

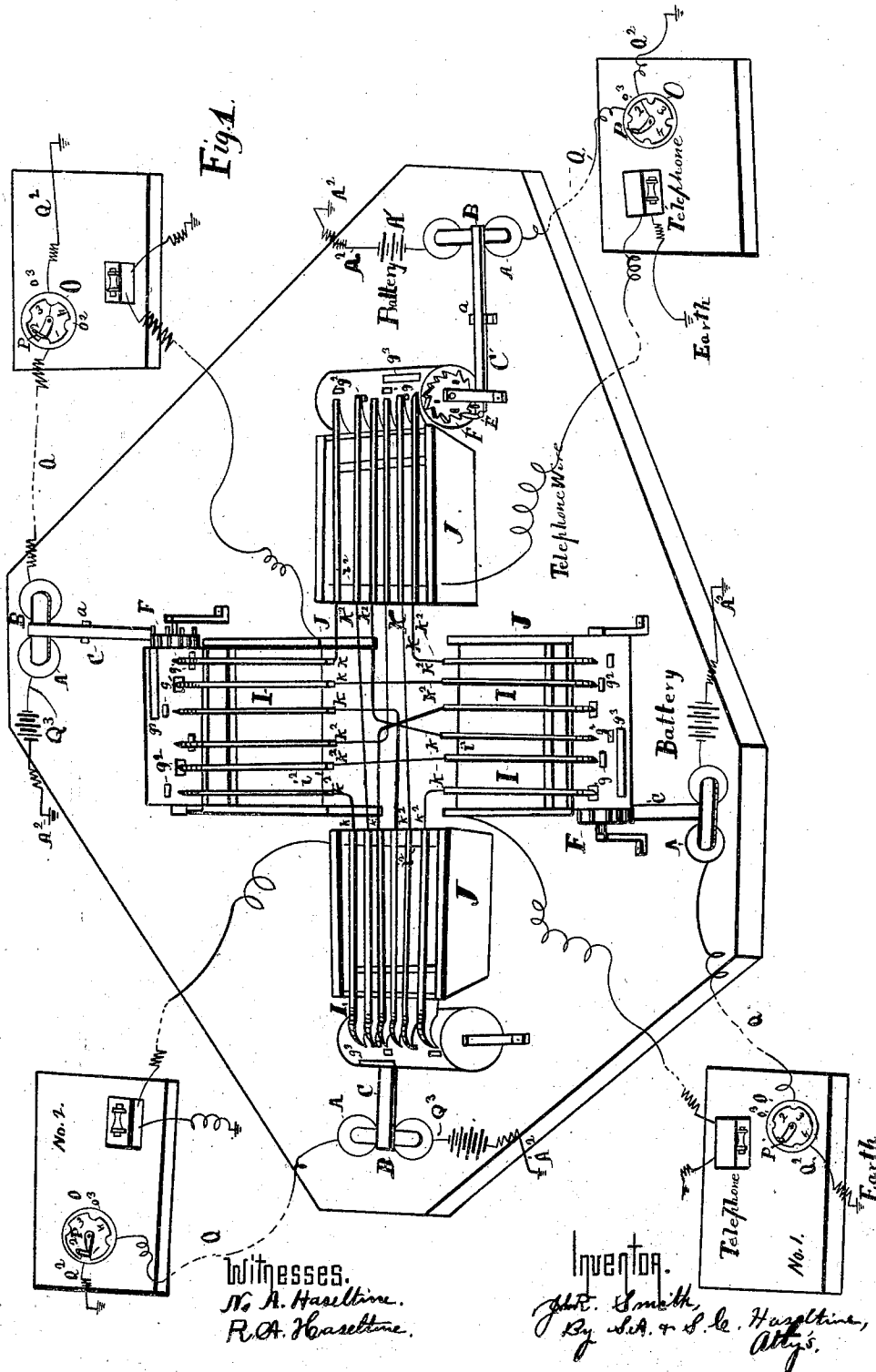
(No Model.)

2 Sheets—Sheet 1.

J. R. SMITH.
TELEPHONE SYSTEM.

No. 408,327.

Patented Aug. 6, 1889.



(No Model.)

