A. M. CRICHTON.

TELEPHONE SERVICE METER.

APPLICATION FILED SEPT. 11, 1908

1,025,378.

Patented May 7, 1912.

2 SHEETS—SHEET 1.

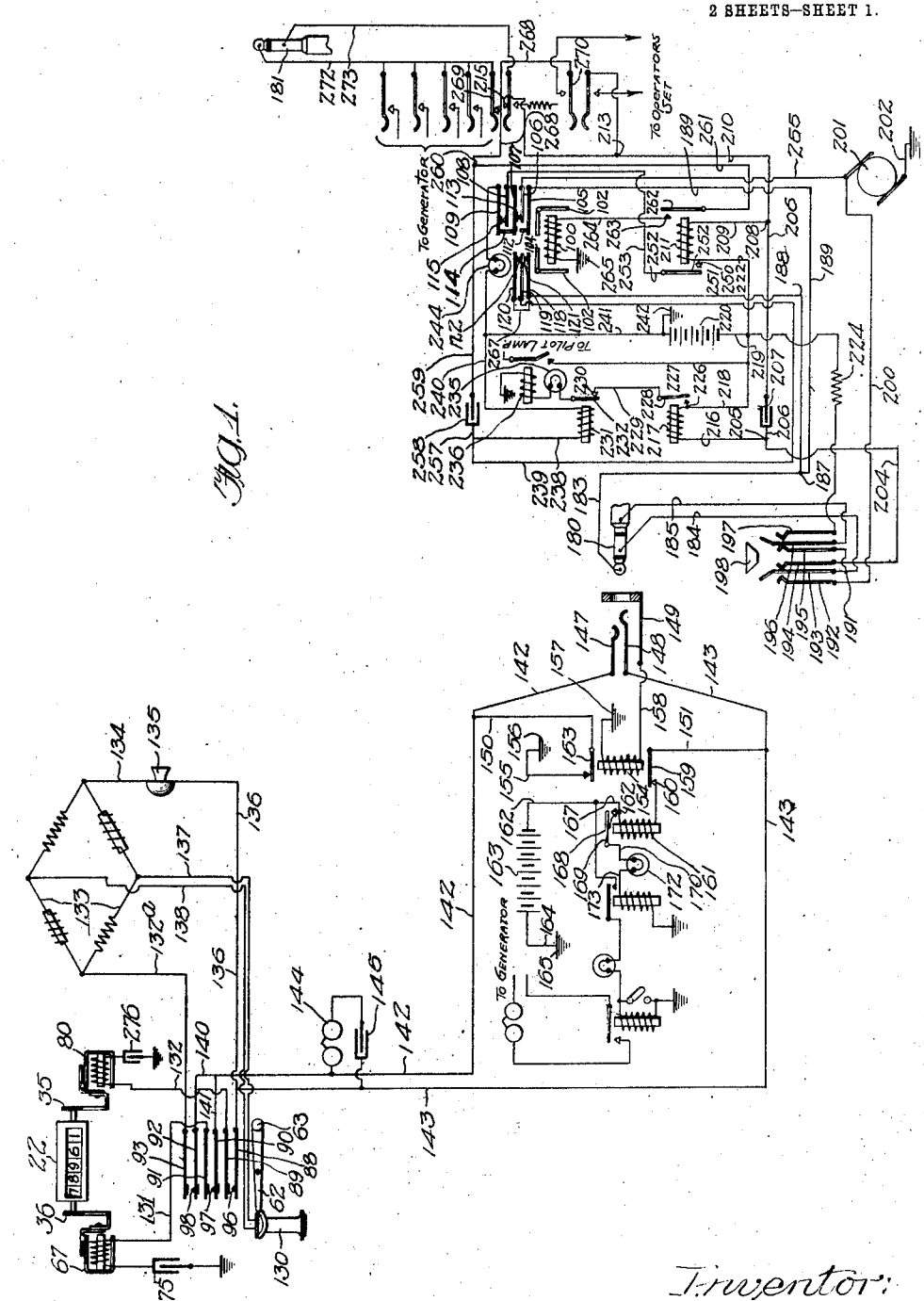

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

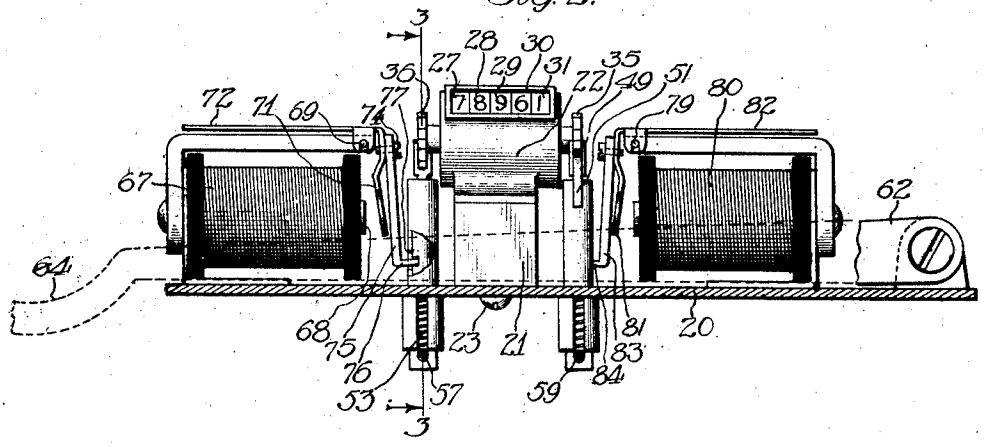


Fig. 3.

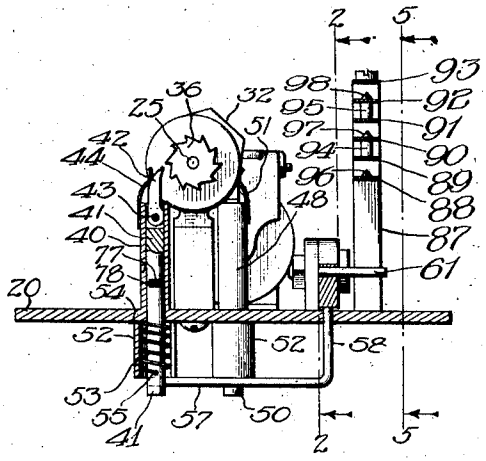


Fig. 3a

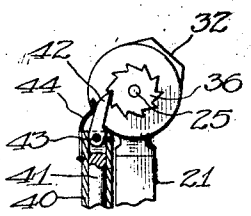


Fig. 4.

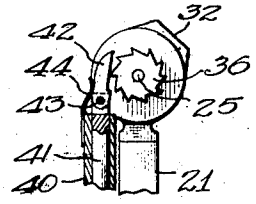
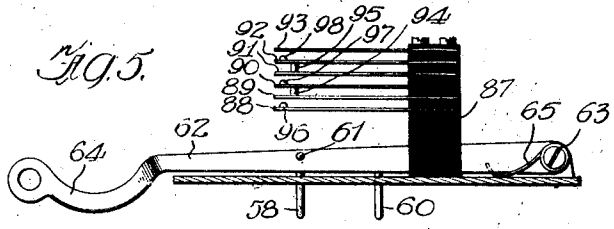


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

ARTHUR M. CRICHTON, OF QUINCY, ILLINOIS.

TELEPHONE-SERVICE METER.

1,025,378. Specification of Letters Patent. Patented May 7, 1912.

Application filed September 11, 1908. Serial No. 452,653.

To all whom it may concern:

Be it known that I, ARTHUR M. CRICHTON, a citizen of the United States, residing at Quincy, in the county of Adams and State of Illinois, have invented a certain new and useful Improvement in Telephone-Service Meters, of which the following is a specification.

This invention relates to telephone systems and particularly to mechanism for automatically measuring or recording the calls or telephone connections with a called subscriber consumed or used by a calling telephone subscriber.

The object of the invention is to provide a meter or recording device located in or immediately adjacent to the calling subscriber's telephone which will when the called subscriber answers automatically register that call in plain view of the calling subscriber.

A further object of the invention is to provide mechanism whereby in the event of the telephone exchange operator making a wrong connection the meter may be reset so as not to show this call with the result that only actual useful and intended calls are recorded.

The invention consists in a meter located in or adjacent to the calling subscriber's telephone so connected electrically and mechanically to the ordinary telephone system that when the called subscriber answers the ring at his telephone by taking the telephone receiver off from the hook an electric impulse is automatically sent to the meter or recording device thereby causing it to record the call.

The invention further consists in mechanism for preventing the meter making more than one record of each call; that is to say to prevent the meter acting while the telephone receiver of the called subscriber is off from the hook except under the momentary impulse produced at the instant said telephone receiver is removed from the hook. And it further consists in mechanism for preventing the meter being moved while the telephone receiver of either subscriber is on the hook.

It also consists in mechanism whereby in the event of a call being improperly registered the meter may be with the assistance of the telephone exchange operator reset to its original position.

The invention further consists in combinations of parts and electric circuits capable of carrying out the foregoing objects, which can be easily and cheaply made and installed which are efficient in operation and are not liable to get out of order.

