on the line 6 of Fig. 7. Fig. 7 is a sectional view of the signal transmitting mechanism on the line 7 of Fig. 5. Fig. 8 shows circuits of the signal transmitting mechanism. Fig. 9 shows central office circuits associated with the substation circuits of Fig. 8 and coöperating therewith.

I shall describe first the signal transmitting device, in connection with which my conversation meter is herein described.

Referring to Figs. 5, 6, 7, 8 which show detail of the signal transmitting device: This signal transmitter is designed for installation at a telephone substation operating in connection with a central office equipment of the type illustrated in British patent to Wise, No. 8648 of 1901, and its function is to coöperate with the central office equipment to connect its substation with any line desired. In operation, the digit arms 41, 42, 43, 44, representing thousands, hundreds, tens and units respectively, are placed upon those digit points corresponding to the four digits respectively of the directory number of the telephone line with which it is desired to connect. In Fig. 8 the device is shown set ready to call line No. 0236. The digit points upon which the digit arms rest are connected to contact points 49, 49′, etc., and a brush 50, mounted upon an arm 51, is adapted to sweep around the circle of contact points and make electrical connection with each point in order. Points shown black are isolated. Brush 52 carried by arm 51 makes contact with collector ring 53 and thus any contact point connected with by brush 50 is connected to conductor 54. Brush 50 and arm 51 are carried by shaft 55 which (see Figs. 6 and 7), through pinion 56, gear 57, pawl 58, sleeved ratchet 59, is driven by mainspring 3, the movement of the gear train, and therefore of brush 50, being controlled by an escapement comprising worm wheel 61, worm 62, toothed wheel 63 and finger 64, the finger 64 being rigidly mounted with armature 65 which is operated by electromagnet 66, which is controlled from the central office in a manner to be described later herein.

In operating the signal transmitter, the mainspring 3 is wound by giving the disk 2 a quarter turn counter clockwise, as viewed in Fig. 5. This is done through link 67 by turning the disk 4. Knob 68 with transverse handle 68′ is rigidly affixed to shaft 69, which shaft bears also the disk 1, and which shaft is normally held in its position of rest by the spring 70. By turning shaft 69 counter clockwise a quarter revolution, as viewed in Fig. 5, the disk 1 engages the pin 5 which is fixed in disk 4, and thus propels disk 4 a quarter revolution, which pushes through link 67 and thus propels disk 2 a quarter revolution, which winds up mainspring 3, the outer end of that spring be-

ing attached to disk 2 and the inner end being attached to fixed stud 60. By reference to Fig. 7, it will be seen that disk 2 is integral with ratchet 59, both elements being sleeved loosely upon stud 60, and that a quarter revolution counter clockwise of ratchet 59 permits pawl 58 on gear 57 to drop into the next notch of ratchet 59, after which ratchet 59 and disk 2 may return to normal only by driving 57, 56, 55 which are parts of the gear train controlled by the escapement 61, 62, 63, 64. The knob 68 may return immediately, however, since the disk 1 may leave pin 5, but upon return of that knob and its attached disk 1 to normal, the latch 6 will drop into engagement with disk 1 and prevent a subsequent operation of the knob until after the complete return of disk 4. This is effected by pin 7 in disk 4 and spring 8 on latch 6. Latch 6 is held out of engagement with disk 1 by the lifting of pin 7 on spring 8, which spring is fixed in latch 6. When disk 4 returns to normal fully, latch 6 is again lifted out of engagement with disk 1 and the knob 68 may be operated again.

