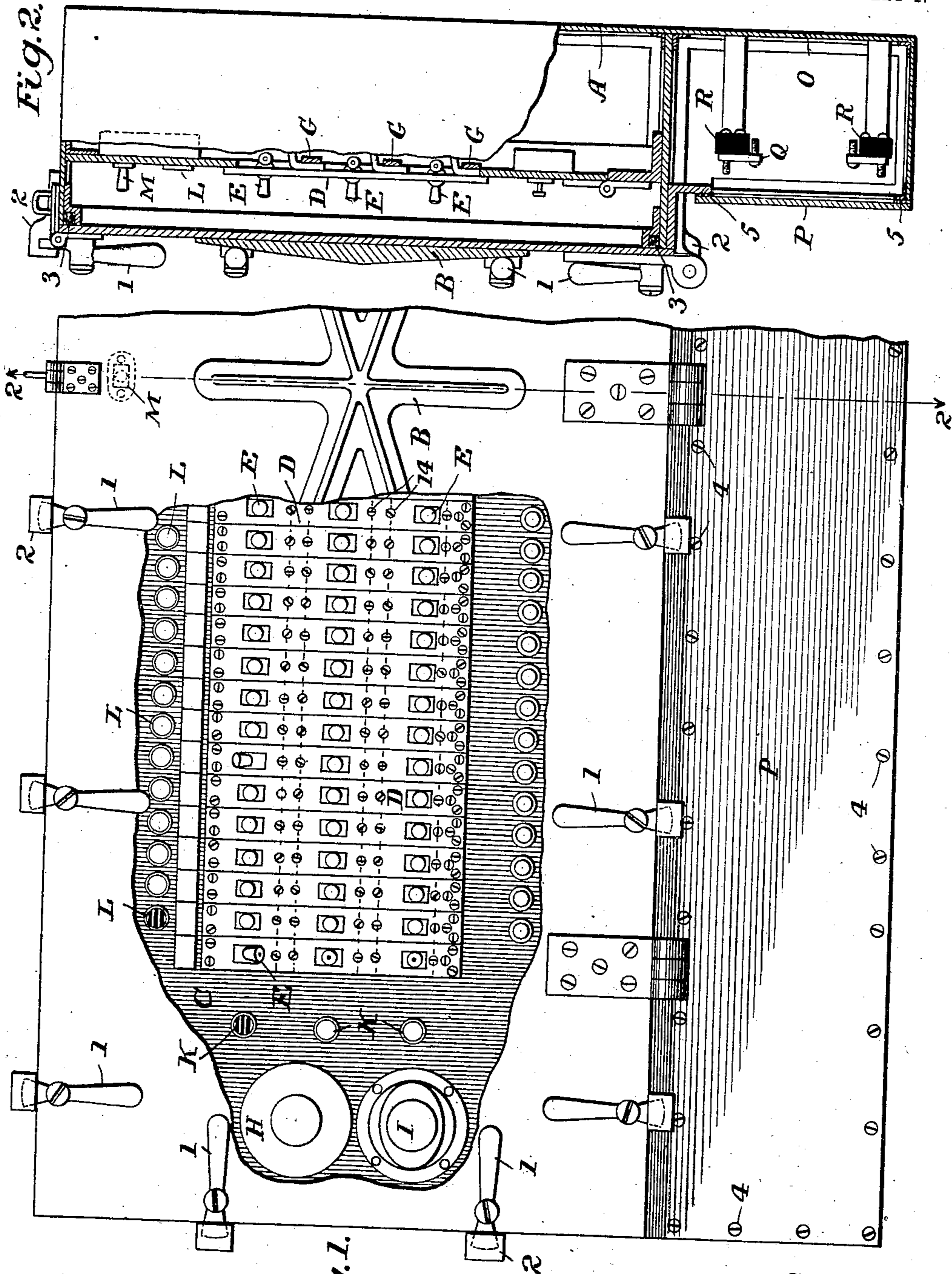


No. 859,276.

F. W. WOOD.  
TELEPHONE SWITCHBOARD.  
APPLICATION FILED JULY 12, 1906.

PATENTED JULY 9, 1907.

3 SHEETS—SHEET 1.



Witnesses  
J. G. Stinkell  
G. M. Stucker

Fig. 1.