It also consists in other details which will be more fully described and claimed as the specification proceeds.

Referring to the drawings, Figure 1 is a diagrammatic circuit illustration showing the telephone system fully equipped with the device of this invention. Fig. 2 is a front view of the meter and its immediate operating mechanism taken substantially on the line 2—2 of Fig. 3. Fig. 3 is an end sectional view taken on the line 3—3 of Fig. 2, showing the dog 42 in its lowest or normal position. Fig. 3ª is a view of part of Fig. 3 showing the position which those parts assume when dog 42 is in the act of moving upward toward the position of Fig. 4. Fig. 4 is a similar view to Fig. 3ª showing dog 42 in its highest upward position or at the end of the stroke. Fig. 5 is a detail front view of the telephone subscriber's switch hook and adjacent contacts taken approximately on the line 5—5 of Fig. 3.

It being thought that a description of the parts illustrated in Fig. 1 will be made clearer and easier thereby a somewhat detailed description of the mechanism illustrated in the remaining figures will be made before taking up Fig. 1. As it is manifestly necessary to illustrate the invention in some specific embodiment of the invention the preferred form has been shown, but manifestly this may be varied without departing from the invention.

Referring to Fig. 2 the reader will see a base plate 20 in whose approximate center as here illustrated, rises a suitable support 21 carrying at its upper end a meter casing 22. In the particular case here illustrated this support 21 is secured to the base plate 20 by a screw 23 but manifestly these parts may be cast in one part if desired without departing from the invention. In the meter casing 22 is journaled a suitable shaft 25 (Fig. 3) carrying a suitable recording mechanism of the ordinary type well known in the art of counting devices, comprising a plurality of numeral wheels 27, 28, 29, 30 and 31, one numeral on each wheel being visible through glass or other inspection plate 32 (Fig. 3) in the ordinary manner, the wheels being so geared together

that rotating the shaft 25 a sufficient distance so that one numeral on the units wheel 31 passes over the visible space 32 the mechanism will record that movement within the counter and show the ultimate result of a larger number of said unitary movements on the numerals visible through the inspection plate or dial 32 in the ordinary manner well known in the art of counters. It is essential for the operation of this device that it be, as is well known in the counting device art, provided with a breaking device so that when the mechanism which should normally move the units wheel over a distance equal to one figure, makes said movement, the units wheel will move in unison therewith exactly the right distance and no more.

On one end of the shaft 25 is a ratchet pinion 35 and on the other end of the shaft is a ratchet pinion 36 one having its teeth pointing in one direction and the other having its teeth pointing in the opposite direction. Adjacent to the wheel 36 and on the side thereof shown in Fig. 3 is a tubular member 40 rising from the base plate 20 secured thereto in any suitable manner. Slidably mounted within this tubular member 40 is a rod 41 carrying on its upper end a ratchet dog 42 pivoted to the rod at 43. Secured to the side of this tubular member 40 is a spring 44 which engages the dog 42 when the parts are in the position of Fig. 3[a] and holds it in contact with the wheel 36. When however the rod 41 is in the position of Fig. 3 or has been moved upward by the mechanism to be hereafter described to the position shown in Fig. 4 the spring 44 does not operatively engage the dog and the dog does not operatively engage the wheel 36 with the result that the shaft 25 may be rotated in a counter clockwise direction or in a direction opposite to the point of the dog 42 by the mechanism which will be hereafter described, connected to the wheel 35. Similarly adjacent to the wheel 35 and similarly located with reference to its pointed ratchet teeth and therefore on the opposite side of the central plane of the shaft 25 from the location of rod 41 is another tubular member 48 having mounted therein a slidable rod 50 carrying a dog 49 engaging the teeth of said wheel 35 in exactly the same manner that the dog 42 engages the teeth of wheel 36. This dog 49 is provided with a spring 51 corresponding with spring 44 which holds it in exactly the same way that spring 44 does dog 42 as described.

Below the base plate 20 and inclosing each rod 41 and 50 are enlarged tubular members 52 each containing a retractile spring 53. The upper end of each spring 53 is rigidly secured as at 54 adjacent to the plate 20 and the lower end of each spring is secured, as at 55, to a somewhat distant point of the inclosed rod 41 or 50 as the case may be. When either rod 41 or 50 is in the position of Fig. 4 the coils of this spring are in substantial contact with each other and exert no perceptible tendency to lift the rod but when the rod is pulled down to the position of Fig. 3 the spring 53 is stretched or placed under increased tension by the switch when the associated telephone receiver is placed thereupon and which switch hook permits the meter actuating mechanism to operate when the receiver is removed from the switch hook and which spring tends to return the rod and attached parts through the position of Fig. 3[a] toward the position of Fig. 4. Rigidly attached to the bottom end of rod 41 is an L shaped member 57—58. Similarly rigidly attached to the lower end of the rod 50 is an L shaped member 59—60. The two upright members 58 and 60 just described are so located that as shown they extend upward through the base plate 20 and are engaged by the bar 62, pivoted at 63, carrying on its opposite end the ordinary telephone receiver hook 64. This bar is provided with a spring 65 which tends to move it upward when the telephone receiver is not upon the hook 64. When the receiver is upon the hook the weight of it and the bar 62 moves these members 58 and 60 to their lowest possible positions with the result that the rods 41 and 50 are correspondingly depressed to their lowest positions viz. those of Fig. 2 against the action of the springs 53 heretofore described.

