

C. T. PATTERSON.
TELEPHONE SYSTEM.

APPLICATION FILED APR. 12, 1909.

Patented Aug. 23, 1910.

4 SHEETS—SHEET 1.

968,396.

FIG. 1

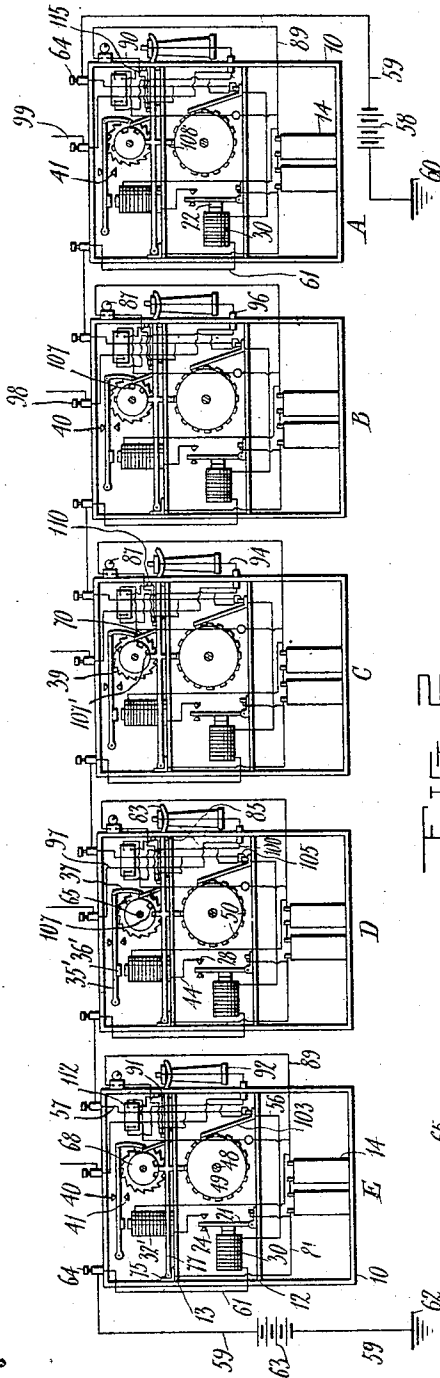
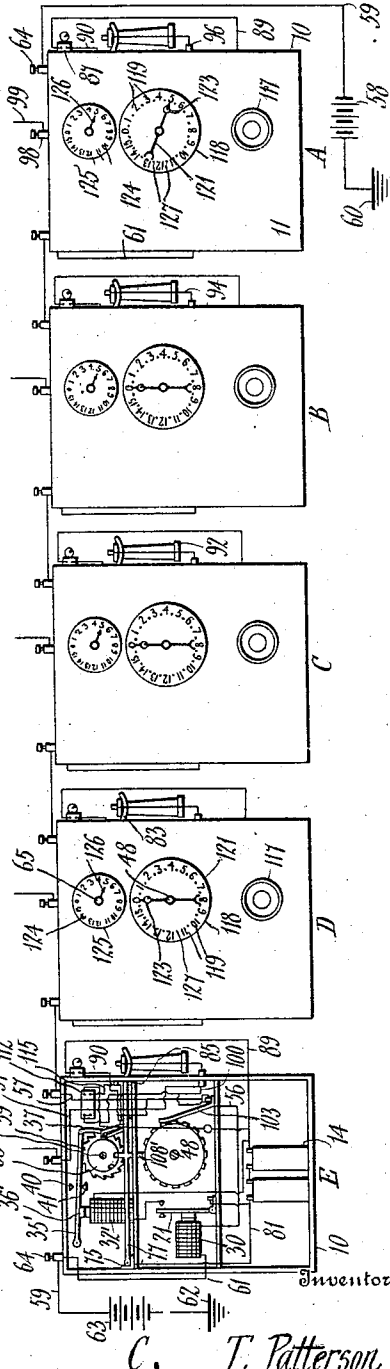


FIG. 2



Witnesses

W. J. ...
W. J. ...

C. T. Patterson

Charles ...

