

I. H. FARNHAM & G. W. DAVIS.
TELEPHONE CIRCUIT.

(Application filed May 11, 1900.)

(No Model.)

2 Sheets—Sheet 1.

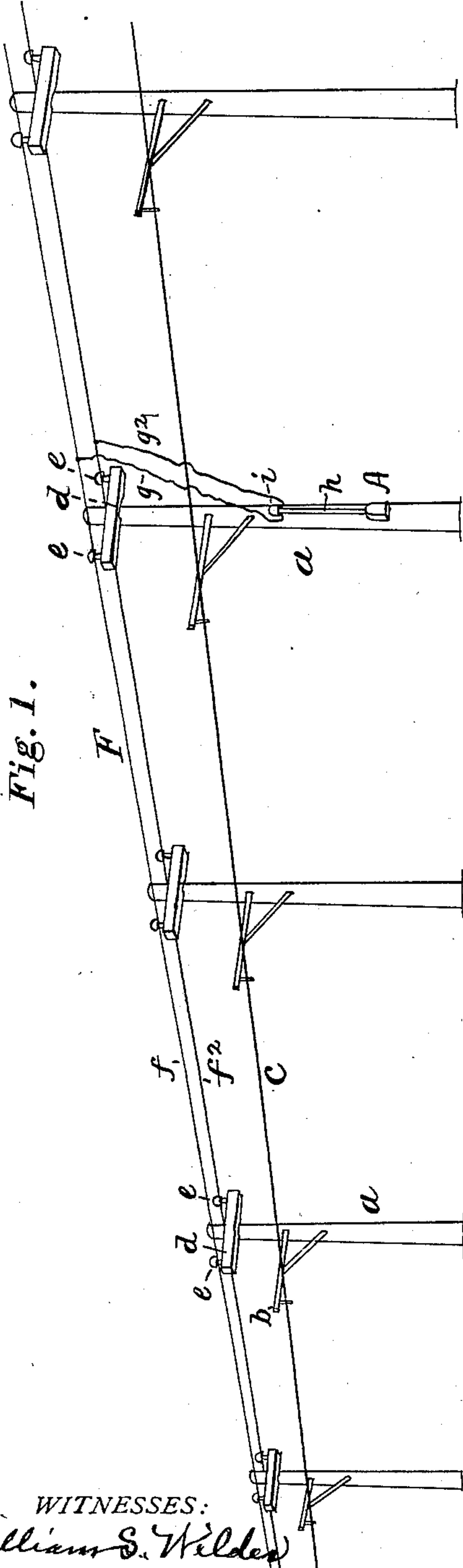


Fig. 1.

