

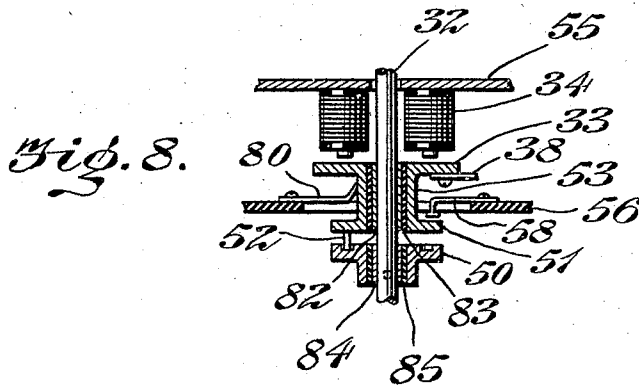
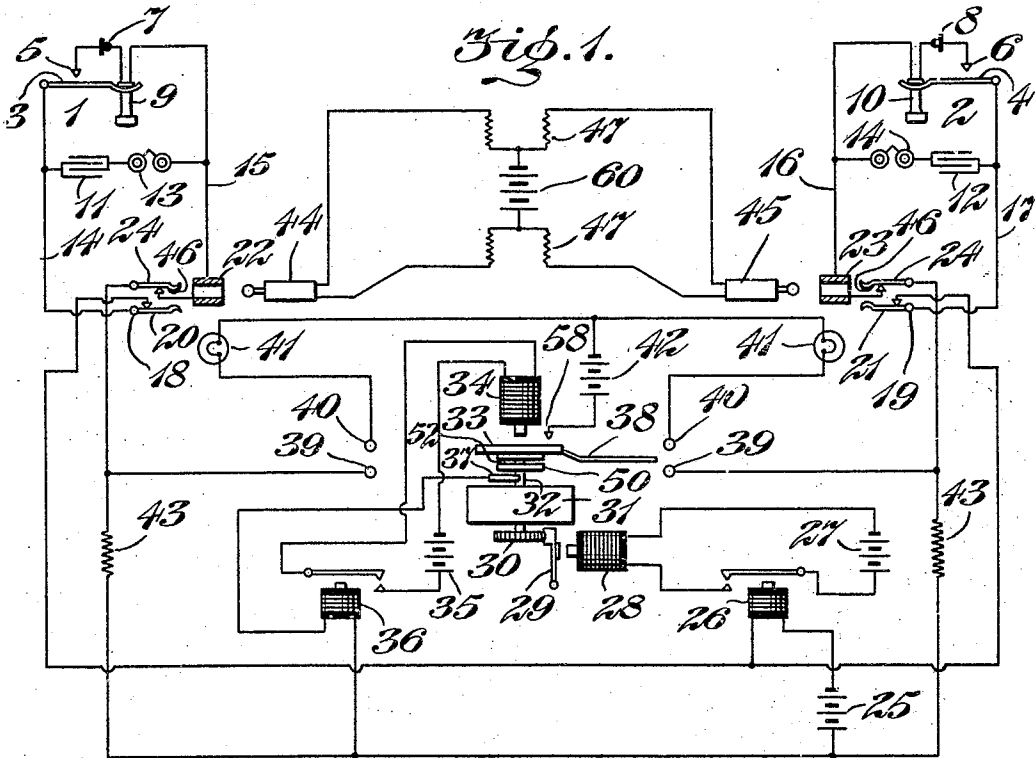
E. J. BURKE.
SIGNALING MEANS.

APPLICATION FILED MAR. 26, 1908.

Patented Jan. 18, 1910.

4 SHEETS—SHEET 1.

946,957.