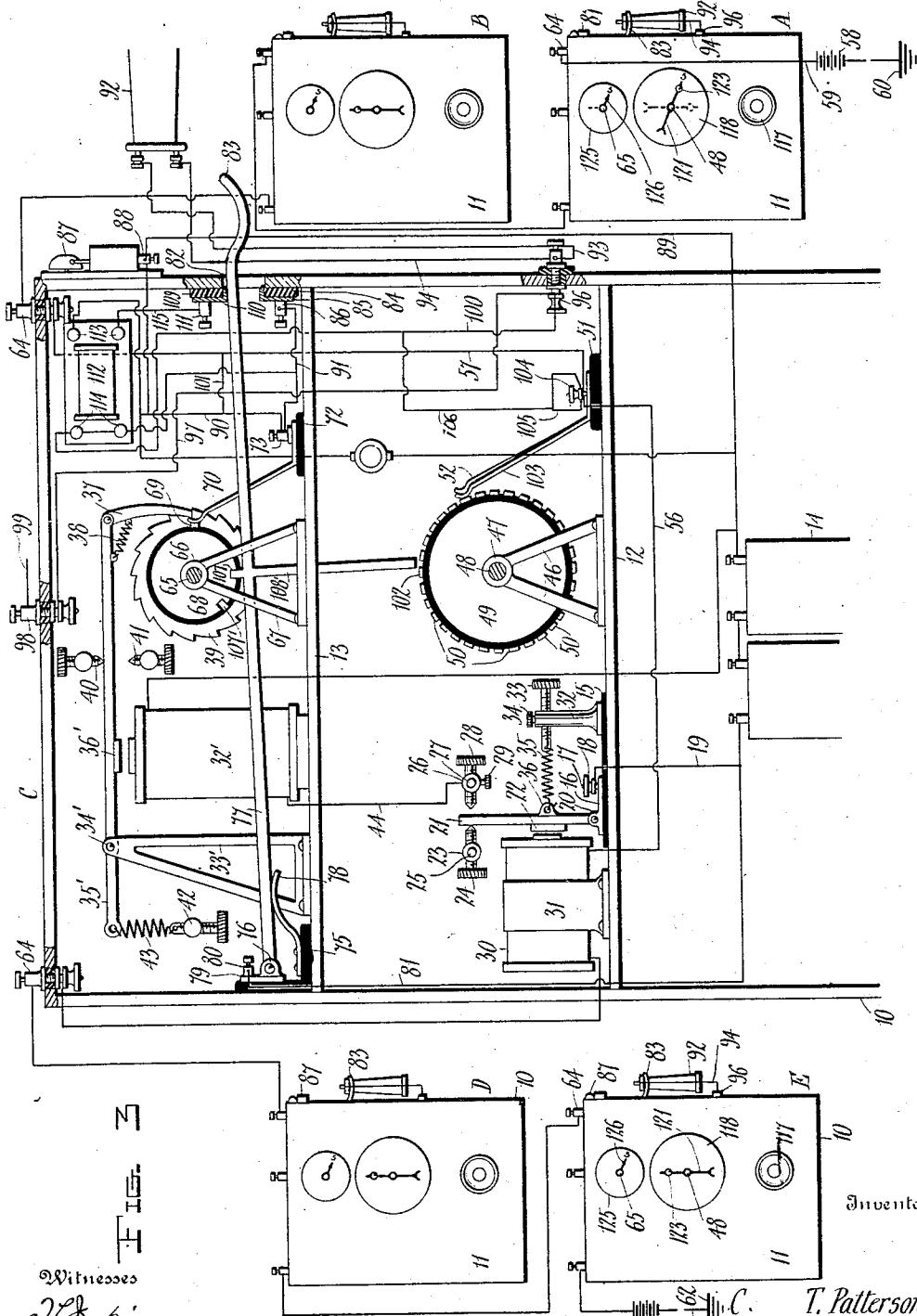
Attorneys

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4 SHEETS—SHEET 2.



Witnesses
H. L. ...
M. ...

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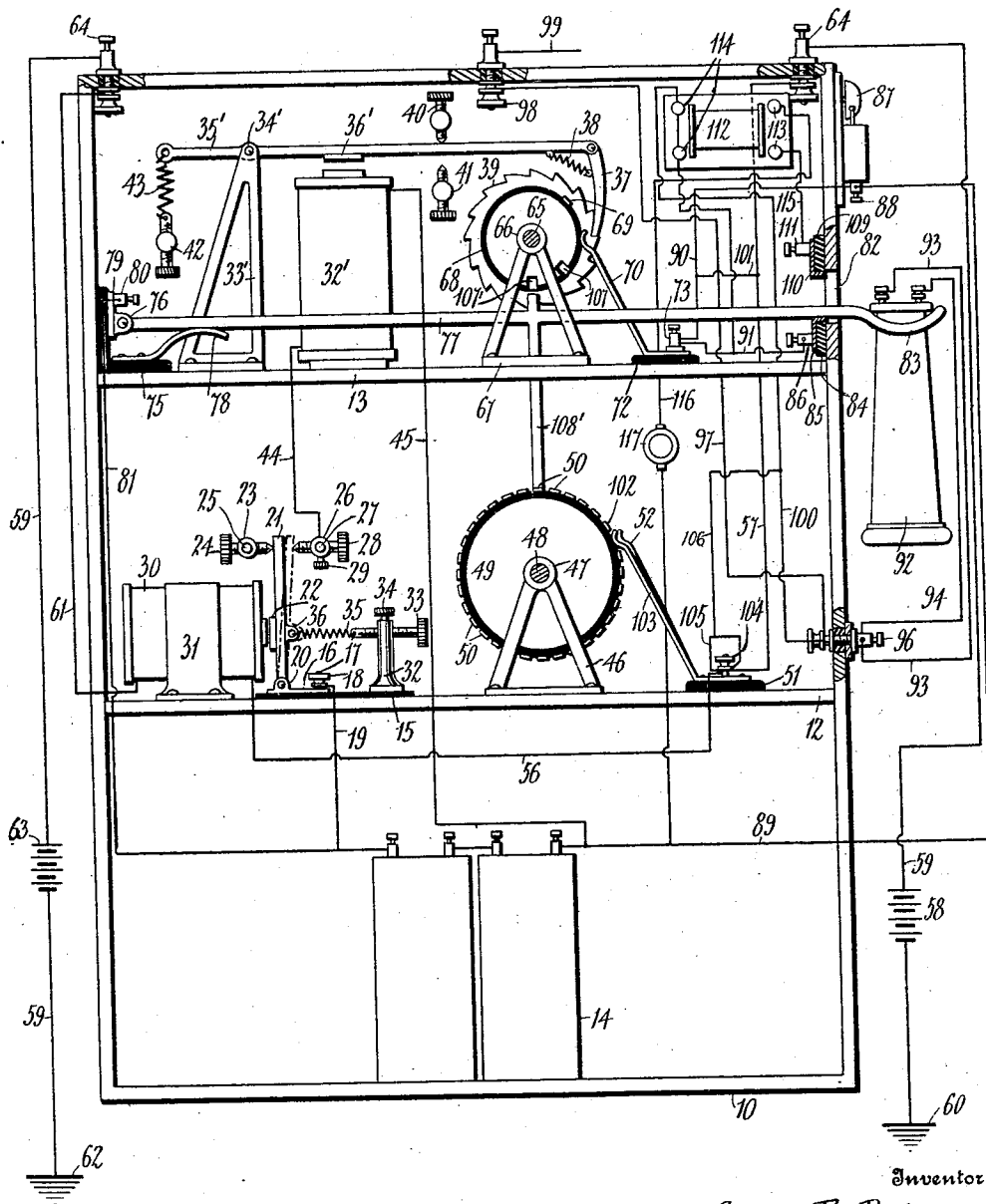
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4 SHEETS—SHEET 3.

