

No. 674.862.

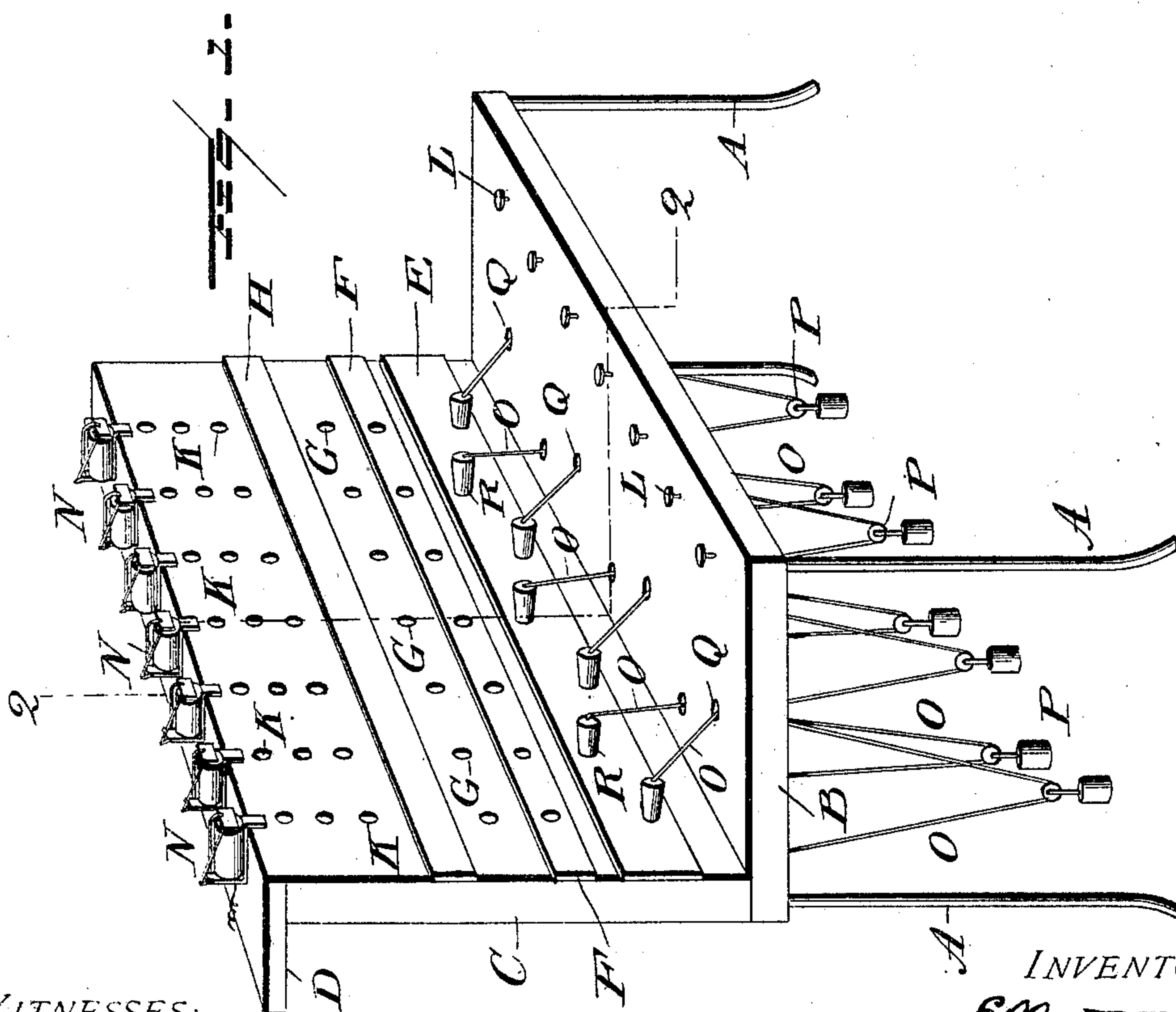