Mounted upon the base 20 adjacent to the tubular member 40 containing the rod 41 is a polarized electromagnet 67 having the core 68. Pivoted to the frame of this magnet at 69 is an L shaped armature composed of the upright member 71 having a horizontal or counterweight member 72 the latter being so shaped and weighted that when the parts are in normal position the upright member 71 is at an angular position with reference to and away from the core 68. Rigidly mounted upon this armature member by means of a screw 74 or other suitable means is a latch member 75 having at its lower end a horizontal locking tooth 76 passing through a suitable slot 77 in the wall of the tubular member 40 and entering a recess 78 in the vertical rod 41 when said rod is in the position of Fig. 3, this with the result that when the parts are in the position of Fig. 3, this tooth 76 locks the rod 41 in the position of said Fig. 3 and against the action of the spring 53. The rod 41 is smooth except for this depression 78 so that when a current has been applied to the magnet 67 and the armature 71 is thereby drawn to it, thereby withdrawing the tooth 76 from engagement with the rod 41 said rod

41 is allowed to move upward under the action of the spring 53 and tooth 76 will not in any way again lock the rod until it has been depressed by means of lever 62 as heretofore described. Similarly located adjacent to the tubular member 48 is another magnet 80 having pivoted at 79 an armature composed of the members 81 and 82 and carrying a lever member 83 on whose end is a dog or tooth 84 engaging a notch or depression in the face of the vertical rod 50 said notch corresponding to notch 78 in rod 41.

The relations and proportions of all the parts heretofore described are such that when the mechanism at the left hand half of Fig. 2 is set as in Fig. 3 and an electric current is applied to the magnet 67 thus drawing the armature member 71 to it and releasing the latch 76 from the rod 41 the spring 53 surrounding said rod will move that rod upward and the dog 42 will be maintained in contact with the wheel 36 while passing through the position of Fig. 3[a] just a sufficient length of time to move the units wheel 31 on the counter one unit space distance after which the dog 42 does not as shown in Fig. 4 engage the ratchet wheel 36. Correspondingly the mechanism on the right hand half of Fig. 2 is so arranged that applying a current to the magnet 80 will momentarily move the armature member 81 toward it and release the rod 50 with the result that its controlling spring 53 will move it upward, its dog 49 just engaging the wheel 35 in passing its position corresponding to Fig. 3[a] a sufficient length of time to cause it to rotate the units wheel 31 of the counter one unitary space and no more after which the dog 49 passes to a position corresponding to that of Fig. 4 in which it does not engage wheel 35. The mechanism just described connected to wheel 36 moves the counting mechanism forward and that connected to wheel 35 moves it backward and either may be worked when the other is in the position of Fig. 3 or that of Fig. 4.

Mounted upon a suitable support 87 and above the sidewardly extending rod 61 carried by bar 62 heretofore described are a plurality of contact springs 88, 89, 90, 91, 92 and 93. Springs 89 and 90 are insulated by the member 94 and springs 91 and 92 are insulated by the member 95. When in normal position these springs are all shaped as shown but when the receiver 130 is taken off from the hook 64 and the lever 62 flies up under the action of the spring 65 it engages the lowermost spring 88 and bends it upward thereby bringing each alternate two of the springs just described in contact with each other through the platinum contacts 96, 97 and 98 respectively.

Referring to the tip-calling supervisory relay, an electromagnet 100 is provided with a depending armature 102. Above this mechanism are five contact springs 105, 106, 107, 108 and 109 insulated from each other and mounted on the frame of the relay in the ordinary manner. Between the members 105 and 107 there is a normally open contact at 112. Between the members 106 and 107 there is a normally closed contact 113. Between springs 107 and 109 is an insulating block 114 and between springs 108 and 109 is a normally closed contact 115. On the opposite side of the top of the magnet 100 are three contact springs 118, 119 and 120. Between the spring members 118 and 119 is a normally closed contact 121 and between the members 119 and 120 is a normally open contact 122. When the arm 104 is raised spring 119 is moved upward thus breaking contact 121 and closing contact 122, it being understood that the arm 104 is directly mechanically connected with the spring 119, the diagram not permitting of the illustration of such mechanical connection, all as will be well understood by those skilled in the art.