968,396.

FIG. 4



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Witnesses

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M. Gillis

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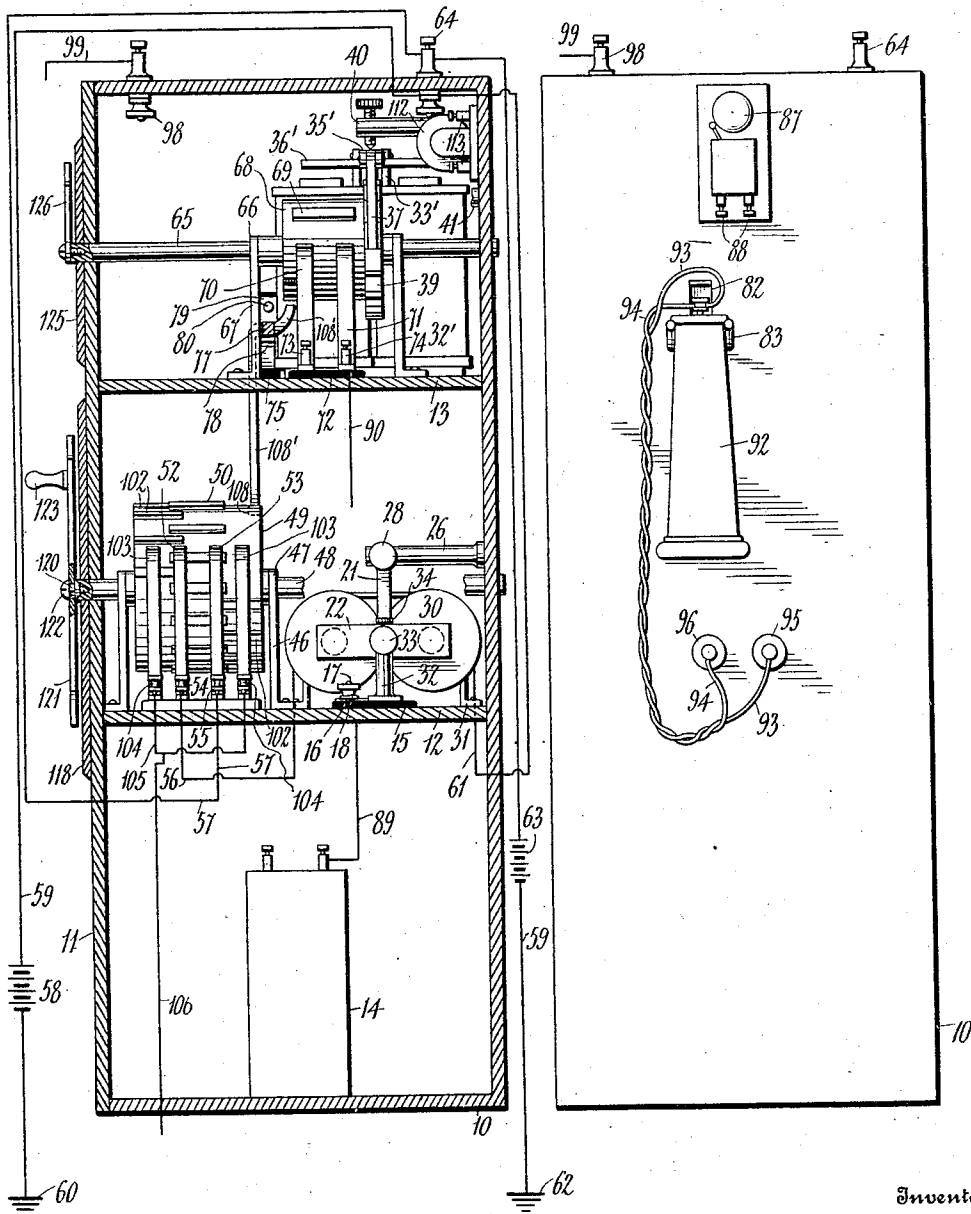
968,396.

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4 SHEETS—SHEET 4.

FIG. 5

FIG. 6



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UNITED STATES PATENT OFFICE.

CHARLEY T. PATTERSON, OF ALBANY, OREGON.

TELEPHONE SYSTEM.

968,396.

Specification of Letters Patent.

Patented Aug. 23, 1910.

Application filed April 12, 1909. Serial No. 489,394.

To all whom it may concern:

Be it known that I, CHARLEY T. PATTERSON, a citizen of the United States, residing at Albany, in the county of Linn, State of Oregon, have invented certain new and useful Improvements in Telephone Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to telephone systems and has special reference to a telephone system designed to be operated without the central station.

One object of the invention is to provide an improved form of telephone system of the above mentioned type which may be operated over a single wire.

Another object of the invention is to provide an improved means in such a system for connecting two of the stations.

A third object of the invention is to provide an improved station mechanism.

A fourth object of the invention is to provide a signaling system in connection with such telephone system, the signaling system being arranged for operation over the same wire that is used for talking.

With the above and other objects in view the invention consists in general of a plurality of stations equipped with improved devices and connected on a single wire, in combination with a signaling means at each of the stations also connected to the same single wire.

The invention further consists in certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings, and specifically set forth in the claims.

In the accompanying drawings, like characters of reference indicate like parts in the several views, and:—Figure 1 is a diagrammatic view of a line equipped with five stations constructed in accordance with this invention, all of said stations being out of use. Fig. 2 is a similar view showing one of the stations signaling to another. Fig. 3 is a view similar to Fig. 2 showing one of the stations of that figure connected for talking. Fig. 4 is a front elevation with the front of the station casing removed to show the operating mechanism. Fig. 5 is a view with one side of the casing removed to show the oper-

ating mechanism. Fig. 6 is a side elevation of one of said stations.