I have described how mainspring 3 is wound by a quarter turn by the patron in inaugurating a telephone call. The disk 2 in rotating has lifted latch 11 from its notch 71, the movement of the latch having lifted the pin 10 fixed in the latch 11 out of the notch 12 of the disk 13. The disk 13, worm wheel 61 and the pinion 56 are all integral with the shaft 55, and when thus placed under tension of spring 3, the movement of all parts is controlled by the finger 64. The first two steps of this gear train are secured by mechanical control of the finger 64, the subsequent steps are electromagnetically controlled. Upon the turning of the shaft 69 to inaugurate the call, the disk 72 fixed to that shaft was revolved and lifted the crank arm 73 which pressed against the armature 65, swinging it upon its pivot 74 and moving the finger 64 to the left, as viewed in Fig. 5, permitting the first step of the gear train to take place on the first application of the power of the spring 3 through the pawl 58 and associated parts. This preliminary step does not move the brush 50 from the conducting pin 45, as it will be noted that the brush 50 projects beyond the conducting pin 45 a sufficient distance to permit the arm 51 to move one step before causing the brush 50 to clear that pin. Since the armature 65 is thus held locked by the crank arm 73, so long as the knob 68 is out of its normal position, the knob 68 must perforce be returned to its normal position to further the progress of the call inaugurated. Upon return of knob 68 and disk 72, crank arm 73 drops into the notch in disk 72 and releases finger 64 which under tension of its spring returns to its right hand position as viewed in Fig. 5, and permits the second step of the arm 51 which passes brush 50 into contact with conducting pin 46.

It will be observed that in the institution of the call, the patron operating the automatic substation signal transmitter first sets his digit arms to the directory number desired, and then is compelled to turn the knob 68 throughout an entire quarter revolution to cause the pawl 58 to engage the next tooth of ratchet 49, and then is compelled to restore knob 68, or to permit the restoration of that knob to normal by spring 70 in order that disk 72 may permit crank arm 73 to release armature 65 to control the escapement of the gear train placed under tension, and thus of the arm 51 and brush 50, one revolution of that arm and brush being required to effect connection with a desired line. Interference stud 75 upon hook lever 9 lies within a notch in disk 2 when the hook lever 9 is up; consequently the hook 9 must be down in instituting a call, and, furthermore, it is positively locked down until disk 2 has completed such portion of its return as will permit the notch therein to register again with interference stud 75. Knob 68 now is locked by latch 6 on disk 1, and the device is wholly under control of the magnet 66 acting through the escapement.

The two preliminary steps of the brush 50 have placed it in contact with conducting stud 46 whence an electric circuit is closed as follows: 76, 77, 78, 46, 50, 51, 52, 53, 54, 87, 88, L^1 and over line conductor L^1 to the central office equipment, this being the signal to the central office that a call has been instituted. The signal is not sent until after the arm 51 and brush 50 have been placed wholly under control of magnet 66, which magnet is controlled by current impulses from the central office over line conductor L^2 and thence over elements 79, 80, 81, 66, 17, 18 and ground, the contacts 17—18 being closed by the elevated position of latch 11. The brush 50 in moving around its circle of contacts makes electrical connection with each in turn and offers a path from L^1 to ground whenever it encounters a conducting contact stud which is associated with a digit point which at that time is connected with by digit arm 41, 42, 43 or 44. The central office apparatus is so designed as to coöperate with the substation transmitter as follows: Current impulses are sent over line L^2 to ground, successively energizing and de-energizing electromagnet 66, thus permitting brush 50 to step around and successively connect with the points in its circle in proper synchronism with selective stepping devices in the central office, the selective stepping devices being further controlled by ground circuits encountered upon L^1. Thus when in the condition shown in Fig. 8, the

arm 51 revolves in response to control of electromagnet 66, the brush 50 comes into electrical connection with the conducting point 49 when the central office stepping apparatus is in a position corresponding to "0" thousands, since digit arm 41 is set upon "0" thousands. In similar manner the positions of the digit arms 42, 43, 44 are signaled to the central office through the occurrence of grounds upon L^1 in the travel of the brush 50 as controlled by impulses from the central office over L^2.

Referring now to Fig. 9: The complete apparatus of the central office is not herein described as it is already publicly known through issuance of the British patent to Wise above cited. Fig. 9 shows that portion of the central office apparatus directly concerned in the transmission to the central office by the substation signal transmitter of the signal determined by the first digit arm.

In Fig. 9 the parallel rows of circles 91, 92 represent fixed contacts in a cylindrical contact bank, each horizontal row consisting of 44 contacts extending entirely around the cylindrical surface. There are six such rows or circles of contacts being substantially three double rows. Movable brushes 93, 94, 95, 96, 97, 98 are pivotally mounted axially within the cylinder and are adapted to move over the rows of contacts. Brushes 93—94 are connected together and form substantially a double bridging brush for the upper double row of contacts. The same is true of pairs of brushes 95—96 and 97—98.