WITNESSES

H. C. Abbott
E. A. Kennedy.

INVENTOR

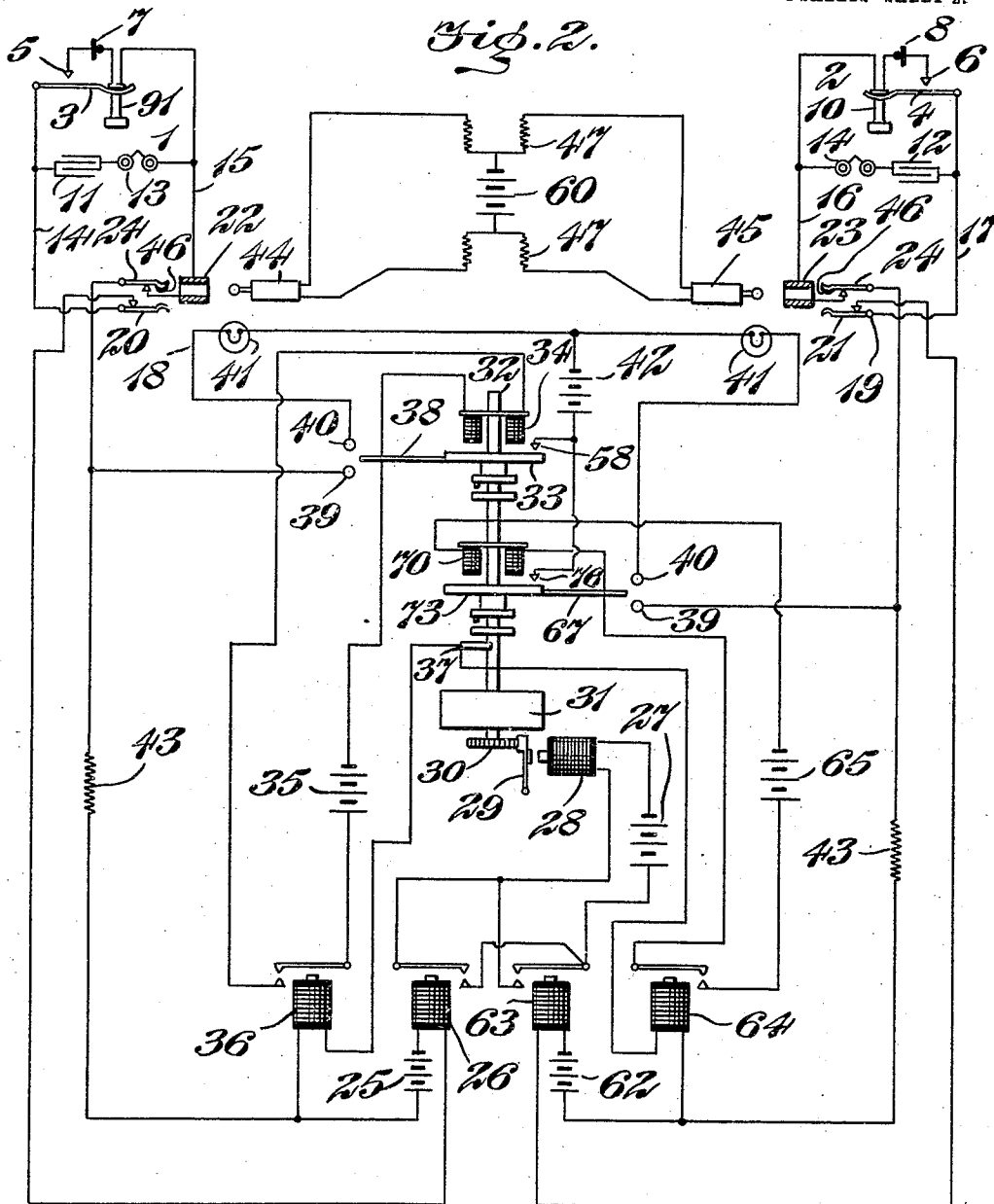
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4 SHEETS—SHEET 2.



WITNESSES

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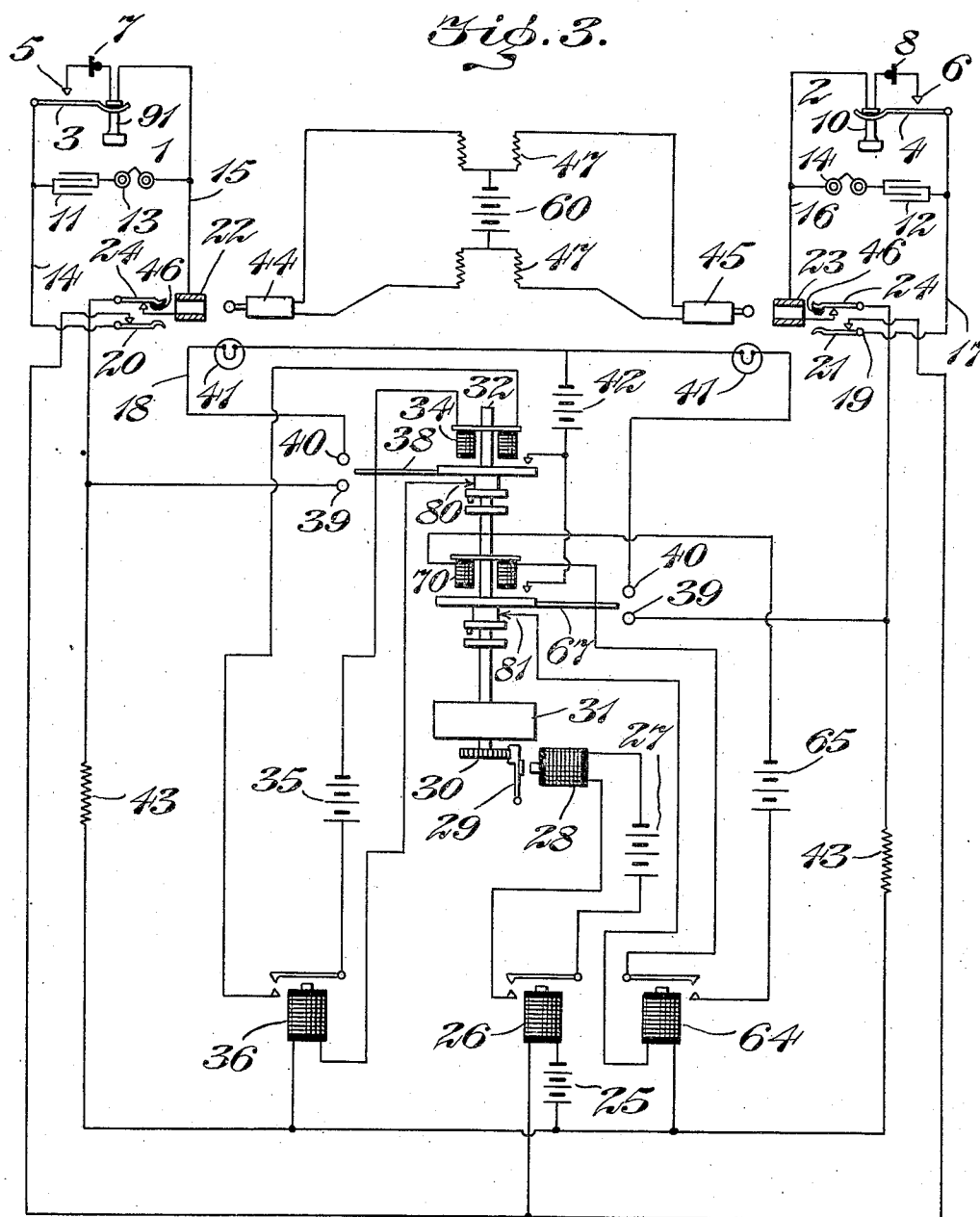
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4 SHEETS—SHEET 3.