While the device has here been shown as equipped with 5 stations it is obvious that as many stations may be used as may be found desirable and that the same station instruments can be used, within certain limitations, for any convenient number of stations. In accordance with this the station instruments are shown as designed for a line containing 15 stations of which 5 only are in use.

In the accompanying drawings the first 5 stations are supposed to be those in use and are designated respectively by the letters A, B, C, D and E.

At each of the stations above noted there is provided a station instrument and these station instruments each has a casing 10, the front 11 whereof is so arranged as either to open on hinges or to be readily detached from said casing to afford access to the interior of the casing. The casing 10 is preferably divided into three portions by means of partitions 12 and 13. In that part of the casing below the partition 12 is held a battery 14 which is termed the local battery. This battery 14 is preferably of what is termed the open circuit type. On the upper side of the partition 12 is mounted an insulating plate 15 whereon is mounted a bearing plate 16 of brass or other conducting material. At one end of this bearing plate there is provided a threaded pin 17 and a thumb screw 18 is carried on this pin for the purpose of securing a wire 19 between the thumb screw and the plate 16. This wire 19 leads to and is connected with one of the poles of the battery 14. The bearing plate 16 is provided with spaced ears 20 wherein is pivotally mounted a lever 21 having an armature 22 fixed thereon, the lever being of conducting material and the armature preferably of soft iron as is usual. For the purpose of controlling the amount of movement of the lever 21 there is provided a stop post 23 having the usual screw stop 24 and lock screw 25. Opposite to this stop post is provided a binding post 26 having a binding screw 27 and being further provided with a stop screw 28 and lock screw 29.

A magnet 30 is mounted on the partition 12 by means of a suitable fastening as indicated at 31 and the magnet pole is posi-

tioned opposite the armature 22. At 32 is positioned a tension post provided with the usual tension screw 33 and lock screw 34. A spring 35 connects the front end of the tension screw 33 with an ear 36 formed on the lever 21. Mounted upon the shelf 13 is a magnet 32', the same being preferably in a vertical position. Upon the same shelf is mounted a standard 33' having a bearing 34' at the upper ends thereof wherein is pivotally supported an arm 35'. The arm 35' is provided with an armature 36' suitably positioned with reference to the pole of the magnet 32'. The arm 35' is prolonged beyond the magnet and is provided at its outer end with a pawl 37 normally drawn toward the arm 35' by means of a spring 38. The pawl 37 is a pivot pawl and is preferably pivoted at the extreme end of the arm 35'. Rotatably mounted adjacent the pawl 37 is a ratchet 39 arranged to be acted on by said pawl. For purposes hereinafter to be described this ratchet is provided with teeth equal in number to one more than the number of stations for which the apparatus is designed. That is to say, in the present instance, there are provided 16 teeth for the 15 stations for which the present apparatus is designed.

It is intended that each time that the armature 36' is attracted by the magnet 32' the ratchet will rotate one notch. In order to adjust this movement there are provided stops 40 and 41 above and below the lever 35' and these stops are similar in all respects to the stop 23 before described. The end of the lever 35' also projects beyond the bearings 34' and a tension post 42 is located adjacent this end and connected therewith by means of a spring 43. From the magnet 32' one end of the wire thereof leads to the binding post and stop 26 as indicated at 44. The other end of the wire is shown at 45 and is connected to the battery 14.

Mounted on the partition 12 is a stand 46 provided with bearings 47 wherein is carried a shaft 48. This shaft is mounted to rotate in the bearings and has rigidly attached thereto a drum 49 made of some insulating material such as vulcanite or the like. Equally spaced around the drum 49 are a series of contact strips 50 equal in number to the notches in the ratchet 39. Upon the partition 12 is further mounted an insulating plate 51 whereon is supported a pair of contact fingers 52 and 53. These contact fingers are securely attached to the plate 51 and are made of some resilient material such as spring brass. Each of these contact fingers is provided with a binding post as indicated at 54 and 55, the binding post 54 being connected to the finger 52 and the binding post 55 to the finger 53. A wire 56 connects the binding post 54 with one end of the magnet 30 while a wire 57 connects the

binding post 55 with the main line wire. A battery 58 is located at any convenient point in the system and one pole of the battery is connected to the main line wire 59 while the other pole is grounded as shown at 60. From the opposite end of the magnet 30 a wire 61 connects with the main line wire. The opposite end of the main line 59 is also grounded as indicated at 62.

With the parts in position as shown in Fig. 1 it will be noted that the various magnets 30 are all in circuit with the main line and are energized by the battery 58. In order that the battery may not quickly polarize it is preferable to make the main line battery 58 one of the closed circuit type. It will also be observed that with the parts in this position the circuit from the battery 14 through the magnet 32' will be an open circuit.

Adjacent the ground 62 in a suitable position in the main line circuit is a battery 63 of the same type as the battery 65 adjacent the ground 60. It will now be apparent that if the main line wire be cut and one end grounded at any one of the stations there will still be a current passing through the grounded portion of the wire.

Considering now the operation of that portion of the system already described it will be noted that the bars 50 are separated from each other by the insulating drum 49. Under the conditions shown in Fig. 1 a constant current of electricity will pass from the battery through the various magnets 30. This current holds the arm or lever 21 in the position shown. This current passes into the several casings by means of binding posts 64 preferably located on the top of each casing. The current passes from the main line 59 through one of the binding posts 64 in each of the casings and from there passes over the wire 57 to the binding post 55 which conducts it to the contact finger 53. It then passes across one of the bars 50 and down the contact finger 52, binding post 54 and wire 56 to the magnet 30 from whence it is returned to the main line 59 through the wire 61 and post 64 connected to that portion of the main line.