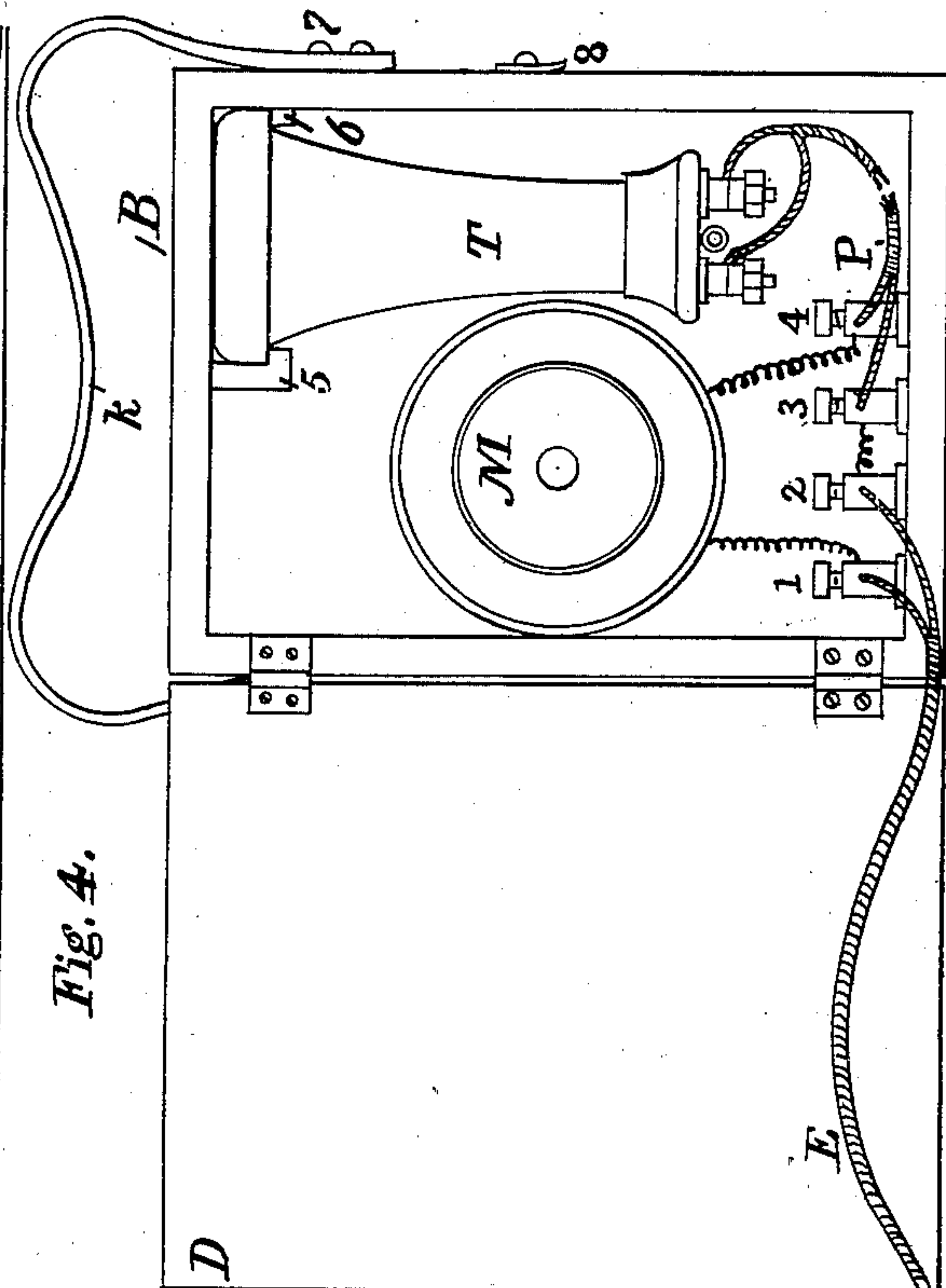