2 Sheets—Sheet 2.

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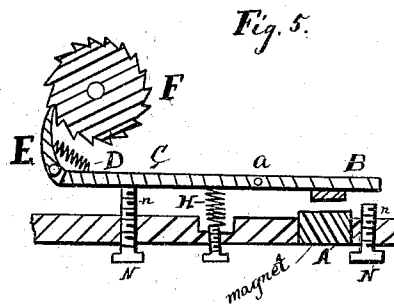
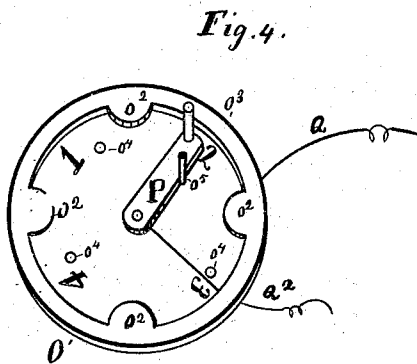
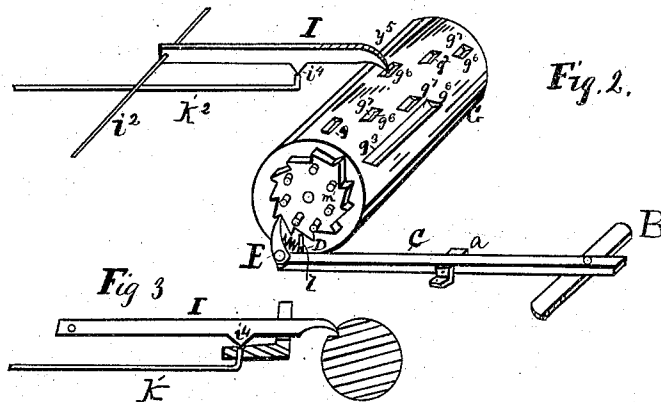
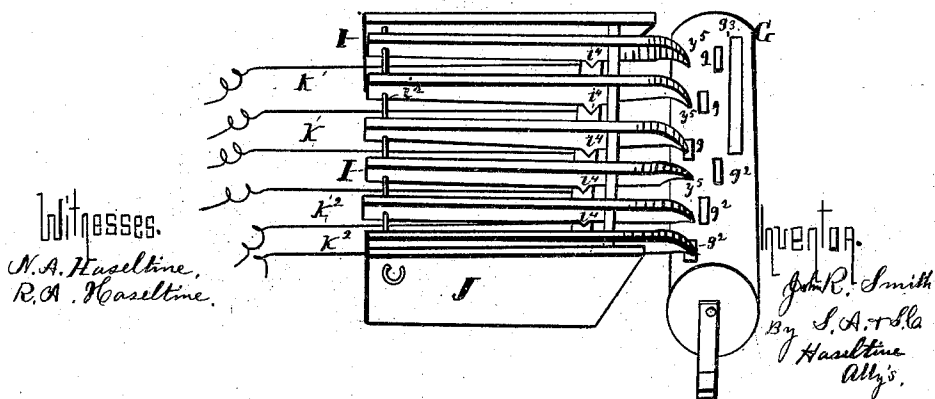


Fig. 6.



UNITED STATES PATENT OFFICE.

JOHN R. SMITH, OF NEOSHO, MISSOURI, ASSIGNOR OF THREE-EIGHTHS TO
LUTHER A. YOUNG AND HENRY J. CURTICE, BOTH OF SAME PLACE.

TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 408,327, dated August 6, 1889.

Application filed February 16, 1888. Serial No. 264,289. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. SMITH, a citizen of the United States, residing at Neosho, in the county of Newton and State of Missouri, 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.

My invention relates to improvements in telephone systems, the object of which is to provide a simple and durable device for making positive connections automatically at the central office by the manipulations of the operator at each telephone in the system, thus insuring promptness, and as it disconnects all other wires from the two that are connected it insures perfect secrecy, and dispenses with the help at the central office, and also enables the telephone to be used at all hours without regard to the office hours at the central office. These objects I attain by means of the device hereinafter explained, and illustrated in the accompanying drawings, in which—

Figure 1 is a view in elevation of a system having four telephones. Fig. 2 is a detail of one of the cylinders and its connections. Fig. 3 is a detail of one of the fingers. Fig. 4 is a detail of one of the dials for setting the telephone or connecting it with the other telephones desired, and also disconnecting it from all other telephones in the system. Fig. 5 is a sectional view of the device. Fig. 6 is a perspective view of one cylinder and its several switch-fingers.

Similar letters of reference indicate corresponding parts in the several figures.