WITNESSES

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4 SHEETS—SHEET 4.

Fig. 4.

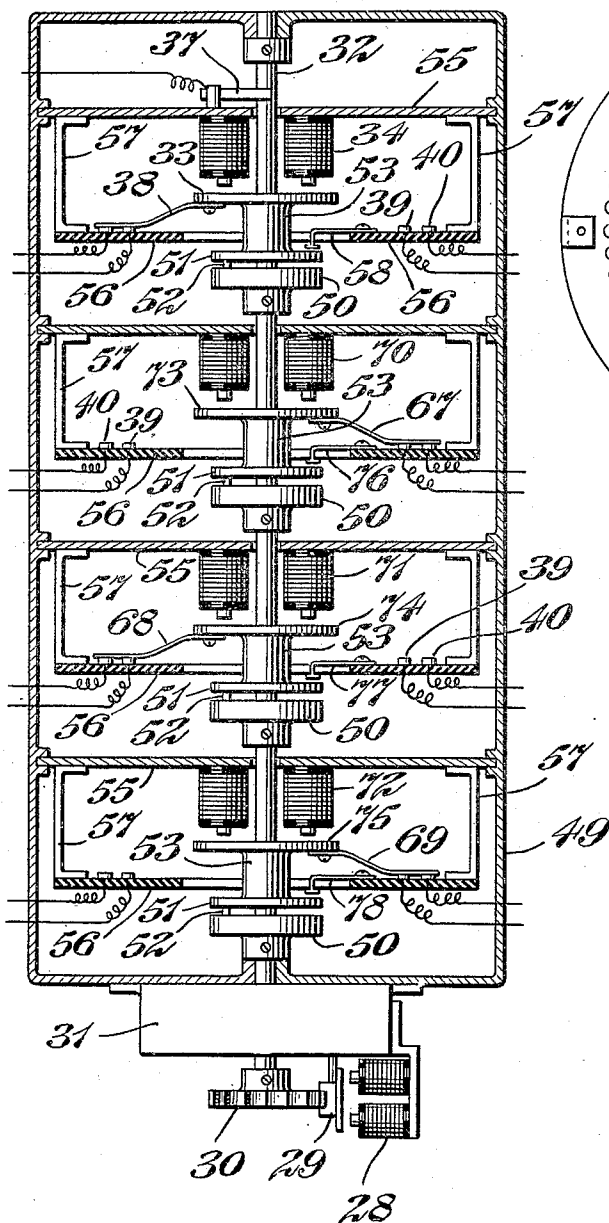


Fig. 5.

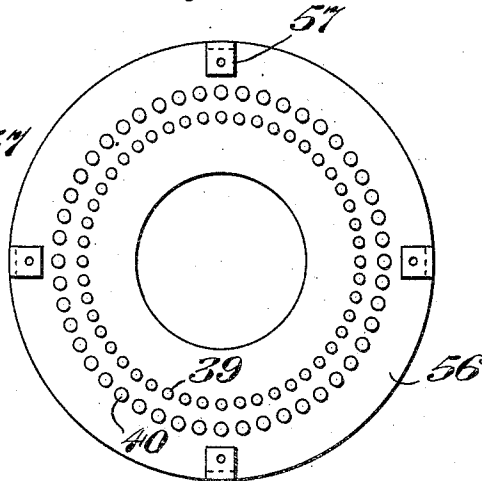


Fig. 6.