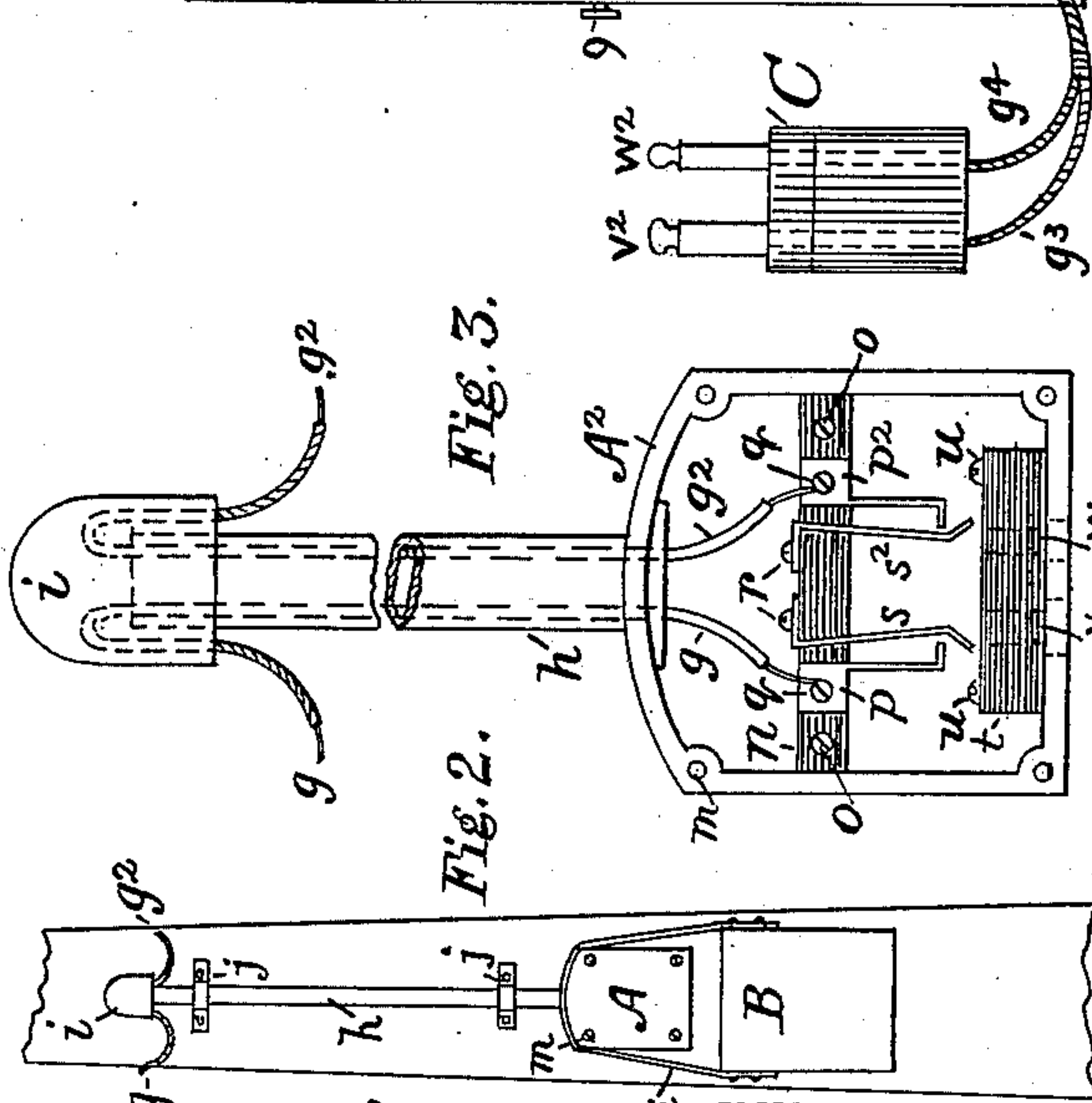