Inventor  
by Frank W. Wood  
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his Attorneys

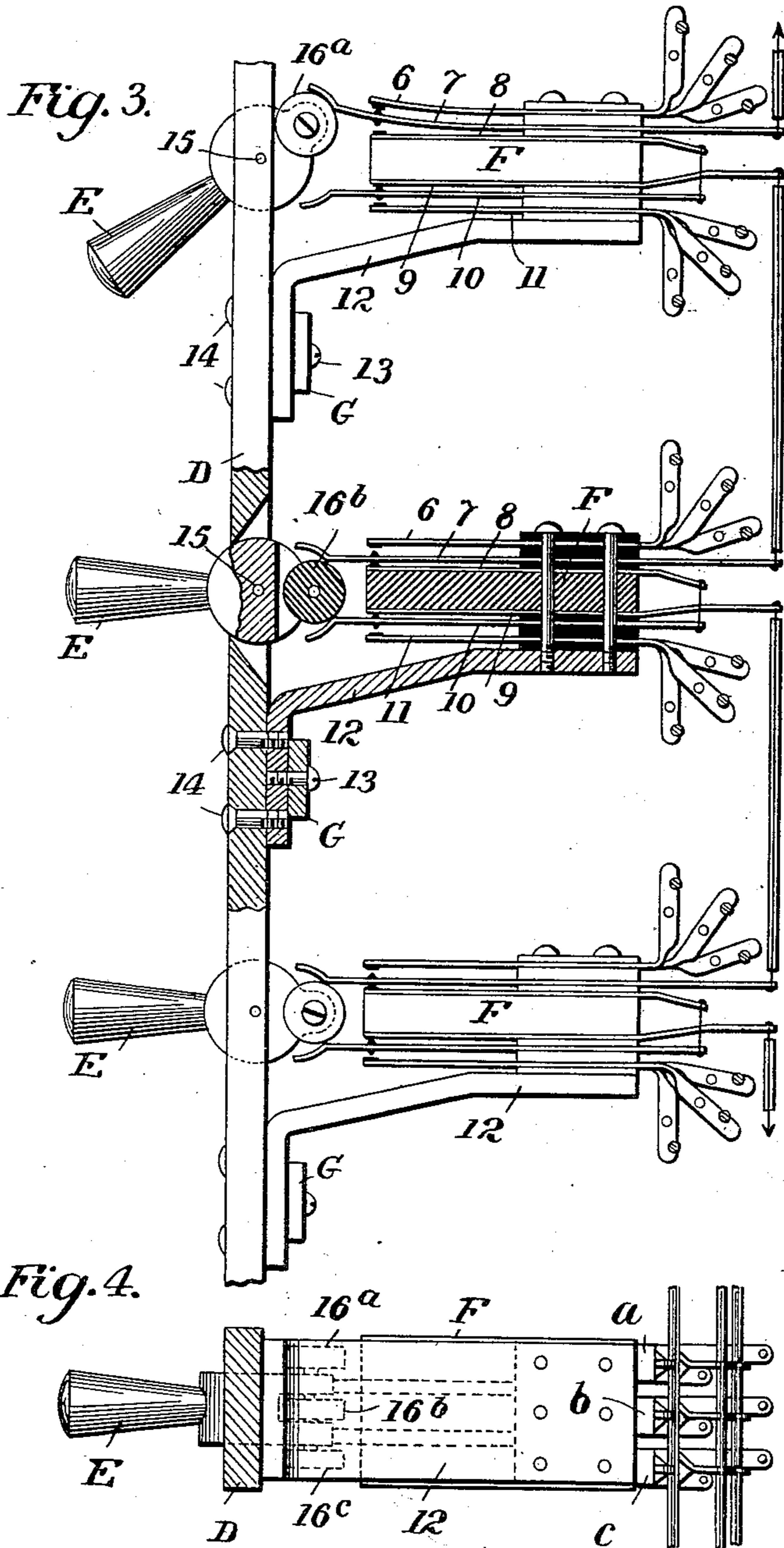
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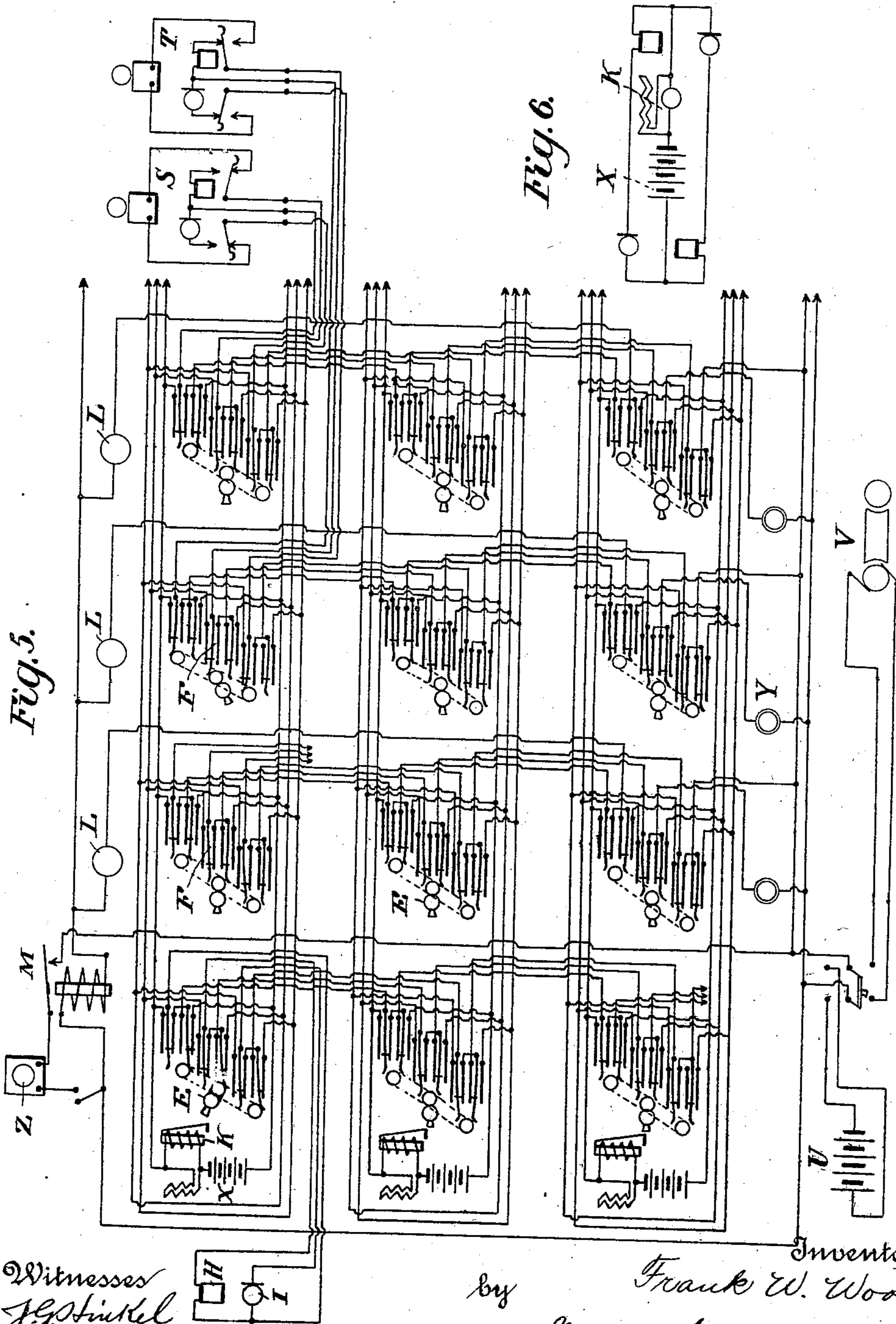
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3 SHEETS—SHEET 3.