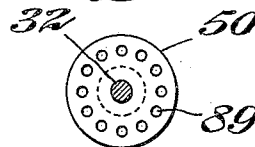
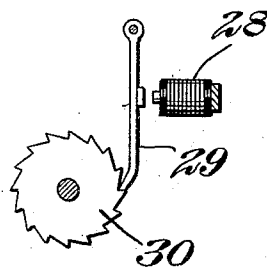


Fig. 7.



WITNESSES

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SIGNALING MEANS.

946,957.

Specification of Letters Patent. Patented Jan. 18, 1910.

Application filed March 26, 1908. Serial No. 423,487.

To all whom it may concern:

Be it known that I, EDWARD J. BURKE, a citizen of the United States, and a resident of the borough of Brooklyn, New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Signaling Means, of which the following is a specification.

My invention relates to a means for producing signals in an electric system.

It more particularly relates to a means for enabling a subscriber of a telephone system to signal the operator at the central station.

The invention consists in a plurality of signaling devices, and a device for causing one of the signaling devices to operate.

The invention also consists in providing a plurality of electric signaling devices, a switch for controlling each signaling device, and a device controlled by the said switch for causing one of the signaling devices to operate.

The invention consists in providing a plurality of electric signaling devices, a device for causing the signaling device to operate, switches adapted to be operated by the subscriber of a telephone system which controls the said devices, and switches adapted to be operated by the operator for restoring the said device.

The invention consists in other features illustrated in the drawings, and described in this specification and set forth in the claims.

Referring to drawings forming a part hereof Figure 1 is a diagrammatic illustration of my invention showing the electrical connections between the various parts thereof. Fig. 2 is a diagrammatic illustration of the invention as applied to a multiple system which requires a number of operators to attend to the calls of the subscribers. Fig. 3 is a modification of the multiple system shown in Fig. 2. Fig. 4 is an illustration of the circuit controller. Fig. 5 is an illustration of a contact plate. Fig. 6 is an illustration of one of the clutch plates. Fig. 7 is an illustration of the stopping and starting magnet, which controls the circuit closers either single or multiple. Fig. 8 is a detail sectional view of one of the circuit closers.

Referring to Fig. 1, 1 and 2 are subscribers' stations having the instruments which are commonly found at such stations, and

which are well known in the art. 3 and 4 are switch hooks. 5 and 6 are contacts. 7 and 8 are transmitters. 9 and 10 are telephone receivers. 11 and 12 are condensers. 13 and 14 are bells.

The subscribers' stations are connected to the central station by lines 14 and 15 and 16 and 17. The lines are connected to the jacks 18 and 19. Line 14 is connected to the contact 20 and line 17 is connected to the contact 21. Line 15 is connected to ring of the jack 18 and line 16 is connected to ring 23 of the jack 19.

The ring 22 is connected through the contact 24 to the controlling magnets which control the circuit closer which is used for closing the circuits of the signaling means associated with each of the jacks. The ring 22 is connected with the battery 25, through the contact 24. The battery 25 is connected to the magnet 26, which is in turn connected with the line 14 through contact 20. In the same way line 16 is also connected with the battery 25 and the line 17 is connected with the magnet 26. All of the lines of the system are connected with the said battery and the said magnet.

The controlling magnet 26 operates to close a local circuit having the battery 27. The current of the battery 27 energizes the magnet 28. The armature of the magnet 28 is a pawl 29 and the pawl 29 operates so as to engage with the teeth of ratchet wheel which is connected with the motor 31. The motor 31 may be electrically operated or may be operated in any other way, the function of the magnet 28, the pawl 29 and the ratchet wheel 30 being merely to start and stop the motor. Any other means may be used to accomplish this result.

A shaft 32 is connected to the motor 31. A disk armature 33 is connected to the shaft 32 and is movable longitudinally along the shaft for a short distance. The armature 33 is operated by the magnet 34, which is connected in a local circuit having a battery 35. The magnet 34 is controlled by the magnet 36. The magnet 36 is connected to the battery 25 and to the spring contact 37 which rubs upon the shaft 32 as it is turned by the motor. A spring contact arm 38, is attached to the armature 33 and is moved over two sets of contacts one of one set being connected with the signaling device

which indicates the calls of that subscriber to the central operator. The spring contact 38 makes contact with one of each set at the same time and during the rotation of the contact 38 while being carried by the shaft 32, it makes contact with all of the contacts of the two sets. This is shown in Figs. 4 and 5 which will be described hereinafter. The contact 38 is flexible so that when it is raised by the operation of the magnet 34 it will retain its electrical connection with a contact of each set.