Fig. 4.



No. 661,714.

Patented Nov. 13, 1900.

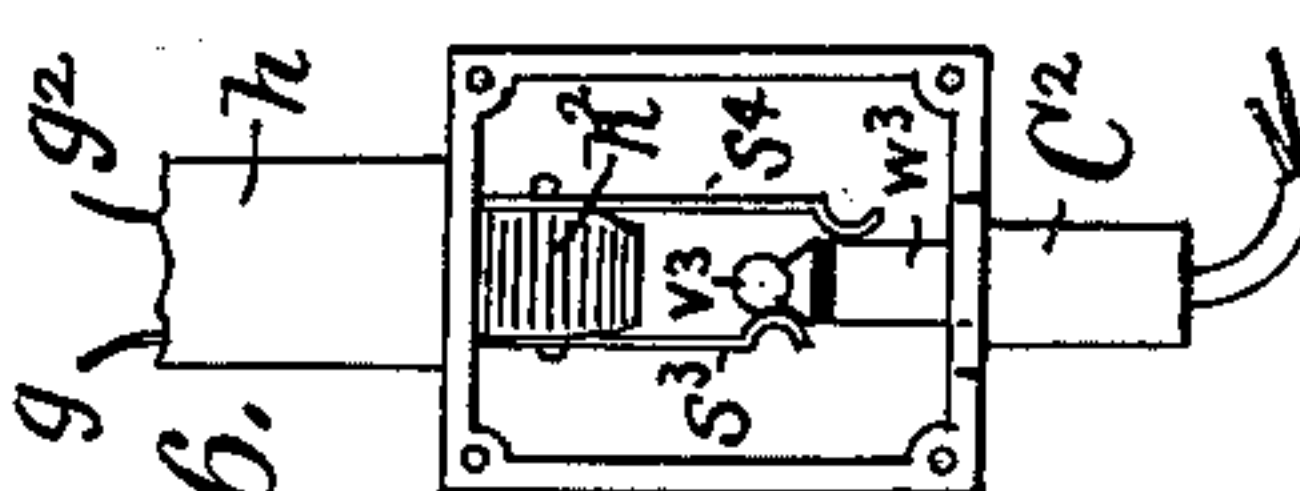
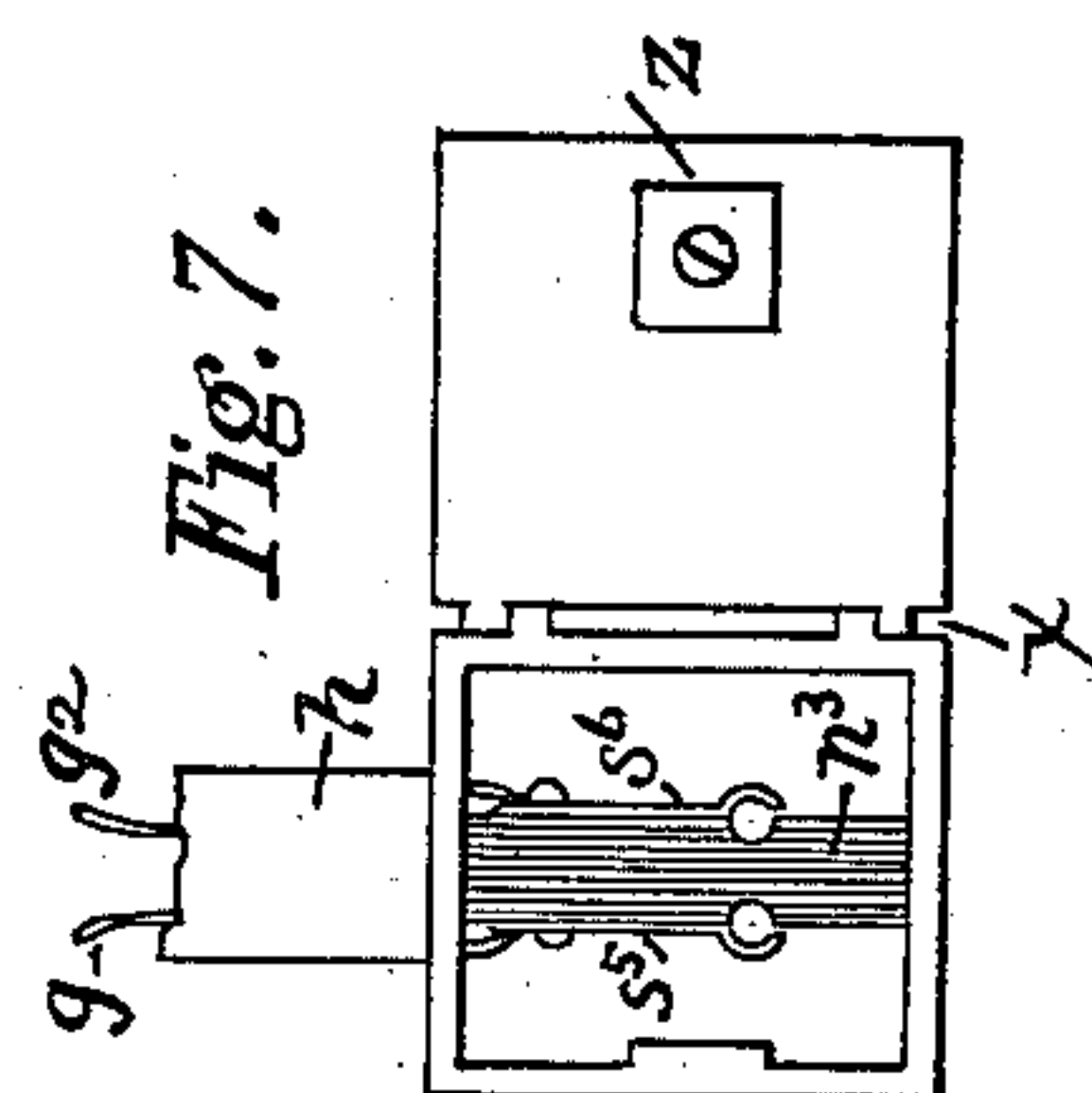