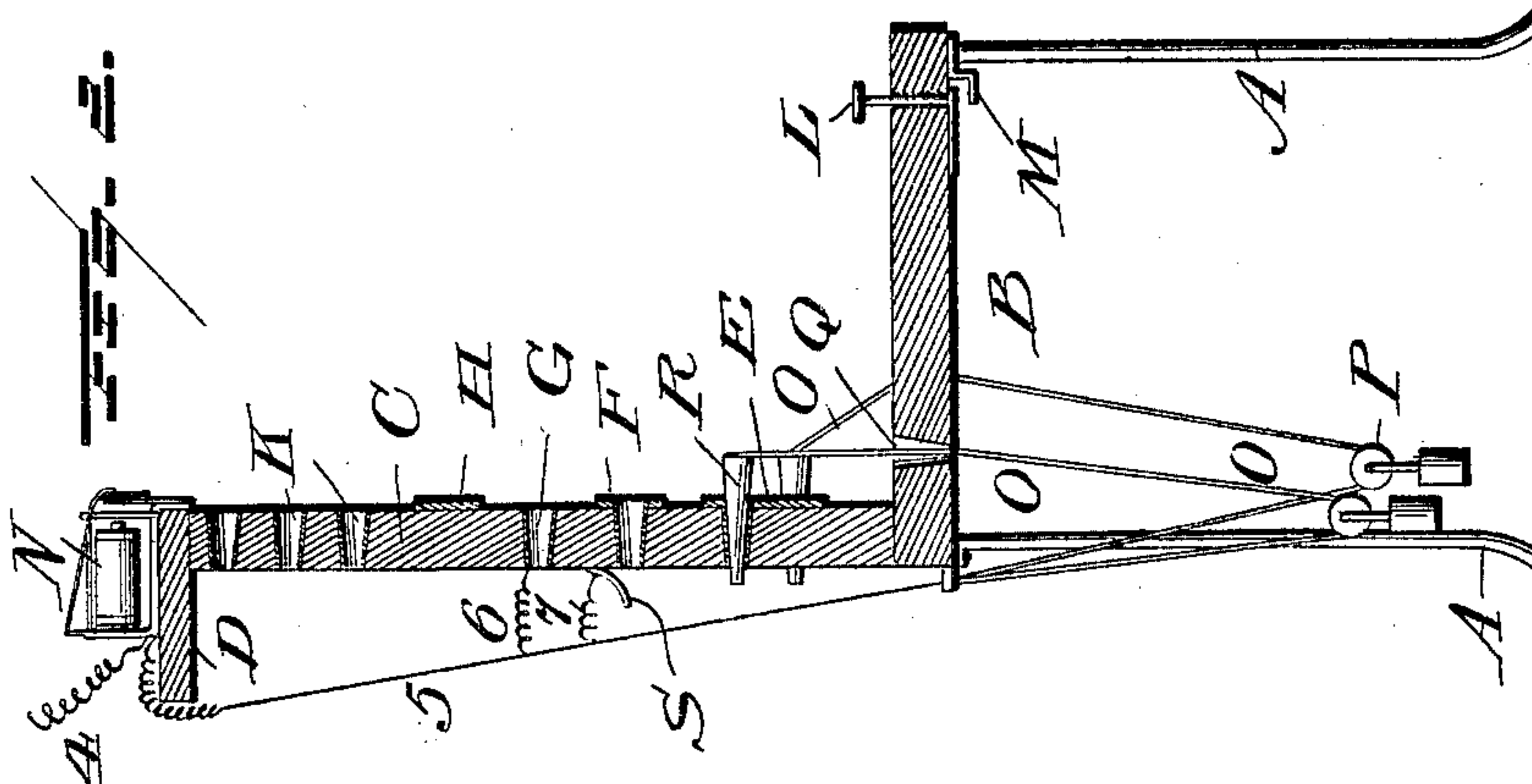
Patented May 28, 1901.