A represents an ordinary coil-magnet of any desired size, which is connected with a battery for making, as hereinafter explained, the connections and disconnections at the central office.

B is an armature secured to one end of a pivoted lever C, which is operated by means of the armature B. Said lever is pivoted in any suitable way, as at *a*, and is provided with a pawl E, which has a spring D for causing it to enter the notches of the ratchet-wheel

F. Said pawl may be hinged in any desired way to the lever for turning the ratchet-wheel.

G is a cylinder of any desired size and provided with any desired number of notches *g*², two for each telephone in the system—less one, the operator's—and also a slot or groove *g*³.

m are projections on the cylinder to prevent the cylinder from going too far when it is moved by the ratchet. This is accomplished by means of a rod *l*, which is secured to the lever C, for being raised up between the projections *m* while the pawl E is operating the ratchet-wheel F, and is drawn down with the lever to permit the wheel to turn when the lever rises again, but to prevent the ratchet-wheel from moving a greater distance than one notch at each movement of the lever. The stroke of the lever may be regulated by the height of its bearings at *a* and by means of knobs N, having screw-threads *n*. Said lever is also provided with a spring H at the end or side opposite the armature, with sufficient strength to hold the lever down at the end next to the cylinder, and holds the armature up, except when under the influence of the battery.

I are fingers, of any desired number, size, and shape. Said fingers are hinged or secured on a rod *i*², which is secured to and is the extension of the telephone-wire and is a conductor of electricity. Said fingers are also separated from each other, when desired, on the rod *i*². Said fingers are also placed in notches or grooves of a frame J, which is a non-conductor. One end of said fingers is formed to rest upon the roller G and is provided with slanting points *g*⁵, extending downward and outward to drop into notches, heretofore mentioned, which have perpendicular edges *g*⁶ and slanting sides *g*⁷. Said fingers have also projections *i*⁴, for making connections with the connecting and disconnecting wires *k* *k*² at the central office. Said connecting and disconnecting wires are insulated from each other and pass through the frame J, which is also a non-conductor of electricity, and terminate in knobs or points in the frame directly beneath the projections *i*⁴. Said wires *k* *k*² are secured in said frame so as to permit the

projections i^4 to come in contact with the wires $k k^2$ or their points when the fingers I rest in the grooves g^3 or notches $g^2 g$ for the purpose of making connections, and for making disconnections when the ends of the fingers I are thrown upon the surface of the cylinder, and the projections i^4 thus raised up away from the ends of the said wires $k k^2$. One half, marked $k^2 k^2$, &c., are connecting-wires of machine No. 1 in the drawings, and the other half, $k k$, &c., are disconnecting-wires of said machine, there being one of each of said wires with its fingers for each telephone in the system, except the one for the machine being operated. At each telephone or station in the system there is a dial O, for calling or making connection with any other telephone or station in the system desired. This is accomplished thus: The dial is provided with a suitable handle or crank P. Said crank, when not in use, rests upon the number of the telephone of the operator, said dial having as many numbers upon it as there are telephones in the system. Said crank is provided with a suitable ratchet to prevent turning it backward. Said dial has a wire Q connected with the magnets A, and also a ground-wire Q^2 , said magnets being temporary magnets, and having a wire Q^3 , connected with the battery at the central office. The dial O has points o^2 , one at each number on the dial, the crank P being a conductor and attached to the ground-wire at the center of the dial. The said crank P does not reach the rim o^3 , but is just long enough to strike the points o^2 as it revolves. The rim o^3 and points o^2 are on the same plane, and the crank passes over the points o^2 , so as to touch them while passing for the purpose of closing the switch-circuit at each point, and the rim of the dial o^3 being also a conductor and connected with the points o^2 , and also with the wire Q, which extends to the central office and connects with the magnet mentioned above, said dial is provided with a hole o^4 at each number on the dial, and also a pin o^5 , for entering the said holes for stopping the crank at any desired number with which connection is desired.