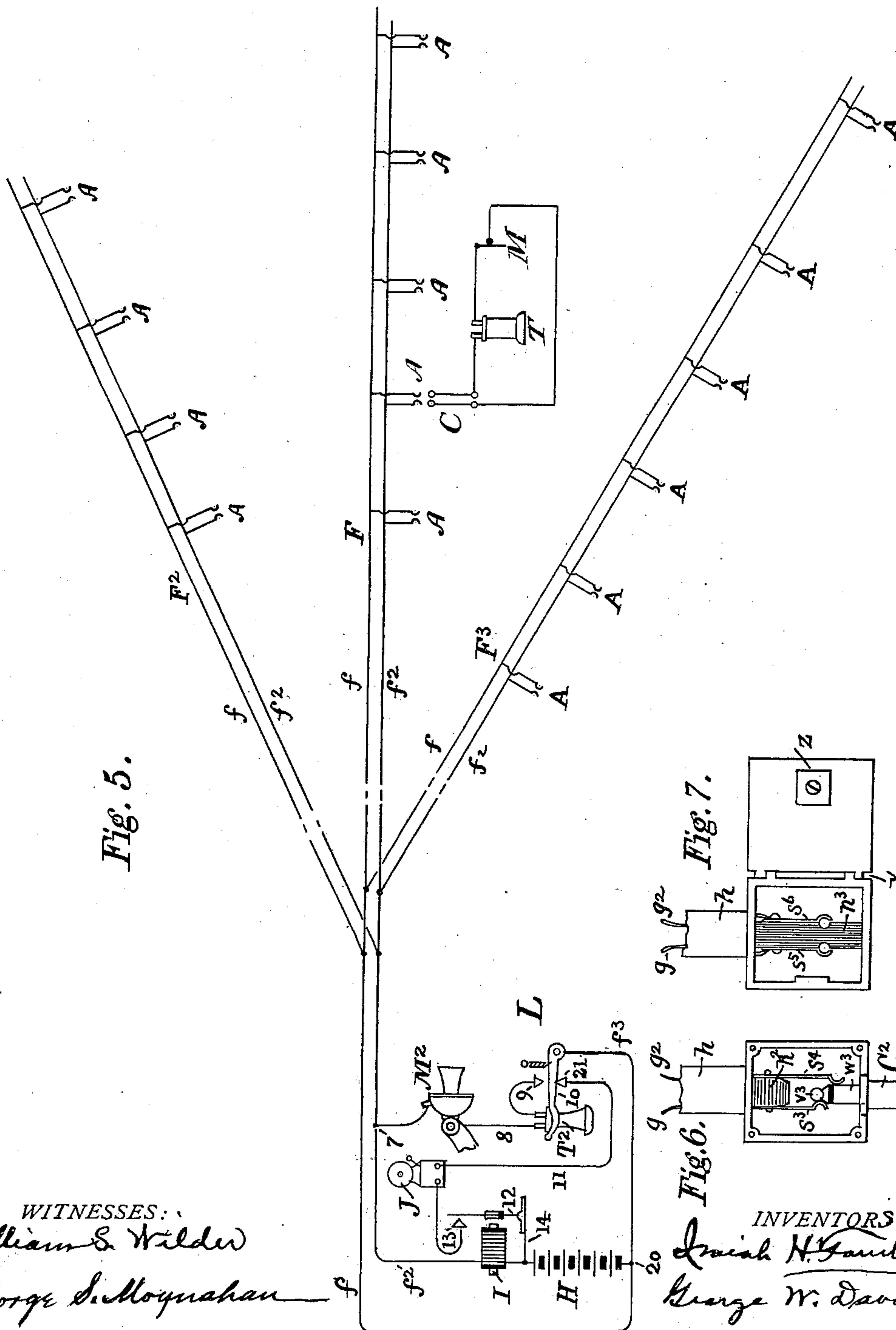
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TELEPHONE CIRCUIT.