E. F. FROST.
TELEPHONE SWITCHBOARD.

(Application filed June 27, 1900.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

L. C. Hills
M. R. Faylor

INVENTOR

Ellie F. Frost

No. 674,862.

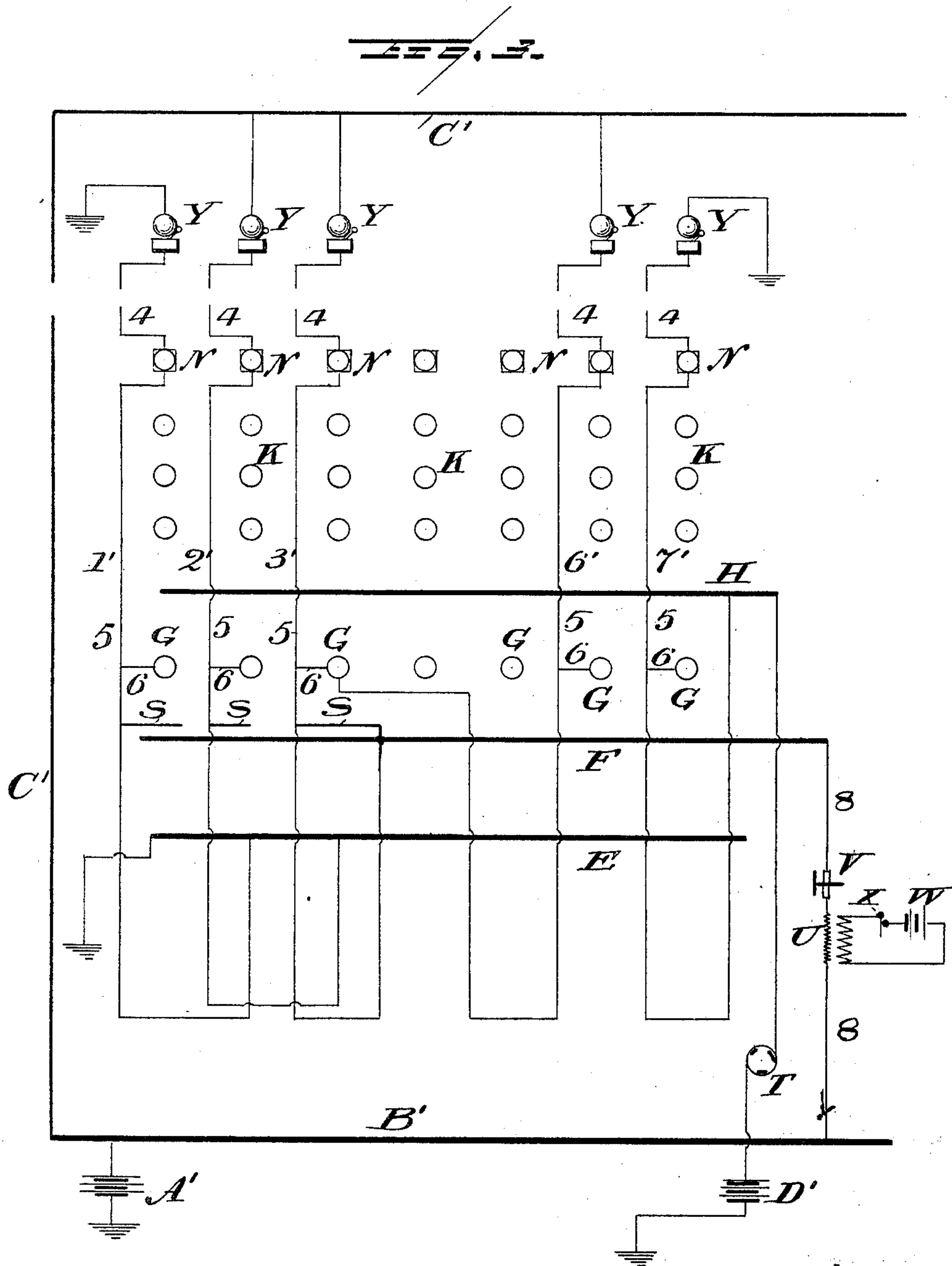
Patented May 28, 1901.

E. F. FROST.
TELEPHONE SWITCHBOARD.

(No Model.)

(Application filed June 27, 1900.)

3 Sheets—Sheet 2.



WITNESSES:

L. C. Hills
W. R. Taylor

INVENTOR

Ellis F. Frost

No. 674,862.