Suitable means, to be hereafter described, is provided for rotating the drum 49. If, now, this drum should be rotated the current through the line wire will be broken and remade as many times as the fingers 52 and 53 contact with one of the bars 50. Each time that this current is broken the magnet 30 is demagnetized and the spring 55 draws the lever 21 into contact with the stop 28. When this occurs a current is set up from the battery 14 through the wires 19, binding post 18, lever 21, binding post 26 and wire 44 to the magnet 32' from whence it passes by means of the wire 45 to the other pole of the battery 14. When

this occurs the lever 35' is depressed by reason of the armature 36 being attracted by the magnet 32'. Stops 40 and 41 having been properly positioned, the result of this
5 will be that the ratchet 39 is rotated one tooth for each break of the circuit through the magnet 30. It will thus be plain that if the circuit be broken five times the ratchet 39 will turn around a distance
10 equivalent to five teeth thereof and the same with any other number of breaks.

The ratchet 39 is rigidly mounted upon a rod 65 which is supported in bearings 66 on a frame 67 attached to the partition 13.
15 Rigidly connected to this ratchet is an insulating drum 68 provided with a single contact bar 69 so positioned that it will contact with the end of a pair of resilient contact springs 70 and 71 when the ratchet has been
20 turned a predetermined number of teeth. The springs 70 and 71 are mounted on an insulating plate 72 and the spring 70 is provided with a binding post 73 while the spring 71 is provided with a similar post 74.
25 Mounted on a suitable insulating plate 75 is a bearing 76 wherein is pivotally mounted a receiver arm 77 normally held in a raised position by means of a spring 78 attached to the plate 75. The bearing 76 is provided
30 with an extension thereon as indicated at 79 and upon this extension is mounted a binding post 80. A wire 81 connects the binding post 80 with one pole of the battery 14. The arm 77 passes out through a slot
35 82 formed in the side of the casing and is provided at its outer end with the usual receiver supporting fork 83. Held on a suitable insulating plate 84 adjacent the slots 82 is a contact 85 arranged to contact
40 with the arm 77 when the same is depressed. Upon the contact 85 is a binding post 86. At 87 is indicated a bell provided with binding posts 88. From the battery 14 a wire
45 89 leads to one of these binding posts and a wire 90 serves to connect the other binding post with the post 74. From the binding post 73 a wire 91 leads to the binding post 86.

Now it is to be observed that the contact strip or bar 69 is so positioned that when the ratchet to which it is connected has been revolved a number of teeth corresponding to the number of the station this contact piece will lie under the ends of the contact fingers 70 and 71 and complete the circuit.
55

When it is desired to call one station from another station the drum 49 is revolved to such position that the main line circuit will be broken and made a number of times
60 equal to the number of the stations to be called. This, as hereinbefore described, will rotate the ratchet 37 a number of teeth equal to the number of times the circuit is made and broken. Owing to the position of the
65 contact bar 69 the same will now complete

the circuit from the battery 14 through the wire 81, binding post 80, bearing 76, arm 77, contact 85, binding post 86, wire 91, binding post 73, contact finger 70, contact bar 69, contact finger 71, binding post 74, wire 90, one of the binding posts 88 on the bell, then through the bell to the other binding post 88, and wire 89 back to the battery 14. As long as this circuit remains unbroken, the bell 89 will continue to ring.
75 When the phone is answered by the person called the receiver is removed from the hook 83. This allows the arm 77 to rise under the action of the spring 78. This breaks the circuit as the arm is lifted from the contact 85. The bell thereupon ceases
80 to ring.

Considering now the talking mechanism with special reference to the receiver. At 92 is shown a receiver which may be of any
85 preferred type. This receiver is connected in the usual manner to a double cable the wires of which are indicated at 93 and 94. The other ends of these wires are held in binding posts 95 and 96. From the binding
90 post 95 there runs a wire 97 to a binding post 98 preferably situated intermediate of the binding post 64 upon the top of the casing. The other end of the binding post is connected to a wire 99 which forms the local
95 ground wire. From the binding post 96 extends a wire 100 which is connected to the wire 91. A wire 101 serves to connect the wire 57 with the wire 90. It will be seen that this provides a circuit leading from the
100 main line wire 59 through the binding post 64, wire 57, wire 101, wire 90, binding post 74, contact finger 71, contact bar 69, contact finger 70, binding post 73, wire 91, wire 100, binding post 96, wire 94, to the receiver 92.
105 From thence the circuit continues through the wire 93, binding post 95, wire 97, binding post 98 to the ground wire 99. It will be noted that this circuit is formed through the contact bar 69. In consequence, this
110 is the circuit at the station which has just been rung up.

In order to place the calling station in talking communication with the called station the drum 49 is provided with a series of
115 contact bars 102. These bars are disposed intermediate each pair of the bars 50. These contact bars are arranged so that they project beyond the ends of the bars 50 but do not extend across the space between the con-
120 tact fingers 52 and 53. These bars are further positioned on opposite ends of the drum 49 in such manner that the bars on each end of the cylinder equal in number the stations
125 located and the number of stations remaining. That is to say if the station be number 5 in the line there will be four of these bars on one end of the cylinder and 11 on the op-
130 posite end in a 15 station line. Mounted

upon the insulating plate 71 are contact fingers 103, there being two of these fingers disposed outside of the fingers 52 and 53. These fingers are provided with binding posts 104 which are connected by means of a wire 105. The wire 105 is connected by a wire 106 with the wire 100. In the drum 68 are notches 107 at the neutral point and 107' at the ringing point. A similar notch 108 is formed in the drum 49 and a bar 108' is mounted on the arm 77, being arranged to enter these notches according as the arm 77 is raised or lowered. By reason of this arrangement all the other telephones on the circuit are securely locked during the time that any two are talking, and the bars 77 belonging to these other telephones will be held from raising so that no talking circuit can be established through any other telephone. With this object in view the notches are so positioned that the contact fingers 70 will rest upon the bar 69 when the bar is ready for engagement with the slot 107. Now when the bell has been rung and the operator at the called station has removed the receiver 92, the arm 77 will rise and the bar 108' will engage the notch 107, thus preventing any further rotation of the drum 69 so long as the receiver remains off the fork 83. When the operator at the called station removes the receiver the operator at the calling station rotates the drum 49 slightly so as to bring the contact fingers 52 or 53 upon one of the bars 102. When this is done one of the fingers 103 will also rest on that bar. It is to be noticed that the rotation is in the same direction as for calling a station and that it is to be but one half of the distance between the bars 50. This brings the fingers in contact with the bar next succeeding the bar 50 which is used for ringing the called station. A circuit is thus established from the ground through the receiver to the wire 100, then through the wire 106, wire 105, one of the binding posts 104, one of the fingers 103, a bar 102 and back to the contact finger 52 or 53 which may be in contact with that bar out to the main line 59.