Witnesses  
*J. G. Stuekel*  
*J. M. Stuekel*

by

Inventor  
*Frank W. Wood*  
*Meyers, Kushnawaker*  
his Attorneys

# UNITED STATES PATENT OFFICE.

FRANK W. WOOD, OF NEWPORT NEWS, VIRGINIA, ASSIGNOR TO CHARLES CORY AND JOHN M. CORY, OF NEW YORK, N. Y., A FIRM.

## TELEPHONE-SWITCHBOARD.

No. 859,276.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed July 12, 1906. Serial No. 325,823.

*To all whom it may concern:*

Be it known that I, FRANK W. WOOD, a citizen of the United States, residing at Newport News, in the county of Warwick and State of Virginia, have invented new and useful Improvements in Telephone-Switchboards, of which the following is a specification.

This invention relates to switchboards especially adapted for use as central telephone switchboards and particularly applicable to use on vessels or in other locations where it is necessary to protect the mechanism from moisture or other injurious influences.

One object of the invention is to provide apparatus of the character described in which those portions liable to deterioration shall be protected.

Another object of the invention is to provide a switchboard in which the contacts can be readily inspected or cleaned and without disturbing their mounting.

Another object is to provide a switchboard in which different portions may be readily dismantled for inspection, repair or renewal without disturbing the remainder of the board.

Other objects will appear hereinafter.