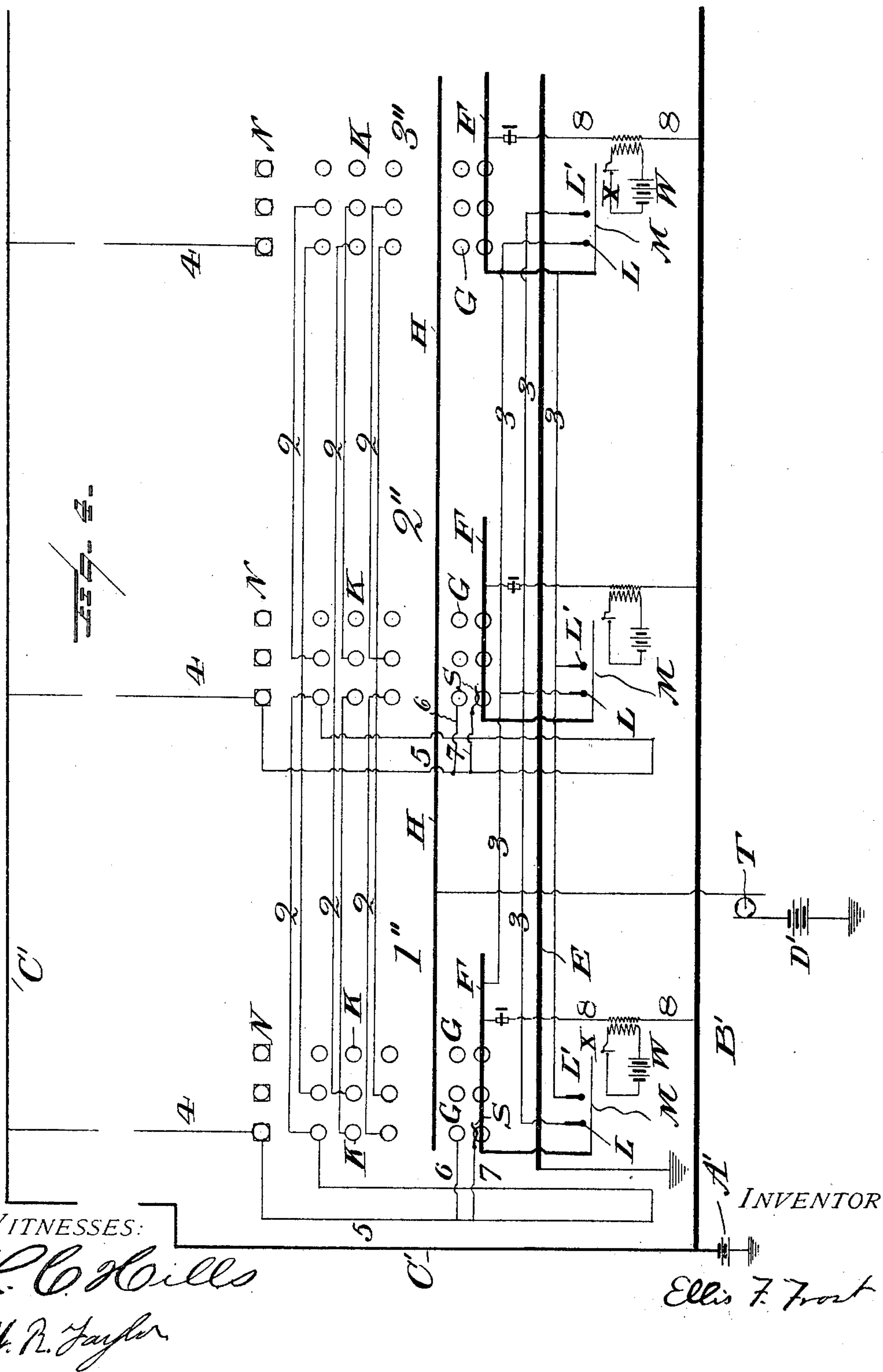
Patented May 28, 1901.

E. F. FROST.
TELEPHONE SWITCHBOARD.

(Application filed June 27, 1900.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES:

L. C. Hills
W. R. Taylor

E. F. Frost

UNITED STATES PATENT OFFICE.