Each contact 39 of one set is connected with a contact 24. Each contact 40 of the other set is connected with an electric lamp 41, each lamp is associated with the jack connected with contact 39, the two contacts 39 and 40 being closed at the same time by contact 38. A branch circuit containing the magnet 36 is closed by the arm 38 and each contact 39. This circuit is in multiple with the resistance coil 43. The resistance 43 causes enough of the current of battery 25 to pass through and operate the magnet 36. The electric lamps or the electric signaling devices 41 are connected to the battery 42. The battery 42 is connected to the armature 33 when it is raised by the operation of the magnet 34.

The jacks of the subscribers are connected together by means of the plugs 44 and 45 in the manner well known in the art of telephony. The plug circuits have the common battery 60, the induction coils 47 and the listening and calling circuits that are usual in such cases. When a plug is inserted in a jack the head of the plug makes connection with one of the subscribers' lines and the ring of the plug makes connection with the other of the subscribers' lines. When a plug is inserted to make connection the head of the plug presses the contact 24 upward and breaks connection with the line leading from the ring of the jack to the controlling magnets 26 and 36. The same is true of contact 20. The contacts 24 are provided with insulated portions 46 which prevents any electrical connection between the plug and the contact 24.

When a subscriber removes his telephone receiver from the switch hook or when the circuit closer or switch 3—5 is closed a circuit is completed from the battery 25, resistance 43, contact 24, lines 15 and 14, magnet 26, back to battery 25. The magnet 26 then closes the circuit of the battery 27 and the magnet 28 starts the motor 31 going. The contact 38 is carried around making contact with the pairs of contacts 39 and 40, until it reaches the particular contact 39, which is connected with the subscriber who has removed his telephone receiver. When this is done, a circuit is completed through the branch circuit having the magnet 36, contacts 37, 38, and 39. The current is di-

rected through the branch by reason of the resistance 43 which is in multiple. The magnet 36 then operates and closes the local circuit of the battery 35 which energizes the magnet 34. This uncouples the armature 33 from the shaft 32 by lifting the armature 33 so that the coupling pin 52 will clear the plate 50. This brings the contact 38 to a stand still and in contact with the contacts 39 and 40 connected with that part of the system allotted to the use of that particular subscriber.

When the armature 33 is raised, the circuit of the battery 42 is closed through the contacts 38 and 40 and the electric lamp 41. The lamp 41 being in the vicinity of the jack 18 of the calling subscriber it immediately indicates to the operator that that subscriber is calling. The operator thereupon inserts a plug 44 into the jack 18 and makes the usual inquiries as to number desired. The operator then inserts plug 45 in the jack of the subscriber called for.

When the operator inserts the plug 44 into the jack 18, the head of the plug breaks the connection of the ring 22 with the controlling part of the circuit closer, that is, the circuit through the magnet 36 is broken and also the circuit through the magnet 26 is broken. This causes the magnet 34 to drop the armature 33 and permit its reconnection to the shaft 32 and also the magnet 28 is deenergized which stops the motor. This places the mechanism in the same condition that it was in when the subscriber first closed the switch 3—5.

If another subscriber is calling while the first one is being served, and before the plug is inserted in his jack, the arm 38 will upon the insertion of the plug into the jack move to the contact 39 connected to such other subscriber that may have thus called. The magnet 34 permits reconnection of the armature 33 and the shaft 32, and the magnet 28 permits the motor to continue in its operation until the contact 38 reaches the contact 39, which is connected with such other subscriber's line. The magnet 34 will then be energized as before and the contact 38 will be brought to a standstill as before. At the same time electrical connections will be established through the battery 42 and the electric lamp which is associated with the jack of such other calling subscriber. Thereupon the operator will then serve the said other calling subscriber in response to the lighting of the lamp.

The shaft 32 may be operated so as to revolve the contact 38 about its axis at any desired speed.

In Figs. 2 and 3, I have illustrated diagrammatically multiple systems. The systems are modifications of each other. The device used in connection with the multiple systems is shown in Fig. 4. The same de-

vice shown in Fig. 4 is also used in the multiple system shown in Fig. 3 except for a slight modification of the circuit closer shown in Fig. 8.

Referring to Fig. 4, 31 is a motor mounted on one end of the cylindrical box 49. The shaft 32 extends through the oblong frame 49, and is connected with the motor 31. The magnet 28 operates the pawl 29 which releases and holds the ratchet 30 and thus they operate to start and stop the motor. This is shown in detail in Fig. 7.

A plurality of coupling plates 50 are connected to the shaft 32. The coupling plates 50 have in each case a plurality of holes 89. This is shown in detail in Fig. 6. A plate 51 is located above each plate 52 and is movable along the shaft 32. The plates 51 have in each case a pin 52. When a plate 51 is allowed to slide down the shaft 32, the pin 52 enters one of the holes 89 of the coupling plate 50 located below, so that the plates when thus located with respect to each other are coupled together and positively connected to the shaft 32. A sleeve 53 is in each case connected to the coupling plate 51. To the sleeves 53 are attached the disk armatures 33, 73, 74 and 75. The armatures move in proximity to the magnets 34, 70, 71 and 72. The contacts 38, 67, 68 and 69 are connected to the disk armatures which are turned by the shaft 32. The magnets are supported on a frame or crosspiece 55 which is attached to the sides of the main frame.