In the accompanying drawings which illustrate the invention, Figure 1 is a front elevation of a central telephone switchboard embodying the invention, partly broken away, Fig. 2 is a section on the line 2—2 of Fig. 1, the contacts being omitted, Fig. 3 is an enlarged view of a portion of Fig. 2, showing the contacts and their mountings, partly in section, Fig. 4 is a plan view of one set of contacts, Fig. 5 is a diagram of circuits controlled by the switchboard, and Fig. 6 is a simplified diagram showing the relative connections of two communicating telephone sets.

Referring to the drawings, the switchboard comprises a box or casing A to which is hinged a lid B. Within the casing is a shutter C having an opening. Over the opening are vertical strips D carrying cam levers E for operating the sets of contacts F. The sets of contacts F are secured to horizontal strips G extending across the opening and secured to the shutter C. The vertical strips D are also secured to the shutter and to the horizontal strips. The levers are equally spaced upon the strips D so that when the said strips are secured side by side, the cam levers will be in horizontal rows and there is a horizontal strip G for each of the horizontal rows. Mounted at one side, upon the shutter are the operator's set comprising the receiver H and transmitter I and clearing-out drops K, there being one drop for each horizontal row of cam levers. On the shutter at the top are mounted line drops L, one for

each vertical row of cam levers, and a switch M for cutting a buzzer or bell Z into the line drop circuit at the will of the operator. The drops are of the well known target self-restoring type and the switch M may be of any suitable construction. No further description of them is therefore necessary. Secured to the casing A is a separate connection box O closed at the front by a cover P and containing terminals Q, for incoming wires, mounted on insulating strips R.

The casing A is water-tight and the cover B is secured thereto to preserve its tightness by means of dogs 1 pivoted to the cover and adapted to engage with ears 2 secured to the casing, packing 3 being interposed between the casing and its cover. The box O is also water-tight and its cover is secured by means of screws 4, a packing 5 being placed between the box and cover.

The sets of contacts F are supported upon horizontal strips G, there being one set of contacts for each of the cam levers. Since each of the sets of contacts F and its corresponding cam lever is precisely similar to every other set of contacts and its cam lever, a description of one set of horizontal strips and its cooperating cam lever will apply to each.

Referring particularly to Figs. 3 and 4, it will be seen that each set of contacts comprises three groups a, b and c, each comprising six contacts 6, 7, 8, 9, 10 and 11. The contacts of a set are so mounted that each one of the contacts is insulated from every other, that is, no circuit is formed through the mounting from one contact to the other. Each set of contacts is supported upon a bracket 12 secured by means of a screw 13 to a horizontal strip G. Through the medium of the brackets 12 the vertical strips D are secured to the horizontal strips G by means of screws 14 which pass through the vertical strips and engage with the brackets. Each cam lever E is pivoted in a vertical strip D at 15 and at its inner extremity carries members 16<sup>a</sup>, 16<sup>b</sup> and 16<sup>c</sup> suitably insulated from each other or being of insulating material, adapted to engage with the ends of the contacts 7 and 10 of the three groups of the set to which the cam lever corresponds. It will be noted that the contacts 7 and 10 extend beyond the others and at their extremities are provided with arc-shaped portions of such configuration that when the cam lever E is thrown upwardly, and therefore the inner end thrown downwardly, the contacts 10 will be moved downwardly and their arc-shaped ends will engage with the members 16<sup>a</sup>, 16<sup>b</sup> and 16<sup>c</sup> so that the cam lever will be held in the position in which it is placed. Similarly if the outer end of the lever is thrown downwardly the members 16<sup>a</sup> to 16<sup>c</sup> inclusive will engage with the extremities of

the contacts 7. The rear ends of the contacts are adapted to have conductors connected to them and are so bent axially that contacts which are to be connected together will be in line and are also twisted more or less to present the broad faces of the contact strips at the most convenient angles for attaching conductors.

It will be noted from the foregoing that the vertical strips D are placed close together and constitute the face of the switchboard and that the cam levers carried by them are removed with the strips, thereby exposing to view and rendering accessible the working ends of the contacts so that they may be readily inspected or cleaned. The cam levers are not mechanically connected to any of the contacts but simply engage there-with when the strips are in position. It is not necessary therefore to effect any mechanical disconnection to remove the strips and examine the contacts other than to remove the screws which secure the particular strip in question. The arrangement of the contacts it will be noted is such that the working ends or those which make and break contact are at the front so that they may be readily examined from the front upon removal of a vertical strip. If after a strip has been removed it is found necessary to remove one of the sets F of contacts this may be readily done by removing the screw 13 holding the particular bracket 12 on which the set of contacts is mounted. Access to the rear ends of the contacts for effecting connections or other purposes is readily obtained by swinging down the shutter C on its hinges when the whole back of the shutter will be exposed to view and will be easy of access.