Taking up now the telephone system proper which is the principal invention of this application and in which the devices heretofore described are used, the numeral 62 as before stated indicates the telephone hook of the calling subscriber carrying the telephone receiver 130, having mounted adjacent thereto, as heretofore described, the spring contacts 96, 97 and 98. This subscriber is also provided with a counting mechanism fully illustrated in Figs. 1 to 5 inclusive the magnet 67 being connected by the wire 131 to the contact spring 91 and the magnet 80 being connected by the wire 132 to the contact spring 89. The opposite terminals of the magnets 67 and 80 are respectively connected to ground through condensers 275 and 276. A contact spring 93 is connected by the wire 132[a] to the ordinary bridge. 133 and the opposite end of the bridge is connected by the wire 134 through the telephone transmitter 135 and the wire 136 to the contact spring 88. The intermediate corners of the bridge 133 are connected by the two wires 137 and 138 to the telephone receiver 130 in the ordinary manner. Contact spring 92 is connected by wire 140 and contact spring 90 is connected by wire 141 to the line wire 142. The wire 136 is also connected intermediate between the transmitter 135 and the contact spring 88 to the opposite line wire 143. Across these line wires 142 and 143 are bridged ringers 144 and condenser 145 as usual. The opposite end of wire 142 just referred to is carried into the telephone exchange and is connected to the tip spring 147 of the line jack. The corresponding end of wire 143 is also carried to the telephone exchange and is

connected to the sleeve spring 148 of the answering jack. This jack is also provided with a third or local contact 149. These jack parts are old and well known in the art and form no part of this invention *per se*. Across the line wires 142 and 143 and within the telephone station are shunt wires 150 and 151. The wire 150 is connected as shown to the upper spring on the tip side of the armature 153 of cut off relay 154. The wire 155 is connected at one end of the lower spring at the tip side of the relay 153 and has the other end connected to ground at 156. One terminal of the coil 154 upon this relay is connected as shown to ground at 157 and the other end of this coil of the relay is connected by the wire 158 to the local contact 149 of the jack heretofore described.

The wire 151 is connected to the upper spring on the sleeve side 159 of the cut off relay just described, the lower spring on this side of the relay being connected at 160 to one terminal of the coil 161 of the line relay. The other side of said coil is connected by the wire 162 to the negative side of the battery 163, the opposite side of said battery being connected by wire 164 to ground at 165. Connected to the same terminal as the wire 162 is another wire 167 which is connected to the lower spring 168 on the line relay. The upper spring 169 of this relay is connected by wire 170 to one side of the line lamp 172 the opposite side of the line lamp being connected by the wire 173 to the pilot lamp relay which is connected to the pilot lamp and night alarm circuit in the usual manner.

All of the mechanism just described, bearing numerals from 144 to 174 inclusive forms no part of this invention *per se* and is not affected in the operation of the invention. These parts have been shown and described simply as a constituent part of a telephone system to which this invention is applied.

Each operator is provided with an answering plug 180 and a calling plug 181 the opposite ends of which are connected together through the mechanism appearing at the right hand half of Fig. 1 which will now be described.