ELLIS F. FROST, OF WASHINGTON, DISTRICT OF COLUMBIA.

TELEPHONE-SWITCHBOARD.

SPECIFICATION forming part of Letters Patent No. 674,862, dated May 28, 1901.

Application filed June 27, 1900. Serial No. 21,765. (No model.)

To all whom it may concern:

Be it known that I, ELLIS F. FROST, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Telephone-Switchboards; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to telephone-switchboards.

The object of my invention is to produce a telephone-switchboard simple and cheap to construct and which shall possess the merits of simplicity and ease of operation and which shall, moreover, be novel in the combination of the several parts.

In the accompanying drawings, Figure 1 is a perspective of the switchboard. Fig. 2 is a cross-section of the same on the line 2 2 of Fig. 1. Fig. 3 is a diagram illustrating the operation of the switchboard. Fig. 4 is a diagram showing the operation of three switchboards with one another.

In Fig. 1, A represents a suitable supporting-frame for the switchboard. On this frame are placed a horizontal table B and the upright C. On the top of the upright C is placed the signaling-drop shelf D.

In Fig. 1 the capacity is represented as limited to seven lines, each line being represented by a vertical row of circles, which circles represent connecting-sockets. Corresponding to each line there is a hole in the table B for the passage of the line-cord O. A metal plate or bus-bar E, bored with as many holes as there are lines, is connected to the earth, as shown in Figs. 3 and 4. This is fastened to the upright C. Immediately above this plate or bus-bar E is fastened a metallic plate or bus-bar F, also bored with holes and connected to the operator's telephone-line, as shown in Figs. 3 and 4. Immediately above this plate or bus-bar F are the local connecting-sockets G, each connected to its proper line, as shown in Figs. 2, 3, and 4. Immediately above these sockets G is the metallic

plate or bus-bar H, which is connected to the ringing-current, as shown in Figs. 3 and 4.

Immediately above the plate or bus-bar H are vertical rows of sockets K, which are connected each with a socket of another board, as shown in Fig. 4, by the wires 2.

On the horizontal table B are several keys L, each key being connected with the operator's telephone of another switchboard, as shown in Fig. 4, by the wires 3. Also fastened to the table B is a metallic strip or bus-bar M, (see Fig. 2,) which is connected to the operator's telephone. The keys L and strip or bus-bar M are so placed that when a key L is depressed it makes contact with the strip or bus-bar M.

On the shelf D are placed the drops or other signaling devices N. A telephone-line 4 on entering the switchboard leads through the drop N, thence through the wire 5 to the cord O, which passes over the weight-pulley P, through the hole Q of table B, to the plug R, to the ground-plate E. The cords O are each permanently connected to the terminal of its proper telephone-line. The line 5 between the cord O and the drop N is connected with the socket G by the wire 6 and with a spring S by the wire 7, designed to project over the one end of the hole in the plate or bus-bar F and upright C, so that when a plug is inserted in the hole in F the plug will connect the spring S with the plate or bus-bar F.

Fig. 3 represents diagrammatically the line-circuits, the common return-line, the common supply-battery, the ringer-battery to supply an interrupted current through a circuit-breaker, a bus-bar, an operator's telephone apparatus, and a switchboard.

The battery A', with one of its poles connected to earth, has its other pole connected to the bus-bar B'. A common return-line C' is connected to the bus-bar B' and extends to each subscriber's station. A battery D' has one of its poles connected to earth, and the other pole, through a circuit-breaker T, is connected to the ringer-bar H. The bus-bar E is connected to the earth. The operator's telephone-circuit 8, connected to the telephone bus-bar F, includes the secondary winding of the induction-coil U and the magneto-receiver V and is also connected to the bus-bar

B'. The primary winding of the induction-coil U is in circuit with the battery W and microphone-transmitter X.

The telephone-lines 1' to 7' when not in use are connected to earth at the subscriber's station and to the bus-bar E, as shown in line 1', including the signaling apparatus of both the subscriber Y and of the central office N in the line-circuit.