The construction here described is well known in the art and is specifically set forth in the British patent cited. The brushes are mounted upon shaft 99 which carries the clutch disk 100 and the clutch dog 101, the dog being controlled by the electromagnet 102; the brushes move continuously over the contacts when the dog is withdrawn from the clutch disk.

An auxiliary rotary switching device is shown controlled by the electromagnet 103. In this device is a double arc of waiting contacts 104—105, etc., a pair of movable brushes 106—107 carried by the shaft 108 concentric with the waiting contacts, and the electromagnet 103 having an armature adapted to control the movement of the brushes over the contacts step by step. Such other of the elements of Fig. 9 as are involved in the operation of the signal transmitter will be understood by the following description of the operation of the device.

The position of the brush 50 in Fig. 8 is that occupied by that brush when the signal transmitter is not in use. It has been described that upon institution of a call, the brush 50 is set forward mechanically two steps; that the first step is not sufficient to cause the brush 50 to pass the pin 45, and that the second step of the brush 50 causes it to leave the pin 45 and to pass into contact with the adjacent pin which is connected to earth at the substation through conductor 76. In this position the circuit may be traced from positive side of battery through the relay helix 119 to L^1 and thence through 88, 87, 54, 53, 52, 51, 50, 46, 78, 77, 76 to earth. As the device of Fig. 9 begins to revolve, the bridged brushes 93—94 connect the positive terminal of battery through contacts 91—92 to L^2, thus completing a circuit over L^2, 79, 80, 81, 66, 17, 18, etc., to earth, energizing 66 and causing brush 50 to take one step which breaks the circuit through helix 119 just described and places the brush 50 in contact with the pin 47 which is an insulated one. As the brushes 93—94 pass farther, the circuit through them is interrupted at 94—92, and by the consequent deënergization of 66 the brush 50 is advanced another step and now rests in contact with pin 48, which also is an insulated one. Next, the brushes 95—96 make connection with contacts 109—110 and a circuit is completed from the positive side of battery through 111, 112, 109, 95, 96, 110, 113, 114, 103, and to earth, energizing 103 and causing the brushes 106—107 to step forward one step into connection with contacts 104—105 respectively, which are the contacts corresponding to the "0" thousand group of subscribers' lines. Next, brushes 93—94 connect contacts 115—116 and brushes 97—98 simultaneously connect contacts 117—118; the former pair of brushes close a circuit from positive terminal of battery to L^2 and thence through 79, 80, 81, 66, 17, 18, to earth, causing brush 50 to make a step and to pass into contact with the pin 49, which is connected to earth at the substation; by this movement of the brush 50, a circuit is closed from the positive terminal of battery through the relay helix 119 to L^1, 88, 87, 54, 53, 52, 51, 50, 49, thence to the first or No. "0" point of the thousands digit indicator, and inasmuch as the thousands digit arm in Fig. 8 is set upon that point, the circuit is completed to earth at the substation through 77—76, thus energizing the relay helix 119 and attracting the armature 111; by the attraction of the armature 111 the circuit is closed from positive pole of battery through 111, 121, 118, 98, 97, 117, 122, 123, relay helix 120 to negative pole of battery, which circuit is a locking circuit to maintain the relay armature 111 independently of the continuance of the substation contact of brush 50. By this locking of the armature 111, the conductor 112 is isolated from the battery terminal and further closing of the circuit above described as energizing magnet 103 is impossible. In the continuance of the motion of the brushes, the brushes 93—94 repeatedly energize and deënergize magnet 66 and thus step the