The device is operated thus: At each office, house, or station in the system is placed a dial, as above described, and at the central office a battery, magnet, cylinder, fingers, and wires connecting with each of the other telephones or stations in the system. The telephone-wire which leads from each telephone to the central office passes through and forms a hinge or bearings of the fingers I of its system of fingers connected with its cylinder at the central office. Thus each telephone or station has two wires to the central office—one the telephone-wire proper, as now in use, and one connected with the dial at the station and the magnet at the central office for operating the switch-board or for making the connections and disconnections at the central office. This is accomplished thus: The crank P, which was placed at the number of the tele-

phone of the operator, (to illustrate No. 1,) is moved to the right. When it passes the point o^2 and strikes the pin which has been moved from the first to the second hole, the battery at the central office charges the magnet A, which attracts the armature B, and the current passes over the switch-wire Q through the dial and crank into the ground by means of the ground-wire Q^2 , and the crank passes on till it strikes the pin at No. 2 on the dial. The cylinder has then moved one notch, and connection with No. 2 is made by the fingers 1 and 4 in the system of four telephones in the illustration, thus permitting the projections on these fingers to rest upon the connecting and disconnecting wires of the operating-telephone and telephone No. 2 and disconnecting all others in the system from telephone No. 1 by throwing their fingers upon the surface of the cylinder and raising their points or projections i^4 away from the connecting and disconnecting wires. The operator then rings the ordinary telephone-bell in the ordinary way, which calls up the desired station, as indicated by the crank on the dial, (which in this illustration is No. 2.) If the ordinary telephone-bell rings (at the station of the operator) when said operator operates his own ordinary telephone-bell crank, he knows that he has the desired connection, because the ordinary telephone system as modified by this invention has no ground-wire at the central office, and the bell cannot ring without a complete circuit, and the speaking or telephone circuit is only closed and complete when the connections are made through the telephone-line wire from the operator's station at No. 1 in the illustration to the central office, thence through the fingers I of the operator's cylinder, thence through connecting and disconnecting wires $k k^2$, or either of them, as each telephone has double connections with every other telephone in the system through the switch-board; thence through the fingers I of the said two wires $k k^2$ of the other telephone (in the illustration No. 2); thence through the telephone line-wire from the central office to telephone No. 2; thence to the earth, completing the circuit, as each telephone in the system has a ground-wire; then in the illustration the circuits of Nos. 1 and 2 normally stand open, and are closed by operating the switch apparatus by means of the crank on the dial at the stations, and the temporary magnet at the central office for operating the fingers I, as explained, and bringing said fingers in contact with the wires $k k^2$.

If the telephone-bell does not ring, as above explained, when the operator turns the crank of his telephone, he knows that the telephone he wants to connect with is in use, and he must wait until the said telephone is not in use, or he can connect with any other telephone in the system which is not in use; or he can turn his dial-crank back to his own number, so that any one in the system may connect with him.

Thus each operator can only operate his own cylinder in the switch-board at the central office, and may make connection with any one in the system not in use, so that all telephones in the system may be in use at the same time in pairs, and any one may at any time disconnect his telephone from any other telephone in the system when he desires. No. 2 is then notified to connect with No. 1. This is accomplished by raising the pin in the dial of No. 2 and placing it at No. 1, and then turning the crank to the right it throws off the connections with all other telephones in the system, and as it passes around it makes connections and disconnections, by means of the magnet and cylinder and points on the dial, until it reaches No. 1, at which point it is disconnected with all other telephones in the system. Telephones Nos. 1 and 2 are thus connected with each other and disconnected with all other telephones in the system. Thus the switch-board may be operated at all hours of day or night, and when the connections are once made between any two telephones in the system disconnections are made with all others in the system.

When the telephone is not in operation, or when the connection is desired to be broken, the crank on the dial is turned round to the right, or always in the same direction until its number is reached. Thus each time the telephone is used a complete circuit is made and the handle rests at its own number, at which point one-half of the fingers, or a number equal to all the other telephones in the system, rest in the notch or groove g^3 of the cylinder, with their points or projections g^4 resting upon the disconnecting-wires of the operator's telephone, so that any other telephone or operator at any other station in the system may call it up when desired, as above mentioned. Thus the connecting-wires of one telephone are the disconnecting-wires of the others in the central office. To further illustrate, to use the example in the drawings showing four telephones, which is illustrative of any desired number of telephones in the system, the connections and disconnections would be formed thus: On moving the handle of dial No. 1 the first notch would connect with No. 2 station or telephone; moving it another notch connects it with No. 3 and disconnects it from No. 2; moving it another notch connects it with No. 4 and disconnects it from No. 3, &c. The first move of No. 2's dial would move its cylinder so as to connect with No. 3, the second move with No. 4, &c. The first move of No. 3's dial would cause its cylinder to connect with No. 4; and in a system of only four telephones its second move would connect with No. 1, its third move with No. 2, &c. The first move of No. 4 in the illustration would connect with No. 1, its second with No. 2, &c.