Annular plates 56 are connected by the uprights 57 to the frames 55. The commutator plates 56 are supported below the switch contacts and are preferably made of insulating material in order that they may insulate the contacts which are mounted thereon. One of the annular plates 56 is shown in detail in Fig. 5. Contacts 58, 76, 77 and 78 are also mounted on the plates 56. The contacts are spring contacts and are so located that when the armatures are raised the plates 51 make connection with the contacts. This closes a circuit through the battery and to one of the signaling devices connected to the plate on which its contact is mounted.

37 is a spring contact which makes electric connection with the shaft 32. The electrical connection is completed through any of the sleeves 53, armatures 33, 73, 74, 75; contacts 38, 67, 68, 69.

The multiple system illustrated diagrammatically in Fig. 2 have the same connections between the instruments at the subscribers' stations and the same connection with the central stations. The system here is to be preferably used in connection with a multiple board system, the jacks being multiplied to the several boards in the well known manner. The connections are substantially the same except in so far as it is

necessary to control the circuit closer for operating the signaling means. A plurality of switch arms 38 are provided as explained in connection with Fig. 4, and the switch arms 38 have a plurality of coupling plates which are adapted to couple the switch arms to the shaft 32 for causing them to revolve and make contact with the fixed contacts located on the plurality of contact plates 56.

The multiple system is divided into sections, that is, the subscribers are divided into groups so that a number of subscribers may have their signaling circuits controlled by one of the revolving circuit closers.

As described in connection with Fig. 1, in the multiple system line 14 is connected to the magnet 26, and the line 15 is connected to the contact 39, and the resistance 43, and the battery 25. The magnet 36 is connected in a branch circuit to the circuit of the resistance 43. The circuit of the magnet 36 is completed through the contact 37, shaft 32, contacts 38 and 39, lines 15 and 14, back to the battery 25.

The subscriber's station 2 is connected to a second contact plate and its signaling circuit is controlled by another switch arm. The subscribers of the section of the system to which the subscriber 2 is apportioned are connected to the battery 62, and the magnet 63. The magnet 63 operates in the same way that magnet 26 operates. The armatures are connected in multiple so that when any of the magnets like magnets 26 and 63 operate the circuit of the battery 27 will be operated and the motor 31 will be permitted to rotate the shaft 32. A magnet 64 similar to the magnet 36 is provided for controlling the contact 67, of the section of the system to which the subscriber belongs. The magnet 64 is also located in a circuit which branches from the circuit of the main line leading to the subscriber's station. It is also connected to the contact 37 and is completed through the contacts 67 and 39, which when closed is in multiple with the resistance 43. When the contact 67 makes contact with the contact 39 connected to the subscriber's station 2, if the switch 4-6 is closed the magnet 64 will be energized by the current of the battery 62, passing through the magnet 64, contact 37, contact 39, lines 16 and 17, magnet 63 back to the battery. This will cause the magnet 70 to be energized. This will raise the armature 73 and the circuit will be closed through the contact 76, battery 42, lamp 41, contacts 40 and 67. This will cause the lamp 41 to indicate to the operator that subscriber 2 is calling, the plug 45 will then be inserted by the operator and inquiry made as to the number called for. The operator will then complete the connection with the other plug in the manner well known in the art.

If the two subscribers call at the same time, the magnets 26 and 63 will be operated which will cause the motor to start or if either one of the subscribers call first one of the magnets will start the motor. The contacts 38 and 67 will continue to rotate independently until they come in contact with contacts 39 which are connected with subscribers who have closed the circuits of their lines. The switch arm 38 may thus be used to keep one of the operators busy in attending to the calls of the subscribers connected to the contact plate which is swept by the switch arm 38 and another operator may be kept busy by the switch arm 67. Any arrangement, however, may be made. One switch arm may be used to keep two or any number of operators busy. All that is done by the operator is that as soon as an electric light appears, the operator inserts a plug in the jack associated with the lighted lamp. The switch arm immediately goes to the next contact which is connected with a calling subscriber. It reaches this contact in a small fraction of a second, and there remains until the operator has served the first subscriber and connected that subscriber with the subscriber called for. Meantime another operator of another board may insert a plug into the jack of the second calling subscriber. It is obvious that one contact 38 can keep several operators busy.

In the modification of the multiple system shown in Fig. 3, the battery 25 is made common to all of the subscribers of the multiple system.