(Application filed May 11, 1900.)

(No Model.)

2 Sheets—Sheet 2.



WITNESSES: ,

WITNESSES:
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UNITED STATES PATENT OFFICE.

ISAIAH H. FARNHAM, OF WELLESLEY, AND GEORGE W. DAVIS, OF REVERE, MASSACHUSETTS, ASSIGNORS TO THE NEW ENGLAND TELEPHONE AND TELEGRAPH COMPANY, OF BOSTON, MASSACHUSETTS.

TELEPHONE-CIRCUIT.

SPECIFICATION forming part of Letters Patent No. 661,714, dated November 13, 1900.

Application filed May 11, 1900. Serial No. 16,306. (No model.)

To all whom it may concern:

Be it known that we, ISAIAH H. FARNHAM, residing at Wellesley, in the county of Norfolk, and GEORGE W. DAVIS, residing at Revere, in the county of Suffolk, State of Massachusetts, have invented certain Improvements in Telephone-Circuits, of which the following is a specification.

In the operation of street and other railways it frequently becomes desirable for the conductor of a car or of a train of cars to effect communication with a central station in order to report thereto any trouble that may have occurred to the railway equipment or for any other reasons which require immediate help or attention.

The object of the present invention is to provide means whereby the conductor of a car may connect himself telephonically with a central station, and to this end we provide a circuit whose conductors are strung upon the telegraph-poles along the route of the track, in case the invention is applied to steam-railways provided with such poles, and if the application is to an electric-car railway the conductors are carried upon the supports which carry the trolley or feed wires. These conductors are open at one end and at the other end enter the central station and are closed there through a generator of electricity and a relay controlling a bell or signal, which circuit is adapted when it is closed at any point away from the central station to ring a bell or display a visual signal, there being an attendant's or operator's telephone in a normally open shunt around the generator and signal.

At suitable intervals in the circuit normally open branch terminal conductors are brought down from each of the line conductors to switch-boxes, preferably of iron, secured to the sides of the poles. Each switch-box is provided with a door or cover and with suitable spring-socket contacts for the reception of plug-connectors. The branching conductors are protected in iron pipes, which extend from the boxes to a proper height above the same. To enable the conductor of a car or train to communicate with

the central station, we provide a transmitting and a receiving telephone and a flexible extensible plug-connector, all adapted to be inclosed and protected within a portable box or case, the telephone-transmitter being preferably secured to the back of the box, the receiving-telephone being provided with a support, and space being made for the said connector, the box itself having a suitable handle by which the whole outfit may be readily carried about and supported upon a pole when in use. When not in use, the portable telephone set may be placed in a locker of the car.

When the conductor wishes to communicate with the central station, the portable set is carried to a pole upon which is secured a switch-box, and the handle thereof is hung over the switch-box, the door opened, and the plug-connector taken out and inserted into the spring-sockets of the switch-box and the telephone-receiver removed from its support. The insertion of the plug-connector into the said sockets closes and completes the circuit through the generator and the relay controlling the bell or signal at the central station, and thereupon the bell rings or a signal is displayed, and when in response thereto the attendant removes the telephone from its hook-switch to answer the call the switch operates to include the central-station telephones in the line-circuit and at the same time to open the bell or signal circuit.

The invention relates to the circuits shown and described and to the specific mechanical and electrical appliances used in connection therewith.

In the drawings which illustrate the invention, Figure 1 is a perspective view of an electric trolley-railway. Fig. 2 is a detached portion of a conductor-supporting pole, showing the location thereon of a switch-box and the suspension thereto of a portable telephone outfit. Fig. 3 is an enlarged portion of the switch-box with its door or cover removed. Fig. 4 is an enlarged view of the portable telephone outfit, showing the door open and the plug-connector removed. Fig. 5 is a diagram of the circuits embodied in the inven-

tion, illustrating the connection of three railway-circuits with a central station; and Figs. 6 and 7 are modifications of the switch-box.