If the subscriber desires to signal the central office by appropriate mechanism, the subscriber disconnects his line from the earth and connects it to the common return-line C'. The circuit is now from earth-battery A', common return-line C', subscriber's telephone-line 2', drop N, and bus-bar E to earth. To answer this signal, the operator removes the plug R from the bus-bar E and connects it to the telephone bus-bar F, as shown in line 3'. The subscriber has in the meantime by appropriate mechanism connected his line through his telephoning apparatus to the common return-line C'. If he desires to be connected with a subscriber, say, of line C'', the operator first signals the subscriber of the desired line by removing the plug of the subscriber's line to be signaled over from the bus-bar E and connecting it to the bus-bar H. This condition of the line is shown in line 7', the current from the battery D' through the circuit-breaker T operating the subscriber's signal Y. The operator then removes the plug R from the bus-bar H, so that the signaling of the subscriber shall cease, and connects it with the socket G of line 3', the lines 3' and 6' being represented as being connected together, the operator's telephone-line 8 being in shunt to the connected lines, as shown in Fig. 3, the operators's telephone-line 8 being connected to the lines 3' and 6' by means of a plug connecting the bus-bar F with the spring S. When satisfied that the subscribers of line 3' and 6' are conversing, the operator removes the plug of line 3' from the telephone bus-bar F and allows it to fall to rest in the hole Q in the table B of Fig. 2. Fig. 4 represents diagrammatically the wiring of two or more switchboards in order to enable a telephone-line of one switchboard to be connected with that of another.

As in Fig. 3, a battery A', bus-bar B', common return-line C', ringing-battery D', and circuit-breaker T are connected as above described. On each switchboard are keys L L', &c., which when depressed make contact with the telephone bus-bar M. The telephone bus-bar M of each switchboard is connected to the operator's telephone-line of that switchboard to which it belongs. Each key L, &c., is connected with the operator's telephone-line of another switchboard, as shown in Fig. 4, where the key L of switchboard 1'' is connected with the telephone-line 8 of switchboard 2'', as is also the key L' of switchboard 3''. Also the key L' of switchboard 1'' is connected with the operator's telephone-line 8 of switchboard 3'', as

is also the key L' of switchboard 2''. In other words, each operator's telephone-line is connected with a key on each other operator's switchboard. The sockets K of each switchboard are connected to transfer-lines 2, extending between the switchboards. For instance, the first vertical row of switchboard 1'' is connected with the first vertical row of switchboard 2'', the second row of switchboard 1'' being connected with the first vertical row of switchboard 3'', the second row of switchboard 2'' being connected with the second row of switchboard 3'', and so on. The connections of the subscribers' lines proper to each switchboard are normally as described above.

In operation suppose that the subscriber of line 1' of switchboard 1'' desires to be connected with the subscriber of line 1' of switchboard 2''. The subscriber of line 1' of switchboard 1'' signals the central office, and his desire is learned by the operator by the operations described above. Having learned that the subscriber 1' of switchboard 2'' is wanted, the operator of switchboard 1'' connects the plug R of the line 1' with one of the transfer-sockets connected with switchboard 2''. The operator of switchboard 1'' then depresses the key L, connected with the operator's telephone-line 8 of switchboard 2'', and asks that the line 1' of switchboard 2'' be connected with the proper socket connected with switchboard 1''. The operator of switchboard 2'' thereupon signals the subscriber of line 1' of switchboard 2'' in the manner described above and connects the plug R of that line in the proper socket, the two subscribers' lines thus being connected together. If while these lines are connected operator of switchboard 1'', for instance, desires to listen on the line, she can do so by inserting a plug in the proper hole in the telephone bus-bar F, thus connecting the spring S of the line with the telephone bus-bar F.

I claim—

1. In a telephone-switchboard a plurality of telephone-lines, a bus-bar B', a source of electric energy one pole of which is connected to the earth the other pole of which is connected to the bus-bar, a common return-line for said telephone-lines connected to said bus-bar, combined with an operator's telephone-line and a second bus-bar which is connected to said bus-bar B' through the said operator's telephone-line.