brush 50 over the first quadrant of the signal transmitter, while brushes 97—98 hold closed the locking circuit of the relay winding 120. As the brushes leave the twenty-first contact of their respective rows, the locking circuit of the relay helix 120 is broken; the brush 50 at this time has passed beyond the first quadrant of the signal transmitter and is entering the second quadrant. As before, the brushes 93—94 send current impulses over the line L^2 to propel the brush 50, the brushes 95—96 send current inpulses through 111—112 and thence through wire 124 and 125 to some further device for interpreting the second or hundreds digit as determined by the setting of the hundreds digit arm in Fig. 8. As in the case of the thousands digit, impulses will be sent by brushes 95—96 until brush 50 encounters a grounded pin in the signal transmitter, whereupon the armature 111 will be attracted by energization of helix 119 and will be retained by energization of helix 120, thereby preventing further impulses, and thus determining the control of the distant brushes acting to select in response to control by the hundreds digit arm of the signal transmitter in a manner analogous to brushes 106—107 in response to control of the thousands digit arm of the signal transmitter. The third and fourth quadrants of the signal transmitter are controlled by a further device similar to that of Fig. 9, and the digital signals from the brush 50 are similarly interpreted.

When the brush 50 has made approximately its complete circle, the disk 2 will have returned nearly to normal and the hook lever 9 will be permitted to rise, giving proper conditions for conversation.

To review the mechanical conditions for instituting a call by means of the signal transmitter herein illustrated; (referring to Fig. 1), the hook 9 must be down and the disk 1 must be turned and restored; at the close of the initial movements, the disk 1 is in the position shown in Fig. 1, the latch 6 engages the disk 1 and the disk 2 has been revolved counter clockwise a quarter turn; at the close of the transmission of the signal and when, so far as the signal transmitter is concerned, the telephone connection is complete and in readiness for conversation, the disk 1 will be locked by the latch 6, the disk 2 will have returned so nearly to its normal position as to permit the rising of the hook 9, and the latch 11 will remain elevated by reason of the engagement of its pin 10 with the edge of the disk 13.

To the signal transmitter device thus described, I add the meter 39 with its controlling devices as follows: Push slide 22 has projecting push button 21 accessible to the telephone user, and has in its upper surface two notches adapted to be engaged by dogs 24 and 30. The slide 22 is carried in the sleeve 27 and tends to hold its button 21 outward by tension of a spiral spring. The arm of the meter 39 is pressed downward by a spiral spring and may be pushed upward by the slide rod 29. The slide rod 29 has an outwardly turned end portion to interfere with the pin 37 upon the latch 6 whereby the latch 6 is prevented from lifting from the disk 1 when the slide 29 is lifted. I add a set of three springs, 14, 15, 16 which are normally separated, but which are closed by the lifting of the latch 11 and which may be opened either by the dropping of that latch or by the elevation of the stud 19 carried by the slide rod 29. Thus the sliding upward of the slide rod 29 will lock the latch 6 against release of disk 1, will open the springs 14, 15, 16 from each other, and will operate the arm of the meter 39. The lifting of the rod 29 is accomplished by a crank arm upon the rocking shaft which carries the crank arm 28, the crank arm 28 being connected by pin and slot connection with the push slide 22; the slide rod 29 may be operated therefore by pushing the button 21, resulting in registering the call, locking the disk 1 and opening the springs 14, 15, 16.

A call having been instituted and connection having been secured with the desired line, the called subscriber answering will send voice currents to the calling station. By reference to Figs. 3 and 4 it will be seen that if springs 14, 15 and 16 were all in contact as would be true except for upward pressure of the stud 19 against the spring 14, the transmitter T will be short-circuited and the receiver R will be shunted by the resistance 20. The magnitude of the resistance 20 is such as to enable received speech to be heard in the receiver R, while yet not great enough to enable that receiver effectively to be used as a magneto telephone transmitter. The condition of the substation set immediately upon calling, therefore, is that the calling subscriber may hear the response of the called subscriber and will be unable to speak to him either through his transmitter or receiver, because of the closed condition of a by-path about each. Because of instructions to that effect, the calling subscriber now will press the button 21. This will force the slide 22 in its guides, with two results. First, that the tooth 23 of the slide 22 will be engaged by the pin 24 dropping into it, thus lowering the shaft 25, which is connected with the pin 24 by means of the frame 26. Removal of pressure from the button 21 will leave it locked against return because of the engagement of 23 and 24, though the spring 27 tends against that engagement to throw the button outward. The second result of this inward pressure of the button 21 is to rock the angle arm 28, lifting the shaft 29 and operating the meter 39.