In this system any number of persons may be operating at the same time without interfering with each other, and make their con-

nections and disconnections by means of electricity, as above. The batteries above mentioned are preferably stationed at the central office.

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

1. The combination, with a battery and a coil-magnet, of an armature B, pivoted lever C, spring-pawl E, ratchet-wheel F, cylinder G, having notches g g^2 and a groove g^3 , fingers I, insulation-frame J, a telephone-wire, and wires for connecting and disconnecting the fingers with and from other telephones, substantially as shown and described.

2. The combination, with a battery, magnet, and movable armature, of a pivoted lever C, a hinged pawl E, provided with a spring D, a ratchet-wheel F, cylinder G, having a groove and notches, fingers I, having projections i^1 , a telephone-wire, and insulated wires for connecting and disconnecting said fingers with and from other telephones, substantially as and for the purpose specified.

3. In a telephone system, the combination of ordinary telephone-batteries, line-wires terminating at the central office in fingers I and switch line-wires Q, switch-batteries, temporary magnets A, armature B, lever C, pawls E, ratchets F, cylinders G, with notches g' g^2 , grooves g^3 , for operating fingers I, and telephone ground or earth wires at each telephone-station completing the circuit between the telephones when their respective fingers I touch their connecting and disconnecting wires k k^2 , substantially as and for the purpose set forth.

4. The combination, with ordinary telephones, telephone line-wires coming to a central office, said line-wires having ground or earth wires at the local stations, of a switching mechanism consisting of a ground-wire A^2 , coil-magnet A, armature B, pivoted lever C, spring-pawl E, ratchet-wheel F, cylinder G, having notches g' g^2 , a groove g^3 , fingers I, and wires k k^2 , which are alternately connecting and disconnecting wires, substantially as and for the purpose set forth.

5. A telephone system in which every telephone has a connecting-wire k and a disconnecting-wire k^2 for each other telephone in the system, combined with ordinary telephones, batteries, telephone line-wires terminating at the central office in fingers I, telephone ground-wires at each local station, and switch-dials O, with ground-wires Q^2 , switch line-wires Q, and ground-wires A^2 , switch-batteries, temporary magnets A, armature B, levers C, pawls E, ratchets F, and cylinders with grooves g^3 , notches g' g^2 , for connecting and disconnecting the fingers I with and from the connecting and disconnecting wires k k^2 , substantially as and for the purpose set forth.

6. The combination, with a switch-battery for each telephone in a system, of a ground-wire, a coil-magnet A, armature B, pivoted lever C, spring-pawl E, ratchet-wheel F, cylin-

der G, having notches g^2 and a groove g^3 , fingers I, connecting and disconnecting wires $k k^2$, insulating-frame J, a switch line-wire Q, a dial O, crank P, a ground-wire Q^2 , and an ordinary telephone. substantially as shown and described.

7. The combination of a dial O, having a rim o^3 , and points o^2 , connecting crank P, ground-wire Q^2 , switch line-wire Q, temporary magnet A, an ordinary battery, a ground-wire A^2 , a movable armature for operating a cylinder, which is provided with conducting and connecting fingers I, and connecting and disconnecting wires $k k^2$, substantially as and for the purpose specified.

8. The combination, with an ordinary battery, a temporary magnet A, and movable armature B, of a pivoted lever C, having a spring for holding the armature up, a hinged pawl E, provided with a spring D, a ratchet-wheel F, cylinder G, fingers I, having projections f^1 , a telephone-wire, and connecting and discon-

necting wires $k k^2$, substantially as and for the purpose set forth.

9. In a telephone system, the combination, with ordinary telephones and telephone-wires having their batteries with ground-wires at the local stations, of a switching apparatus consisting of ground-wires Q^2 , cranks P, dials O, having a rim o^3 and points o^2 , switch line-wires Q, a switch-board having a temporary magnet A, batteries, and ground-wires A^2 , cylinders having grooves and notches operated by the said mechanism, and armature B, levers C, having pawls and ratchet-wheels, fingers I, insulating-frames, and insulated connecting and disconnecting wires $k k^2$, all substantially as and for the purpose specified.

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

JOHN R. SMITH.

Witnesses:

B. P. ARMSTRONG,
ANDREW COPEL.