In the diagram of circuits shown in Fig. 5 the connections of the contacts for the particular telephone system illustrated is clearly set forth.

Referring particularly to Fig. 5 it will be seen that there is one telephone instrument and one line drop for each vertical row of switches. The extreme left hand row is connected with the operator's set. As many horizontal rows are provided as the number of separate conversations which it is desirable to carry on at once. It will be noted that there are apparently shown two receiver hooks at each telephone set. If desired, two receivers or hearing tubes, joined in multiple, and mechanically connected together, may be used to co-operate therewith, as is well known in the art, or, the diagram may be understood as merely representing two contact strips carried by the same receiver hook. When the person desiring to call, removes his receiver from the hook, the contacts assume the position shown at T, and the line drop of that particular vertical row is actuated by means of a circuit including the transmitter of the calling station and battery U or generator V. The line drop having been actuated, the operator's set and subscriber calling are connected in conversational relation by throwing a cam switch in the vertical row corresponding to the operator's set in one direction and the switch in the row corresponding to the calling station and in the horizontal row with the thrown operator's switch in the opposite direction. An example of such a connection is shown in the top horizontal row of the diagram. The operations as described having been effected the connections between the operator's set and the calling subscriber are simply

shown in Fig. 6, the talking current being supplied by the battery X of which there is one corresponding to each horizontal row of switches.

The operator having ascertained what station the calling subscriber desires to communicate with, a push button, Y corresponding to the vertical row of the subscriber desired, is pushed whereupon a ringing current passes from battery U or generator V through the signal of the called station. The operator then throws a cam switch in the horizontal row with the thrown switch of the calling station and in the vertical row corresponding to the called station in the opposite direction from the switch of the calling station whereupon circuit connections are established between the called and calling stations as shown in Fig. 6. The operator cuts his own set out of circuit by bringing his switch to normal position. It will be observed that during conversation the clearing-out drops are energized but upon the hanging up of a receiver at either of the communicating stations the talking circuit and therefore that of the clearing-out drop is broken when the latter restores to cleared position.

By closing the switch M an audible signal Z is operated by the closing of the line drop circuit so that in case of darkness or for other reasons where the attention of the operator would not be attracted by the visual drops he will not fail to be notified of a call.

While the invention has been illustrated in what is considered its best application it may be embodied in other constructions or arrangements and should not therefore be limited to the construction or arrangement shown.

What I claim is:—

1. The combination with a support, of a shutter hinged thereto, and contacts, operating means therefor, drops and an operator's set mounted upon the shutter.
2. The combination with a casing, of a shutter movably mounted therein, contacts, operating means therefor, drops and an operator's set mounted upon the shutter, and a lid for said casing outside the shutter.
3. The combination with contacts having their working ends toward the front of the switchboard and the said board constructed in separately removable sections, said sections being removable independently of said contacts, whereby the working ends of a particular set of contacts can be examined and cleaned by removing the section in front of it without disturbing the remainder of the board, of means for operating the contacts mounted in the said sections of the switchboard.
4. The combination with contacts having their working ends toward the front of the switchboard and the said board constructed in separately removable sections, said sections being removable independently of said contacts, whereby the working ends of a particular set of contacts can be examined and cleaned by removing the section in front of it without disturbing the remainder of the board, of means mounted in the said sections for operating said contacts, the said means being adapted to engage with the contacts but being mechanically connected only with the said sections.
5. The combination with a support comprising horizontal strips, of brackets extending rearwardly from the strips, sets of contacts mounted on the said brackets, vertical strips also carried upon said support and levers mounted in said vertical strips and adapted to engage with said contacts.
6. The combination with a hinged support comprising horizontal strips, of brackets extending rearwardly from the strips, sets of contacts mounted on the said brackets, vertical strips also carried upon said support, levers

mounted in said vertical strips and adapted to engage with said contacts, and a water-tight casing having a lid in which the said support and the apparatus which it bears are located.

- 5 7. The combination with a support comprising separated strips, of sets of contacts carried by said strips and sections carrying operating means for said contacts, said sections being removable independently of each other and of said contacts.
- 10 8. The combination with a casing, of a shutter movably mounted therein and comprising separated strips,

sets of contacts carried by said strips and sections carrying operating means for said contacts, said sections being removable independently of each other and of said contacts, and a lid for said casing outside said shutter.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRANK W. WOOD.

Witnesses:

J. E. WARREN,  
GERRARD F. MASON.