The answering plug 180 is provided with the tip contact wire 183, the sleeve contact wire 184, and the local contact wire 185. The tip connecting wire 183 just described forks at 187 one branch 188 being connected to the contact spring 118 of the tip calling supervisory relay heretofore described, the other branch 189 of said wire 183 being connected to the spring 105 of said tip calling supervisory relay. The wire 184 heretofore described is forked at 191, one branch being connected to the spring 193, the other branch being connected to the spring 195 of the resetting key. The local wire 185 is connected to the spring 196 of said resetting key. This resetting key is also provided with three other springs 192, 194 and 197. Above all of these springs is a button 198 so mounted that it can be depressed from the position shown to throw the spring 193 into contact with the spring 192 and out of contact with the spring 194 and to simultaneously throw the spring 196 out of contact with the spring 195 and into contact with the spring 197. The spring 192 is connected by the wire 200 to a source of alternating current 201 whose opposite side is connected to ground 202. The spring 194 has connected to it a wire 204 which forks at 205 one branch 206 passing through the condenser 207 to the branching point 208 where it divides into the wires 209 and 210. Wire 209 connects to one end of the coil 211 of the sleeve calling supervisory relay. The wire 210 passes through branching point 213 to the closed contact of the sleeve of the ringing key 215. The other branch 216 of the wire 204 is connected to one side of the coil 217 of the sleeve answering supervisory relay. The opposite end of this coil 217 is connected by the wire 218 to the battery wire 219 leading to the battery 220. Similarly the opposite end of the coil 211 from the wire 209 heretofore described is connected by the wire 222 to said battery wire 219 leading to battery 220. The opposite end of this battery wire 219 is connected through resistance 224 to the contact spring 197 heretofore described. To the same terminal of the sleeve answering supervisory relay 217 to which wire 218 is connected is also connected a wire 226 the other end of which is connected to the lower spring 227 of the sleeve answering supervisory relay. The upper spring 228 of this relay is connected by the wire 229 to the top spring 230 of the tip answering supervisory relay 231. The lower spring 232 of this tip answering supervisory relay is connected through the answering supervisory lamp 235 and thence through the pilot and night alarm circuits common to the art, to the supervisory pilot relay 236 and thence to the night alarm circuits not shown. One terminal of the tip answering supervisory relay coil 231 heretofore described is connected by the wires 238 and 239 to the contact spring 119 heretofore described and the opposite side of this coil 231 is connected by the wire 240 to the battery wire 241 connecting the positive side of the battery 220 heretofore described. The positive side of this battery is as usual connected to ground 242. This battery wire 241 heretofore described is also connected through the calling supervisory lamp 244 to the contact spring 109 heretofore described. The terminal of the coil of the sleeve calling supervisory relay to which wire 222 is also connected is a wire 250, the other end of which is connected to the lower contact

spring 251 of the sleeve calling supervisory relay. The upper spring 252 on the same side has connected to it the wire 253 which is connected to spring 108.

Contact spring 106 heretofore described is connected by wire 255 to one terminal of the source of alternating current 201.

The wires 238 and 239 are connected through wire 257 and condenser 258 to wire 259 which branches at 260 one branch 261 connecting to the lower contact spring 262 of the sleeve calling supervisory relay 211. The upper contact spring 263 of the same side of this relay is connected by the wire 264 to one side of the coil of the tip calling supervisory relay heretofore described. The opposite end of this last mentioned relay is connected to the ground at 265.

The top spring 120 heretofore described is connected to the lower spring 118 by the wire 267. Wires 259 and 261 are connected at their junction 260 to a wire 268 which leads first to the tip side of the ringing key 215—269 and thence to the listening key 270 of ordinary construction. This wire 268 makes contact at the tip side of the ringing key 269 to wire 272 which leads to the tip of the calling plug 181.

The wire 210 heretofore described after passing the junction point 213 goes to the sleeve side of the ringing key 215 and 269 and thence by the wire 273 to the sleeve of the calling plug 181.

In the operation of the device when the subscriber removes the receiver 130 from the hook 62 the hook is immediately spring pressed upward as heretofore described allowing contacts 96, 97, and 98 to close. This action also releases the hook control from the members 58 and 60 so that either rod 41 or 50 may be released by an energizing of the coil 67 or the coil 80 as the case may be as heretofore described. Simultaneously with this occurrence the mechanism operates like many ordinary telephones, to call the central station operator by lighting the line lamp 172 in the telephone station switch board. When this occurs the operator inserts the answering plug 180 in the answering jack 147—148—149. As soon as this is done the operator is able to converse with the calling subscriber and ascertain the number required in exactly the ordinary manner well known in the art. Having ascertained the number the operator inserts the calling plug 181 in the jack which will connect her with the subscriber called. She then calls said subscriber in the ordinary manner by the ordinary mechanism. When the operator inserts the calling plug 181 in the called subscriber's jack a circuit for the battery current from battery 220 is completed in the ordinary manner through wires 222, through the coil of the sleeve calling supervisory relay, thence by wires 209—210 through the contacts 215 and the wire 273 out through the jack and along one side of the called subscriber's line. As soon as the called subscriber answers his call, he closes the contacts in his hook switch allowing the battery to make a complete circuit through his instrument, the tip of calling plug 181, through wire 272, through the ringing key 269 to wires 268, 261 and through the springs 262 and 263 to wire 264, and to the coil 100 of the tip calling supervisory relay and thence to ground which energizes that relay and pulls armature 102 toward the magnet of the relay, thus operating said relay in the manner heretofore fully described. As soon as this happens contacts 121 and 122 are thrown open at the same instant as contacts 112 and 113 are closed thus allowing alternating current to flow from the source 201 along the wire 255 through contacts 113 and thence through contact 112 through the wire 189 and wire 183 to the tip of the answering plug on to the tip spring 147 of the answering jack, through the wire 142, through the closed contacts 97, and along the wire 131 to one side of the coil of the polarized magnet 67 and thence through condenser 275 to ground. This action magnetizes magnet 67 and draws armature 71 toward it thereby drawing lever arm 75 toward it and pulling tooth 76 out of engagement with rod 41 thus allowing spring 53 to force the rod and attached tooth 42 upward through a sufficient length of travel to engage the wheel 36 and rotate the units counter wheel 31 one unit forward thus indicating on the meter one actual call used. The continued motion of the armature 102 toward the coil 100 forces the tip calling supervisory relay to the positions in which the whole system is put in normal position for conversation that is to say the alternating current momentarily passing from the source 201 of alternating current is disconnected and no longer continues to flow through the system and the alternating current is cut off at relay 100 with the result that the meter can not again operate until everything has been reset to normal position. When the alternating current is flowing momentarily through the circuit the regular cord circuit is disconnected from the answering plug so that the alternating current can only go to the calling subscriber and can not pass along the line to the called subscriber and thereby operate his meter when it is not intended to be operated.