By reason of the peculiar arrangement of the bars on opposite ends of the drum 49 it will be observed that when the contact fingers on one end are in contact with the bar the wire 57 will be connected in this circuit while if the fingers be in contact with a bar 102 at the opposite ends the fingers 56 and 103 will be in contact therewith. This establishes circuit in either direction from the station. When the circuit is broken to move the fingers on to the bars 102 the ratchet 39 will be prevented from rotating by the engagement of the lugs 107 and the notch 108.

It will be noticed that when the talking circuit is established the main line will be

grounded at both ends. In order to maintain a current of electricity through this main line there is provided a circuit from the local battery now to be described. Upon the side of the casing above the opening 82 is positioned an insulating plate 109 whereon is supported a contact 110 having mounted thereon a binding post 111. An induction coil 112 is supported within the casing and is provided with binding posts 113 for the primary circuit and 114 for the secondary circuit. A wire 115 serves to connect one of the posts 113 with the post 111. From the other post 113 a wire 116 runs to the battery 14. It will now be plain that when the receiver 92 is removed from the arm 77 and the arm allowed to rise a circuit will be established from the battery 14 through the wire 81, arm 77, contact 110, binding post 111, wire 115, primary coil of the induction coil 112, and the wire 116 back to the battery 14. For the purpose of including the secondary coil of the induction 112 in the talking circuit the wire 100 is broken and the end of each of the parts is held in one of the binding posts 114. It will thus be plain that a current will be induced in the talking circuit as soon as the receiver is removed from the fork. At 117 is located a transmitter which may be of any desired type and for the purpose of including this transmitter in the talking circuit the wire 116 from the primary is broken and the ends of the broken wire are attached to the binding posts of the transmitter 117.

The drum shafts 48 and 65 each projects through the front of the casing. Surrounding the drum shaft 48 is a dial 118 whereon is formed a series of numerals 119 equal in number to one more than the number of stations for which the line is designed. The top numeral is represented by zero and is what is preferably termed the neutral point. The end of the shaft 48 is squared as indicated at 120 and upon the squared end is carried a pointer or arrow 121. The arrow 121 is held upon the end of the shaft 48 by means of a suitable screw 122 and this arrow is further provided with a finger piece 123 which serves as a means for rotating the arrow and consequently the drum 49. A dial plate 125 is provided around the shaft 65 and an arrow 126 is held upon the shaft 65 in a manner similar to which the arrow 121 is held upon the shaft 48. The dial plate 125 is provided with a series of numerals 124 arranged like the numerals 119 on the dial 118. Between the numerals 119 on the dial 118 is provided a series of marks 127. The numerals 119 indicate the numbers of the stations to be called and when the pointer 121 is moved over a number of these numerals the current will be broken and remade a number of times corresponding to the numeral at which the pointer is stopped.

The marks 127 are for the purpose of positioning the pointer 121 so that the proper bar 102 will be beneath the contact finger 103 after the called station has removed the receiver from the fork.

In the operation of this device the pointers, and consequently the drums are ordinarily at the neutral point or zero so that all of the stations are disconnected so far as conversation is concerned. If it be desired to call from one of the stations to any other station the pointer 121 is moved to a number corresponding to that station. For instance, if station number 1 desires to call station number 5, the operator at station number 1 first lifts his receiver and then moves the pointer 121 until it reaches the numeral 5. There a pause is made until the person at the called station responds. As this pointer is moved the current is made and broken five times and each of the indicator arrows 126 will move progressively to the numeral 5 thus indicating to all parties on the line that the same is in use and that station 5 has been called. However, by reason of the peculiar position of the contact bar 69 the bell will only be rung at the called station. When this is done the operator at the called station removes the receiver and thus throws the bell out of circuit and at the same time establishes the circuit for the receiver to the main line. The operator at the calling station then moves the pointer 121 to the next mark 127 beyond 5. The line is then in circuit as has been previously described and conversation may be carried on. When the parties using the line are through the operator at the called station first hangs up the transmitter. This releases the drum 68 at that station. The operator at the calling station then moves the pointer 121 entirely around the circle until it again assumes the position at zero. The line is then ready for use by other persons as all of the drums 68 have been rotated around to the zero point. This fact of the arrows of the indicator dial 125 being at zero shows that the line is not in use.

It will be observed that an instrument intended to be used on a line having 15 stations may be used for any less number and that any instrument may be positioned anywhere on such line by merely changing the location of the contact bar 69 upon the drum 68.

It will further be noticed that this system is of such character as to dispense entirely with the multiplicity of wires common in most of the systems used and that there is here shown but the one main line wire to which each station is connected and a single local ground from each of the stations.

It is obvious that in place of grounding

the ends of the main line wire the same may be connected with a return wire and the effect will be precisely the same. It is to be understood that minor changes may be made in the form and construction of this apparatus without departing from the material principles thereof. It is not therefore desired to confine the invention to the exact form herein shown and described, but it is wished to include all such as properly come within the scope of the invention.

Having thus described the invention, what is claimed as new, is:—

1. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, means to alternately break and make the main line circuit and simultaneously close and break the local circuit, a step by step mechanism actuated by the closing and breaking of the local circuit, an open local signal circuit, an insulating drum rotated by said step by step mechanism, a pair of spaced contact fingers forming part of said signal circuit normally bearing on said drum, and a conductor bar carried on said drum and adapted to contact with said fingers and complete the signal circuit.

2. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, means to simultaneously break the main line circuit and close all of the local circuits, and close the main line circuit and break all of the local circuits, a step by step mechanism for each of said local circuits actuated by the closing and breaking thereof, an insulating drum rotated by each of said step by step mechanisms, an open local signal circuit for each of said local circuits, a pair of spaced contact fingers forming part of each of said signal circuits and normally bearing on the drum rotated by the corresponding step by step mechanism, and a conductor bar carried on each of said drums and adapted to contact with the fingers in the corresponding signal circuit and complete said circuit, said conductor bars being differently positioned on said drums so that the different signal circuits may be successively closed.

3. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, means to alternately break and close the main line circuit and simultaneously close and break the local circuit, a step by step mechanism actuated by the closing and breaking of the local circuit, an open signal circuit, means actuated by the step by step mechanism to close said signal circuit, and manually operable means to break said signal circuit, said manually operable means normally locking the main line circuit breaker and adapted to

simultaneously release the main line circuit breaker and lock the step by step mechanism.

4. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, means to alternately break and close the main line circuit and simultaneously close and break the local circuit, a step by step mechanism actuated by the closing and breaking of the local circuit, an open local signal circuit, means actuated by the step by step mechanism to close said signal circuit, and manually operable means to break said signal circuit and lock the signal circuit closing means from movement.

5. In a telephone system, a circuit comprising a main line circuit and a main line battery; in combination with a plurality of local circuits, means to simultaneously break the main circuit and close all of the local circuits and close the main line circuit and break all of the local circuits, a step by step mechanism actuated by each of the local circuits, an open local signal circuit for each of said step by step mechanisms, means actuated by the step by step mechanism to close said signal circuit, and manually operable means to break the closed signal circuit, said manually operable means normally locking the main line circuit breaker and adapted to simultaneously release the main line circuit breaker and lock the step by step mechanism.

6. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, means to simultaneously break the main line circuit and close all of the local circuits, and close the main line circuit and break all of the local circuits, a step by step mechanism for each of the local circuits, an open local signal circuit for each of the step by step mechanisms, means actuated by the step by step mechanism to close the signal circuits successively, and manually operable means to break the closed signal circuit and lock the signal circuit closing means from movement.

7. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, means to alternately break and close the main line circuit and simultaneously close and break the local circuit, a step by step mechanism actuated by the closing and breaking of the local circuit, an open local signal circuit, an insulating drum rotated by said step by step mechanism, a pair of spaced contact fingers forming part of said signal circuit normally bearing on said drum, a conductor bar carried on said drum and adapted to contact with said fingers and complete the signal circuit, and manually operable means to break said signal circuit.

8. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, means to alternately break and close the main line circuit and simultaneously close and break the local circuit, a step by step mechanism actuated by the closing and breaking of the local circuit, an open local signal circuit, an insulating drum rotated by said step by step mechanism, a pair of spaced contact fingers forming part of said signal circuit, and normally bearing on said drum, a conductor bar carried on said drum and adapted to contact with said fingers and complete the signal circuit, and manually operable means to break said signal circuit and lock the drum from movement.

9. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, means to simultaneously break the main line circuit and close all of the local circuits, and close the main line circuit and break all of the local circuits, a step by step mechanism actuated by the local circuits, an open local signal circuit for each of the step by step mechanisms, an insulating drum rotated by each of the step by step mechanisms, a pair of spaced contact fingers forming part of each of the signal circuits and normally bearing on the drum actuated thereby, conductor bars each carried on one of said drums and adapted to complete the local circuit by contact with the local circuit fingers, said bars being differently positioned so that the signal circuits are successively closed, and manually operable means to break the closed signal circuit.

10. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, means to simultaneously break the main line circuit and close all of the local circuits, and close the main line circuit and break all of the local circuits, a step by step mechanism connected with each of said local circuits, an open local signal circuit for each of the step by step mechanisms, an insulating drum rotated by each of the step by step mechanisms, a pair of spaced contact fingers normally bearing on each of said drums and forming part of each of the local signal circuits, a conductor bar carried on each drum and adapted to contact with the corresponding fingers and complete said circuit, said bars being arranged to successively contact with the various pairs of fingers to successively complete the signal circuits, and manually operable means to break the closed signal circuit and lock the drum of said circuit from movement.

11. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, a pair of contact fingers forming part of said main

line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said main line circuit, a step by step mechanism, other means to close and break the local circuit controlled by the breaking and closing of the main line circuit, said means actuating said step by step mechanism, an open local signal circuit, mechanism actuated by the step by step mechanism to close said signal circuit, and a manually operable means to break said signal circuit, said manually operable means normally locking the main line circuit breaker and adapted to simultaneously release the main line circuit breaker and lock the step by step mechanism.

12. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, a pair of spaced contact fingers forming part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close the said circuit, other means controlled by the breaking and closing of the main line circuit to close and break the local circuit, a step by step mechanism actuated by the closing and breaking of the local circuit, an open local signal circuit, means actuated by the step by step mechanism to close said signal circuit, and manually operable means to break the closed signal circuit, said manually operable means normally locking the main line circuit breaker and adapted to simultaneously release the main line circuit breaker and lock the step by step mechanism.

13. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, a pair of contact fingers forming part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said main line circuit, other means controlled by the breaking and closing of the main line circuit to close and break the local circuit, a step by step mechanism actuated by the closing and breaking of the local circuit, an open local signal circuit, means actuated by the step by step mechanism to close said signal circuit and manually operable means to break said signal circuit and lock the signal circuit closing means from movement.

14. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, a pair of contact fingers forming a part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said circuit, other means controlled by the breaking and closing of the main line circuit to severally close and break the various local circuits, step by step mechanism

for each of said local circuits controlled by the closing and breaking thereof, an open local signal circuit for each of said local circuits, means actuated by the various step by step mechanisms to close the various signal circuits, said circuits being arranged to close in succession, manually operable means to break the closed signal circuit and lock the circuit closing means from movement.

15. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, a pair of contact fingers forming a part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said main line circuit, other means controlled by the breaking and closing of the main line circuit to close and break the local circuit, a step by step mechanism actuated by the closing and breaking of the local circuit, an open local signal circuit, a pair of spaced contact fingers forming part of said signal circuit, an insulating drum rotated by said step by step mechanism, said contact fingers normally bearing on said drum, a conductor bar carried on said drum and adapted to contact with said fingers and complete the signal circuit.

16. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, a pair of contact fingers forming part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said main line circuit, other means controlled by the breaking and closing of the main line circuit to close and break each of the local circuits, a step by step mechanism for each of said local circuits actuated by the closing and breaking of the individual circuit, an open local signal circuit for each of said step by step mechanisms, means actuated by the step by step mechanism to close the various signal circuits, said means comprising a pair of spaced contact fingers forming part of said signal circuit, an insulating drum rotated by the step by step mechanism, said contact fingers normally bearing on said drum, a single conductor bar carried on said drum and adapted to contact with said fingers and complete the signal circuit.

17. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a local circuit, a pair of contact fingers forming part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said main line circuit, other means controlled by the breaking and closing of the main line circuit, a step by step mechanism actuated by the breaking and closing of the local circuit, an open local signal circuit, a second

insulating drum rotated by said step by step mechanism, a pair of spaced contact fingers forming part of said signal circuit normally bearing on said drum, a conductor bar carried on said drum and adapted to contact with said fingers and complete said signal circuit, and manually operable means to break said signal circuit when closed.

18. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, a pair of contact fingers forming part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said main line circuit, other means controlled by the breaking and closing of the main line circuit to close and break each of the individual local circuits, a step by step mechanism for each of said local circuits actuated by the closing and breaking thereof, an open local signal circuit for each of said step by step mechanisms, means actuated by the several step by step mechanisms to successively close said local signal circuit, each of said means comprising a pair of spaced contact fingers forming part of said signal circuit, an insulating drum rotated by said step by step mechanism, said fingers normally bearing on said drum, a conductor bar carried on said drum and adapted to contact with said fingers and complete the signal circuit, the bars in the various signal circuits being differently positioned on the different drums, manually operable means to break the closed signal circuit and lock the drum from movement.

19. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, a step by step mechanism actuated by each of said local circuits, an open local signal circuit, means actuated by the step by step mechanism to close said signal circuit, means to simultaneously break the main line circuit and close all of the local circuits, and close the main line circuit and break all of the local circuits, an open local transmitter circuit, a transmitter on the transmitter circuit, an induction coil having a primary coil forming part of said transmitter circuit, a receiver, a receiver circuit, a secondary coil in said induction coil forming part of the receiver circuit, means controlled by the means for breaking and closing the main line circuit and closing the signal circuit for closing said receiver circuit, and manually operable means to break said signal circuit and close said transmitter circuit, said manually operable means normally locking the main line circuit breaker and adapted to simultaneously release the main line circuit breaker and lock the step by step mechanism.

20. In a telephone system, a circuit comprising a main line and a main line battery;

in combination with a plurality of local circuits, a pair of contact fingers forming a part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said main line circuit, other means controlled by the breaking and closing of the main line circuit to close and break the local circuit, a step by step mechanism for each of the local circuits controlled by the closing and breaking of said local circuit, an open local signal circuit, means actuated by the step by step mechanism to close each of said signal circuits, an open local transmitter circuit for each of said step by step mechanisms, a transmitter on the transmitter circuit, an induction coil having a primary coil forming part of said transmitter circuit, a receiver, a receiver circuit, a secondary coil in said induction coil forming part of the receiver, means controlled by said drum and step by step mechanism for closing said receiver circuit and manually operable means to break said signal circuit and close said local transmitter circuit, said manually operable means normally locking the main line circuit breaker and adapted to simultaneously release the main line circuit breaker and lock the step by step mechanism.

21. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, a pair of contact fingers forming a part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break and close said main line, other means controlled by the breaking and closing of the main line circuit to close and break the local circuit, a step by step mechanism for each of said local circuits actuated by the closing and breaking of the individual circuits, an open local signal circuit for each of the step by step mechanisms, means actuated by the step by step mechanism to close said signal circuits successively, an open local transmitter circuit, a transmitter on the transmitter circuit, an induction coil having a primary coil forming part of said transmitter circuit, a receiver, a receiver circuit, a secondary coil in said induction coil forming part of the receiver circuit, means controlled by said step by step mechanism and said drum for closing said receiver circuit, manually operable means to break the closed signal circuit and lock the drum from movement and simultaneously close said local transmitter circuit.

22. In a telephone system, a circuit comprising a main line and a main line battery; in combination with a plurality of local circuits, a pair of contact fingers forming a part of said main line circuit, an insulating drum provided with a plurality of contact bars, means to rotate said drum to break

and close said main line circuit, other means controlled by the breaking and closing of the main line circuit to close and break the local circuit, a step by step mechanism for
5 each of the local circuits actuated by the closing and breaking of that local circuit to which it is connected, an open local signal circuit, there being one of said circuits for each of the step by step mechanisms, a sec-
10 ond insulating drum rotated by said step by step mechanism, a pair of spaced contact fingers forming part of said signal circuit normally bearing on said drum, a conductor bar carried on said drum and adapted to
15 contact with said fingers and complete the signal circuit, an open local transmitter circuit, a transmitter on the transmitter circuit,

an induction coil having a primary coil forming part of said transmitter circuit, a receiver, a receiver circuit, a secondary coil 20 in said induction coil forming part of the receiver circuit, means controlled by the first mentioned drum and the step by step mechanism for closing said receiver circuit, and manually operable means to break the 25 closed signal circuit and lock the first mentioned drum from movement and simultaneously close said local transmitter circuit.

In testimony whereof, I affix my signature, in presence of two witnesses.

CHARLEY T. PATTERSON.

Witnesses:

A. D. HALL,
W. R. BLYEU.