Referring to the drawings, *a a* represent the conductor-supporting poles of an electric trolley-railway.

b b are projecting-arms sustaining the trolley-wire *c*.

d d are cross-arms having on each end insulators *e e*, to which are attached the conductors *f f*², which constitute the circuit F, extending to the central station L. At suitable intervals branch conductors *g g*² extend from the respective conductors *f f*² and pass down a protecting-pipe *h*, whose upper end is covered by any suitable cap *i*. The lower end of the pipe is screwed into the upper side of an iron switch-box A, and the conductors are secured to the spring-terminals *p p*², which are fastened to the insulating-block *n* by the screws *q q*, the block being secured to the box A with the screws *o o*. Opposite each spring-terminal is a spring-connector *s*, secured to the block *n* by the screw *r*. The lower end of the connectors *s* are bent to one side to partly cover the respective plug-holes *v* and *w* (of different diameters) in the insulating-block *t*, which holes register with holes in the lower side of the box A. The block *t* is fastened to the box A by the screws *u u*. The holes in the floor of the box are made larger in diameter than those in the block *u* to prevent electrical contact with the connecting-plugs.

B represents the box which contains the portable telephone outfit, provided with the door D on the front side, hinged to the box and adapted to be secured when closed by the hasp and button 8 and 9, and *k* is a handle, preferably flat and flexible, secured at each end to the opposite sides of the box. Within the box and to its back is secured a telephone-transmitter M, and the telephone-receiver T is adapted to be supported therein upon the cleats 5 and 6, and its terminals are connected by the flexible cord P to the screw-posts 3 and 4.

C is a double plug-connector consisting of an insulating-handle in which are inserted the metal plugs or terminals *v*² and *w*², of different diameters, which are connected to the insulated conductors *g*³ and *g*⁴, which constitute the flexible cord E and are joined to the screw-posts 1 and 2. The transmitter is connected in series with the receiver, as shown. When not in use, the telephone T is supported, as shown, by the cleats, and the plug-connector is within the box. The conductors *f* and *f*² terminate in the central station at the opposite poles of the battery H, the electromagnet of the signal-controlling relay I being shown in circuit with the latter conductor. A wire 14 connects the conductor *f*² with the foot of the relay-armature 12, whose free end is opposite a terminal 13 of the bell J, whose opposite side is connected by wire 11 with the resting-contact 21 of the hook-switch 10, and

wire *f*³ connects the point 20 with the hook-switch. The telephones are in series with one another by means of the wire 8, which connects one side of the receiver T² with point 7 on conductor *f*². It will be readily understood that an annunciator or other visual signal may be substituted for the bell.

The operation of the invention is quite apparent from what has been said; but a brief description will perhaps be required. When for any cause the conductor of a car wishes to communicate with the central station, the box B is suspended from the switch-box A by passing its strap handle over the latter, as shown in Fig. 2, the plug-connector C removed from the box, and its terminals inserted into the switch-sockets—the plug *v*² into the hole *v* and the plug *w*² into the hole *w*—and as the connector is pressed in the springs *s* and *s*² are forced against the respective spring-terminals *p* and *p*², so that the circuit is continued from the branches *g*, spring-terminals *p*, springs *s*, to the respective plugs, as will be easily understood. The springs *s s*² by their bent ends furnish a protection to the circuit-springs, and if any foreign plug or wire is mischievously inserted no connection is made with the connectors *p*, and a further protection is provided in making the plugs and their sockets of different diameters, and the battery-current is thus always passed through the receiver in the same direction, preventing the demagnetizing of the receiver-magnet. When the plug-connector C is thus inserted, the circuit is closed thereby through the central-station battery H, the relay I operates in a well-known manner, and the bell rings or a visual signal is displayed. When the telephone T² is removed, the switch 10 in rising closes with contact 9 and opens the signal-circuit and includes the telephones in the shunt-circuit. Current from battery H then circulates throughout the circuit F, and when the transmitters are used the current is varied in a well-known manner.