Should a mistake be made by the operator and a wrong number be called in response to the calling subscriber's request, with a consequent incorrect record on his meter, he can at once advise the central station operator of his mistake who will at once press down the key 198 thereby disconnecting the

connection between the sleeve and the local contact on the answering plug and at the same time connects springs 196 with 197 which allows the battery current from battery 220 to flow through resistance 224 to the local contact of the answering plug, to the local contact of the answering jack thence to the cut-off relay. Simultaneously contact springs 193 and 192 engage each other thereby allowing alternating current from source 201 to flow through wire 200 and these contacts, thence through the sleeve of the answering plug to the sleeve spring of the answering jack on the sleeve side of the line and through contacts 96 of the hook switch and the wire 132 to the magnet 80 thence through condenser 276 to ground. The energizing of this magnet releases rod 50 and attached dog 49 thus rotating wheel 35 one unit of measurement backward and this corrects the previous mistake. When the conversation has been finished and the calling subscriber hangs up his receiver 130 he thereby depresses hook 62 and causes it to engage the posts 58 and 60 heretofore described thereby resetting rods 41 and 50 in engagement with their respective latches 68 and 84 in which position they are ready to be operated in the manner heretofore described.

While I have herein shown and particularly described my invention as used in connection with a manual exchange, and have also described the meter as being operated at the calling station by the called station for the purpose of increasing its count, it is to be understood that I do not limit myself to manual exchanges nor to meters that are operated by called stations for increasing their counts, as it is obvious there are many advantages obtainable by means of my invention when not restricted to use in connection with manual exchanges and to operation by called parties.

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

1. In a telephone system in combination with a calling and a called subscriber's telephone set, a meter mechanism in the calling subscriber's station, means for temporarily electrically connecting the two subscribers' sets, mechanism operated by the first use of the called subscriber's set in answering his call adapted to operate the meter at the calling subscriber's station so as to record said call, means operatable where the aforesaid means are located for reducing the count of the meter furnished by the counter that is operated to indicate the number of connections, and mechanical means for preventing operation of the meter to increase its count after it has been operated to increase its count during an established connection.

2. In a telephone system in combination with a calling and a called subscriber's telephone set, a meter mechanism in the calling subscriber's station, and means for temporarily electrically connecting the two subscribers' sets and mechanism operated by the first use of the called subscriber's set in answering his call adapted to operate the meter at the calling subscriber's station so as to record said call and then automatically operated to mechanically cut out said meter mechanism so that only one record can be made upon the meter by that use of the called subscriber's telephone.

3. In a telephone system in combination with a calling and a called subscriber's telephone set, a meter mechanism in the calling subscriber's station, means for temporarily electrically connecting the two subscribers' sets and mechanism operated by the first use of the called subscriber's set in answering his call adapted to operate the meter at the calling subscriber's station so as to record said call and then automatically operated to mechanically cut out said meter mechanism so that only one record can be made upon the meter by that use of the called subscriber's telephone and mechanism operated by the calling subscriber's telephone when restored to idle position.

4. In a telephone system in combination with calling and called subscriber's telephone sets, calling and answering jacks and calling and answering plugs therefor; a meter at the calling station, an independent source of electrical energy furnishing wave form current and connected between said plugs, a plurality of switches, a relay connected between said plugs adapted to be energized when the called subscriber answers his telephone, and said plurality of switches operated by said relay and to first momentarily send electric current from said independent source to the meter at the calling subscriber's station and at the same time open the system so that said current can not flow toward the called subscriber's set and finally cut off the wave form current and close talking circuit.