In the modification shown in Fig. 2, the batteries like 25 and magnets like 26 are common only to the subscribers of any one group into which the multiple system may be divided. In the system shown in Fig. 2 a common connection can be made for the entire system through contact 37, and shaft 32 which leads to the circuit closers like that marked 38. In the system shown in Fig. 3, the circuit closers like 38 are insulated from each other, and connections therewith are also necessarily insulated from each other. This is accomplished by insulating the disk armatures, sleeves, and coupling plates like those marked 33, 53, 51 and 50 from the shaft 32. This is shown in detail in Fig. 8. Fig. 8 is an illustration of one of the sections of the device shown in Fig. 4, when the device is modified and used in order that it may be used in connection with a system like that illustrated in Fig. 3. The sleeve 53 is provided with an inside bearing sleeve 82 of metal which is adapted to allow the shaft 32 to rotate when the circuit closer 38 is to be held stationary, and which is also adapted to be moved longitudinally along the shaft 32 upon the operation of the magnet 34. An insulated sleeve 83 is located between the sleeves 82 and 53. The sleeve 83

operates to insulate the circuit closer 38 and prevent the currents that pass therethrough from entering the shaft 32.

The pin may be insulated or the coupling plate 50 may be insulated from the shaft 32 in order to prevent electrical connection between the shaft and the circuit closer 38. In the device illustrated, the coupling plate 50 is insulated from the shaft 32. It is insulated in the same way that sleeve 53 is insulated. A sleeve 84 is secured to the shaft 32, and the insulated sleeve 85 is located between the sleeve 84 and the plate 50. The contact 38 is electrically connected with one of the external circuits through the contact 80, which is mounted on the insulated plate 56. The contact 80 is a spring contact and permits the sleeve 53 to rotate or to move along the shaft 32.

Referring to Fig. 3 wherein the battery 25 and the magnet 26 may be used by all the subscribers of the system, controlling magnets and batteries like 63 and 62 are done away with but the relay magnets 36 and 64 are under the control of the subscribers of the group with which each magnet is associated. The magnet 36 controls the magnet 34, and the magnet 64 controls the magnet 70.

When a subscriber closes his switch the magnet 26 is energized and the motor 31 operates the shaft 32. The shaft 32 carries with it all of the circuit closers until the circuit closer which is controlled by the group to which the subscriber is apportioned reaches the contact 39, connected to the subscriber's line. The magnet 34 will then uncouple the circuit closer from the shaft and the circuit closer will come to a standstill in contact with contacts 39 and 40. At the same time the uncoupling magnet will connect the contacts 38 and 40 with the battery 42. The current will then pass through the lamp 41 which is associated with the jack of that subscriber. The lighting of the lamp indicates to the operator that the subscriber is calling, and the operator inserts a plug in the subscriber's jack and establishes a connection as described before.

The connection of the relay magnet 36 is completed through the contact 80, the circuit closer 38, and the contact 39 which is in multiple with the resistance 43. It is further completed through the switch 3—5 at the subscriber's station when the subscriber removes the telephone receiver, or otherwise closes the switch.

The circuit of the relay magnet 64 is completed through the contact 81, circuit closer 67, and contact 39. It is further completed upon the operation of the switch 4—6. The operation of either of the switches 3—5 or 4—6 will cause the magnet 26 to start the shaft which carries the circuit closer and the operation of one of the switches will

cause the magnet 34 to stop the circuit closer 38, and the switch 4—6 will cause the magnet 70 to stop the circuit closer 67. This will cause the lamp 41 in each case to become lighted, and give the necessary indication to the central operators.

The invention may be modified by those skilled in the art without departing from the spirit thereof.

I have merely shown or described two or three embodiments of my invention.

The invention may be used in connection with calling systems of various kinds and the connections of the devices may be varied while the gist of the invention may be still involved.

What I claim as new, and desire to secure by Letters Patent is as follows:

1. In a signaling means the combination of a plurality of signaling devices, a switch and a jack for controlling the circuit of each of the said signaling devices, a circuit closer, means for causing the said circuit closer to close the circuit of any signaling device upon the operation of the switch and to operate on the circuit of the said signaling device upon the operation of the said jack.

2. In a signaling means the combination of a plurality of signaling devices, a switch and a jack for controlling the circuit of each signaling device, plugs for connecting the said jacks together, a circuit closer, means for causing the circuit closer to operate upon the circuit of any one of the said signaling devices upon the operation of the said switch, and to again operate on the circuit of the signaling device upon the insertion of a plug into the associated jack.

3. In a signaling means the combination of a plurality of electric signaling devices, a plurality of circuit closers a switch and a jack for controlling the circuit closer of each signaling device, means for causing one of the said circuit closers to close the circuit of any one of the said signaling devices and for opening the circuit upon the operation of the said jack independent of the operation of the other of the said circuit closers.

4. In a signaling means the combination of a plurality of electric signaling devices, a plurality of circuit closers, a shaft for operating the said circuit closers, a switch for controlling the circuit of each circuit closer and the operation of the said shaft, means for causing each circuit closer to uncouple from the shaft upon the operation of the said switch.

5. In a signaling means the combination of a plurality of electric signaling devices, a circuit closer, a shaft for operating the said circuit closer, a switch for controlling the operation of the said shaft and the circuit of each signaling device, means for

causing the said circuit closer to uncouple from the said shaft and close the circuit of the said signaling device upon the operation of the said switch.