One operator's telephone set may be made available for a plurality of railway routes, as indicated in Fig. 5, and there will be no disturbance should a call be received from a box on a second route while conversation is taking place between a box on any route and the central station, as the operator can easily take care of both.

Fig. 6 represents a modification of the switch-box, in which the branches *g* and *g*² are connected to spring-terminals *s*³ and *s*⁴, secured to the insulating-block *n*², and C² is a single plug provided with two contact-surfaces *v*³ and *w*³, which register with the springs *s*³ and *s*⁴, respectively. The plug C² is adapted to be passed through a hole in the floor of the box large enough to prevent the plug from coming into contact with its sides.

Fig. 7 is another modification of the switch-box, in which a double plug is used. In this case the door is hinged to the case and is locked thereto when closed, and to insert the

plug the door is opened. There are some advantages in this construction, as no apertures are made in the walls of the box.

It is within the spirit of our invention to use a portable transmitter and receiver, both of which are secured to a common bar or support of a well-known construction, and the instruments will be connected by a flexible cord with the plug-connector.

We claim as our invention—

1. A telephonic circuit composed of two conductors open at one end and provided with a series of branches extending from the conductors to normally open terminal switches inclosed in a series of boxes; the other end of said circuit being closed through an electric generator; a branch from one of said conductors including telephones normally open at the hook-switch; a signal-circuit controller having its windings in one of said conductors, a signal adapted to be operated by said controller and to be included in parallel with said generator, and adapted to be inoperative by the said hook-switch; with a portable telephonic outfit or set, inclosed in a box, consisting of a telephone-transmitter, a receiver, and a plug-connector, united in series by conducting-wires, as set forth.

2. A telephonic circuit composed of two conductors open at one end and provided with a series of branch extensions from the conductors to normally open terminal switches inclosed in a series of boxes; the other end of the circuit being closed through an electric generator; a branch from one of the conductors including transmitting and receiving telephones normally open at the hook-switch; a signal-circuit controller having its windings in one of the conductors, a signal in a circuit parallel with the generator open at the controller and normally closed by the hook-switch; with a portable telephonic set inclosed in a box consisting of a telephone-transmitter, a receiver and a double plug-connector united in series by conducting-wires, as set forth.

3. A system of telephonic intercommunication composed of a plurality of metallic circuits each comprising two conductors open at their outer ends and provided with a series of branch extensions from their conductors to normally open terminal switches inclosed in a series of boxes; the inner ends of the circuit-conductors being combined and closed

through an electric generator at a central station; a branch from one side of the combined circuit including transmitting and receiving telephones normally open at the hook-switch; a signal-circuit controller having its windings in one side of the combined circuit, a signal in a circuit parallel with the generator open at the controller and normally closed by the hook-switch; with a portable set or sets, inclosed in a box consisting of a telephone-transmitter, a receiver and a plug-connector, united in series by conducting-wires, as set forth.

4. A system of telephonic intercommunication comprised of a metallic circuit open at one end and closed through a battery and the windings of a signal-circuit-controlling relay at a central station; a signal device in a derived circuit around said battery normally open at said relay and normally closed at and by the telephone-hook switch; transmitting and receiving telephones in a normally open derived circuit around said battery; the circuit-conductors being secured to a series of poles; a series of branches extending from the conductors to normally open terminal switches inclosed in a series of boxes secured to said poles; with a portable telephonic outfit or set inclosed in a box consisting of a fixed telephone-transmitter, a movable telephone-receiver and a plug-connector, united in series by connecting-wires, as set forth.

5. A switch-box for the purpose set forth, adapted to be secured to a suitable support, consisting of a metal casing provided with a detachably-secured door or side; a block of insulation secured to a wall of the box supporting two spring-terminals, and two spring-connectors with bent ends; a second block of insulation secured to a wall of the box having holes opposite the said spring-connectors and coinciding with holes in the wall of the box; with a tube extending upward from the box to the top of which is secured a protecting-cap, as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 8th day of May, 1900.

ISAIAH H. FARNHAM.
GEORGE W. DAVIS.

Witnesses:

WILLIAM S. WILDER,
GEORGE S. MOYNAHAN.