5. In a telephone system in combination with calling and called subscriber's telephone sets, jacks and calling and answering plugs therefor; a meter at the calling station, an independent source of electrical energy furnishing wave form current and connected between said plugs, a plurality of switches, a relay connected between said plugs adapted to be energized when the called subscriber answers his telephone to operate said plurality of switches which first momentarily send electric current from said independent source to the meter at the calling subscriber's station and at the same time open the system so that said current can not flow toward the called subscriber's set and finally cut off the wave form current

and close the talking circuit, and means operated automatically by the calling subscriber in discontinuing the use of his set to restore all of the mechanism to original operative position.

6. A telephone exchange system including telephone lines extending from stations to an exchange where means are provided for extending the telephone lines and connecting the same for conversation, a meter at one of said stations for counting connections made with the line extending thereto, means associated with an extension of said latter telephone line for operating the meter to increase its count, means also associated with such extension for operating the meter counter that is operated to record the number of connections to reduce its count, and mechanical means for preventing operation of the meter to increase its count after it has been operated to increase its count during an established connection.

7. A telephone exchange system including telephone lines extending from stations to an exchange where means are provided for extending the telephone lines and connecting the same for conversation, a meter at one of said stations for counting connections made with the line extending thereto, means associated with an extension of said latter telephone line for operating the meter to increase its count, and mechanism located at the station where the meter is located for mechanically preventing reoperation of the meter to increase its count during the continuation of the extension of the telephone line extending to the station having the meter.

8. A telephone exchange system including telephone lines extending from stations to an exchange where means are provided for extending the telephone lines and connecting the same for conversation, a meter at one of said stations for counting connections made with the line extending thereto, means associated with an extension of said latter telephone line for operating the meter to increase its count, there being a switch hook at the station having the meter and mechanism governed by the switch hook for mechanically preventing the operation of the meter when the switch hook supports the associated telephone receiver and serving to permit the operation of the meter when the switch hook is freed from the weight of the telephone receiver and also serving to prevent reoperation of the meter during the absence of the receiver from the switch hook.

9. A telephone exchange system extending from subscribers' stations to an exchange at which exchange means are provided for extending the telephone lines and uniting the same for conversation, a meter at one of the subscribers' stations, mechanism for operating the meter which includes a spring, means whereby the tension of said spring is increased by the switch hook when the associated telephone receiver is placed thereupon and which switch hook permits the meter actuating mechanism to operate when the receiver is removed from the switch hook, electromagnetic mechanism for holding the meter actuating mechanism when the switch hook is relieved of the weight of the receiver, and means associated with an extension of the telephone line extending to the station having the meter for operating the electromagnetic mechanism to remove its restraining influence from the meter actuating mechanism to permit the meter actuating mechanism to operate the meter when the switch hook is free of the receiver.

10. A telephone exchange system extending from subscribers' stations to an exchange at which exchange means are provided for extending the telephone lines and uniting the same for conversation, a meter at one of the subscribers' stations, automatic mechanism for operating the meter and held under restraint by the switch hook when supporting the receiver and permitted by the switch hook to operate the meter when the switch hook is relieved of the weight of the receiver, electromagnetic mechanism for holding the meter actuating mechanism when the switch hook is relieved of the weight of the receiver, and means associated with an extension of the telephone line extending to the station having the meter for operating the electromagnetic mechanism to remove its restraining influence from the meter actuating mechanism to permit the meter actuating mechanism to operate the meter when the switch hook is free of the receiver.

11. A telephone exchange system including telephone lines extending from stations to an exchange where means are provided for extending the telephone lines and uniting the same for conversation, a meter at one of the telephone stations, means associated with an extension of the telephone line extending to the station having the meter for effecting the operation of the meter, said meter having three conditions of operation, one in which the meter actuating mechanism is prepared to operate the meter, another in which the meter operating mechanism is in actuating relation with the meter counter, and a third in which the meter actuating mechanism is thrown out of actuating association within the meter counter, and means governed at the station having the meter for changing the meter actuating mechanism from its said third condition to its said first condition.

12. A telephone exchange system including telephone lines extending from stations

to an exchange, where means are provided for extending the telephone lines and uniting the same for conversation, a meter at one of the telephone stations, means associated with an extension of the telephone line extending to the station having the meter for effecting the operation of the meter, said meter having three conditions of operation, one in which the meter actuating mechanism is prepared to operate the meter, another in which the meter operating mechanism is in actuating relation with the meter counter, and a third in which the meter actuating mechanism is thrown out of actuating association with the meter counter, and means for changing the meter actuating mechanism from its said third condition to its said first condition.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

ARTHUR M. CRICHTON.

Witnesses:
THOS. A. SCHERER,
W. P. MARTINDALE.