2. In a telephone-switchboard a bus-bar B', a source of electric energy one pole of which is connected with the earth the other pole of which is connected with said bus-bar B', and a telephone bus-bar M which is connected to aforesaid bus-bar B' through an operator's telephone-line, combined with a key adapted to make contact with the telephone bus-bar.

3. In a telephone-switchboard consisting of a plurality of operator's sections, a bus-bar B', a source of electric energy one pole of which is connected to earth the other pole of

which is connected to the said bus-bar, combined with an operator's telephone-line which is connected to said bus-bar B' at an operator's section and which is connected to a key 5 in each of the other operator's sections, and means for completing the battery-circuit.

4. In a telephone-switchboard consisting of a plurality of operator's sections, a bus-bar B', a source of electric energy one pole of 10 which is connected to the earth the other pole of which is connected to the said bus-bar, and a telephone bus-bar at each operator's section, combined with an operator's telephone-line at each operator's section which is connected to the said bus-bar B' and to the tele- 15 phone bus-bar.

5. In a telephone-switchboard a bus-bar B', a source of electric energy one pole of which is connected to the earth the other pole of 20 which is connected to the said bus-bar, a telephone-line, and a bus-bar connected to the earth, combined with means adapted to connect said telephone-line to said grounded bus-bar.

6. In a telephone-switchboard a bus-bar B', a source of electric energy one pole of which is connected to the earth the other pole of 25 which is connected to the said bus-bar, a telephone-line, an operator's telephone-line and a telephone bus-bar connected through said operator's telephone-line to the aforesaid bus-bar B', combined with means adapted to connect said telephone-line with said tele- 30 phone bus-bar, and means for completing the battery-circuit.

7. In a telephone-switchboard a bus-bar B', a source of electric energy one pole of which is connected to the earth the other pole of 35 which is connected to the said bus-bar, a telephone-line, a circuit-breaker, and a ringer bus-bar connected to one pole of a source of electric energy through said circuit-breaker the other pole of which is connected to the 40 earth, combined with means adapted to connect the said telephone-line to the said ringer bus-bar and means whereby a ringing-current may be derived from the ringer bus-bar.

8. In a telephone-switchboard a bus-bar B', a source of electric energy one pole of which is connected to the earth the other pole of 45 which is connected to the said bus-bar, a plurality of telephone-lines, a common return-line for said telephone-lines connected to said

bus-bar, combined with means adapted to connect one telephone-line with another, and 55 means for completing the battery-circuit.

9. In a telephone-switchboard a bus-bar B', a source of electric energy one pole of which is connected to the earth the other pole of 60 which is connected to the said bus-bar, two telephone-lines adapted to be connected to each other, a common return-line for said telephone-lines connected to said bus-bar, and an operator's telephone-line connected to the 65 said bus-bar, combined with means adapted to connect the operator's telephone-line with the connected telephone-lines.

10. In a telephone-switchboard consisting of a plurality of operator's sections, a bus-bar B', a source of electric energy one pole of 70 which is connected to the earth the other pole of which is connected to the said bus-bar, and an operator's telephone-line at each section connected to the bus-bar, combined with means adapted to connect said operator's tele- 75 phone-lines to each other, and means for completing the battery-circuit.

11. In a telephone-switchboard consisting of a plurality of operator's sections, a bus-bar B', a source of electric energy one pole of 80 which is connected to the earth the other pole of which is connected to the said bus-bar and a telephone-line at each section, combined with trunk-lines adapted to connect a telephone-line of one section with that of another, 85 and means for completing the battery-circuit.

12. In a telephone-switchboard consisting of a plurality of operator's sections, a bus-bar B', a source of electric energy one pole of 90 which is connected to the earth the other pole of which is connected to the said bus-bar, a telephone-line at one operator's section adapted to be connected with that of another section, a common return-line for said telephone- 95 lines connected to the said bus-bar, and an operator's telephone-line connected to the bus-bar, combined with means adapted to connect the operator's telephone-line with the connected telephone-lines, and means for com- 100 pleting the battery-circuit.

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

ELLIS F. FROST.

Witnesses:

F. A. LEHMANN,
ROSANN SMITH.