The latter may be of a type adapted to count one complete unit for each lifting of the shaft 29, with no count for each downward motion, or it may count one unit for each complete upward and downward cycle. But the shaft 29 extends downwardly from its engagement with the part 28 and bears the pin 19 previously described as adapted to move the spring 14. The counting of the meter, therefore, accompanied by the locking of the slide 22, breaks and holds broken the contacts 14, 15, and 16, so releasing the transmitter from its short-circuit and the receiver from its shunt. Conversation may now proceed, and upon its completion the restoration of the receiver to the switch hook 9 will cause the latter to press upward the rod 25 to remove the engagement of 23 and 24 and to permit the button 21 to snap outward into its normal position. The conversation thus will have been charged upon the meter, and more than one count will have been prevented because of the inability of the subscriber to press the button more than once, even if he should attempt to do so, by malicious intent or thoughtlessness. As the system is automatic and the connection has been broken at the central office as a response to the depression of the switch hook 9, a new call now may be instituted, with a repetition of the meter counting if the called subscriber responds and with no counting if he does not.

Should a malicious or careless person attempt to press the button 21 without instituting a call, and thus to charge for a service not secured, his success will be prevented by the engagement of the catch 30 in another notch than 23 in the slide 22. This notch faces in the opposite direction from 23 and is adapted to prevent an inward pressure unless the rod 31, carrying the catch 30, is elevated. This will be true only when the disk 2 is nearly in its normal position. Such a position of that disk is shown in Fig. 1, and in so resting the lug 32 engages the lower end of the shaft 31 so holding the catch 30 out of the slide 22 whenever the pawl 11 stands in the position shown in Fig. 1, which is the position permitted by the gear train of the telephone set during a time of conversation resulting from a call by a patron at this station. But a conversation resulting from a call to this station will take place with the pawl 11 within its notch in the disk 2 and also with its pin 10 engaging the notch 12 in the disk 13. There is thus a mechanical difference in the telephone set, between the conversations of a sent and a received call. The inclined plane 33 borne by the pawl 11 is adapted to slide behind the rod 31 when the pawl falls into the notches as described. In so doing the rod 31 has its lower part swung toward the observer viewing Fig. 1, permitting it to slip off the lug 32 and to fall because not otherwise prevented. This will engage the catch 30 in the slide 22, preventing any registry upon the meter by pressure on the button 21 when the pawl 11 is in its normal position. It will be noted that the spring 34 bears against the rod 31, holding it normally in position to be engaged by the lug 32. The bracket 35 is so mortised as to permit the shaft 31 to be moved to clear the lug 32 when that shall be necessary.

The previously described operations will make clear that the slide 22 is only freed by the catch 30 when a call has been instituted, which time only is a proper one for a possible registry upon the meter.

Should a patron attempt to secure successive connections without more than one pressure upon the button 21 by holding this button depressed while turning in successive calls, he would find it impossible to institute such calls because of the engagement of the right angled end of the rod 29 with the pin 37. The main spring 3 could not be wound nor a call transmitted during such a holding of the pin 37, as in that position the pawl 6 will engage the shoulder of the disk 1 to which the handle of the device is directly attached.

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

1. In a measured service telephone, a conversation meter, manual actuating means therefor, and call-sending means adapted to be locked against operation during actuation of such manual means.

2. In a measured service telephone, a conversation meter, manual operating means therefor, call-sending means adapted to be locked during actuation of said meter, and means adapted to lock said meter against operation during conversation.

3. In a measured service telephone, a talking circuit, a conversation meter, a call-sending device, a meter-operating device locked against operation when said talking circuit is in condition for conversation, and means locking said call-sending device when said meter-operating device is actuated.

4. In a substation telephone, a conversation meter, an actuating device therefor, a call-sending device, a talking circuit, and means locking both said meter-actuating and said call-sending devices when said talking circuit is in use.

5. In a measured service telephone, a call-sending device, a transmitter, a conversation meter and actuating means therefor, a shunt about said transmitter adapted to be closed during operation of said call-sending device and to be opened during operation of said meter-actuating means, and means locking said meter-actuating means during conversation.