6. In a signaling means the combination of a plurality of electric signaling devices, a plurality of circuit closers, a shaft for operating the said circuit closers, a switch for controlling the operation of the said shaft and each of the said signaling devices, a jack for controlling the circuit of each of the said signaling devices and the said shaft, plugs for connecting the said jacks, means for causing the said shaft to rotate and the circuit of the signaling device to be operated upon upon the operation of the said switch and for coupling the said circuit closers to the said shaft upon the insertion of the said plug into the said jack.

7. In a signaling means the combination of a plurality of electric signaling devices, a plurality of circuit closers, a shaft operating the said circuit closers, a means for controlling the circuit of each circuit closer and the operation of said shaft, means for causing each circuit closer to uncouple from the shaft upon the operation of the said means.

8. In a signaling means the combination of a plurality of electric signaling devices divided into groups, a plurality of circuit closers, each circuit closer adapted to close the circuits of all of the signaling devices of one of said groups, a device adapted to operate any number of the said circuit closers during the same time, means for causing a circuit closer to close but one circuit of a signaling device independently of the operation of the other circuit closers.

9. In a signaling means the combination of a plurality of electric signaling devices, a plurality of circuit closers, a shaft for operating the said circuit closers, a device for uncoupling each circuit closer from the said shaft and for closing a circuit of any one of the said signaling devices independently of the operation of the other of the said circuit closers.

10. In a signaling means the combination of a plurality of signaling devices, a circuit closer, controlling devices for controlling the said circuit closer, means for causing the said circuit closer to close the circuit of one of the said controlling devices and means for causing the said circuit closer to complete the circuit of the selected signaling device when it has completed the circuit of the said controlling device.

11. In a signaling means the combination of a plurality of signaling devices, a circuit closer, controlling devices for controlling the said circuit closer, means for causing the said circuit closer to be connected to the said controlling device upon the operation of the said controlling device and auto-

matic means for causing the said circuit closer to complete the circuit of a signaling device when it has become connected to the said controlling device.

5 12. In a signaling means the combination of a plurality of signaling devices, a circuit closer, controlling devices for controlling the said circuit closer, means for causing the said circuit closer to complete the circuit of one of the said controlling devices
10 upon the operation of the said controlling device and means for causing the circuit closer to complete the circuit of the associated signaling device when the said circuit
15 of the controlling device is completed by the circuit closer.

13. In a signaling means the combination of a plurality of electric signaling devices, a circuit closer, two controlling devices associated with each signaling device and for controlling the said circuit closer, one of the said controlling devices adapted to cause the circuit closer to complete the circuit of the said controlling device and
20 means for causing the circuit closer to complete the circuit of the associated signaling device, the other of said controlling devices adapted to cause the circuit closer to open the circuit of the signaling device.

30 14. In a signaling means the combination of a plurality of electric signaling devices, a circuit closer, two controlling devices associated with each signaling device and for controlling the said circuit closer, one of the said controlling devices adapted to cause the circuit closer to complete the circuit of the said controlling device and means for causing the circuit closer to complete the circuit of the associated signaling device, the other
35 of the said controlling devices adapted to cause the circuit closer to open the circuit of the signaling device and to disconnect the said circuit closer from the control of the first of the said controlling devices.

45 15. In a signaling means the combination of a plurality of electric signaling devices, two controlling devices for controlling the circuit of each of the signaling devices, a circuit closer adapted to close the circuit of one
50 of the said controlling devices, one of the said controlling devices adapted to cause the circuit closer to complete the circuit of its

signaling device and the other of the said controlling devices adapted to cause the circuit closer to open the circuit of the said signaling device. 55

16. In a signaling means the combination of a plurality of electric signaling devices arranged in a plurality of groups, a circuit closer associated with each group, a device
60 for causing any number of the said circuit closers to operate during the same time, means for causing the circuit closer of each group to close but one circuit of a signaling device of its group independently of the operation of the other of the said circuit
65 closers.

17. In a signaling means the combination of a plurality of electric devices, a circuit closer, a pair of switches for controlling the
70 said circuit closer, means for causing the said circuit closer to complete the circuit to one of the said switches and a means for completing the circuit of the signaling device associated with said switch and to open
75 the circuit of the said signaling device upon the operation of the other of the said switches.

18. In a signaling means the combination of a plurality of signaling devices, a switch
80 and jack, a circuit closer controlled by the said switch and jack, means for causing the said circuit closer to become connected with the said switch and jack and means for causing the said circuit closer to complete
85 the circuit of a signaling device.

19. In a signaling device the combination of a plurality of electric lamps, a switch and jack associated with each of the said lamps, a circuit closer having a contact adapted to
90 make connection with the said switch, jack and lamps and means for causing the said circuit closer to complete the circuit of a lamp associated with an operated switch and to be disconnected from the said lamp and
95 switch upon the operation of the said jack.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

EDWARD J. BURKE.

Witnesses:

F. F. CRAMPTON,
E. A. HENNESEY.