6. In a telephone set, a receiver, a transmitter, and a by-path for each; a conversation meter and actuating means therefor, a call-sending device and means adapting both said by-paths automatically to be opened during conversation upon a received call, and manually opened during conversation upon a sent call.

7. In a telephone set, a receiver, a transmitter, and a by-path for each; a conversation meter and actuating means therefor, a call-sending device and means adapted to close said by-paths on sending a call, and to break said paths on recording a conversation.

8. In a substation telephone, a conversation meter, actuating means therefor, an electrical switch operated by said actuating means, a transmitter short-circuited by said electrical switch prior to the operation of said actuating means, a switch hook, and means for locking said actuating means upon operation of said actuating means when said switch hook is elevated, and releasing said actuating means when said switch hook is depressed.

9. In a substantion telephone, a switch-hook, a conversation meter and a press-button therefor, a rotary circuit-changing automatic call-sending device and means locking said press-button except after operation of said call-sending device and while said switch-hook is elevated.

10. In a substantion telephone, a conversation meter, a press-button therefor, a call-sending device and means locking said call-sending device when said press-button is actuated.

11. In a substation telephone, automatic impulse-governing means for sending a call, means for recording a call, locking means for said call recording means, and means associated with said call sending means for unlocking said call recording means.

12. In a substation telephone, a calling device; a transmitter; a shunt for said transmitter and having an open contact controlled by said calling device, said contact being adapted to close said shunt when said calling device is off normal and to open said shunt when said calling device is in its normal position of disuse.

13. In a substation telephone, a speech-transmitter; a call-sending device; a shunt for said speech transmitter and controlled by said call-sending device, said call-sending device operating to close said shunt when said call-sending device is off normal and to hold said shunt open when said call-sending device is in its normal position of disuse; and further means for opening said shunt when said call-sending device is positioned to close said shunt.

14. In a substation telephone, a speech transmitter; disabling means for said transmitter; a press-button for restoring said transmitter into service; locking means for said press-button, and further means whereby said locking means is operated to release said press-button by the downward movement of the telephone hook.

15. In a substation telephone, a speech transmitter; a shunt for said transmitter; a press-button for removing said shunt from said transmitter; a locking latch for said press-button; and means whereby said locking latch is operated to release said press-button by the downward movement of the telephone hook.

16. In a substation telephone, a speech transmitter; a shunt for said transmitter; means for removing said shunt from said transmitter; locking latch for said means; and further means whereby said locking latch is operated to release said means upon the downward movement of the telephone hook.

17. In a substation telephone, a speech transmitter; disabling means for said transmitter; restoring means for said transmitter; call-sending means operating said disabling means upon the sending of a call; and locking means for said call-sending means, said restoring means operating said locking means upon the operation of said restoring means to lock said call-sending means upon the operation of said restoring means to restore said transmitter into service.

18. In a substation telephone, a speech transmitter; disabling means for said transmitter; restoring means for said transmitter; call-sending means operating said disabling means upon the sending of a call; locking means for said call-sending means, said restoring means operating said locking means to lock said call-sending means upon the operation of said restoring means to restore said transmitter into service; and further locking means for said restoring means, said further locking means being operated to unlock said restoring means upon the downward motion of the telephone switchhook.

19. In a substation telephone, a speech transmitter; a shunt for said transmitter; a press-button for removing said shunt from said transmitter; a call-sending device operating to shunt said transmitter upon the sending of a call; and a locking latch for said call sending device, said press-button operating said locking latch to lock said call-sending device upon the pressing of said button to remove said shunt from said transmitter.

20. In a substation telephone, a speech transmitter; a shunt for said transmitter; a press-button for removing said shunt from said transmitter; a call-sending device operating to shunt said transmitter upon the sending of a call; a locking latch for said call-sending device; said press-button oper-

ating said locking latch to lock said call-sending device upon the pressing of said button to remove said shunt from said transmitter; and a locking latch for said press-button, said button latch being operated to unlock said button upon a downward motion of the switchhook.

Signed by me at Piqua, county of Miami, State of Ohio, in the presence of two witnesses.

GEORGE W. LORIMER.

Witnesses:
GEORGE A. VAUGIER,
ELBERT M. BELL.