(No Model.)

H. E. WAITE & S. H. BARTLETT.

ELECTRIC SWITCH.

No. 306,789. Patented Oct. 21, 1884.

Fig. 2.

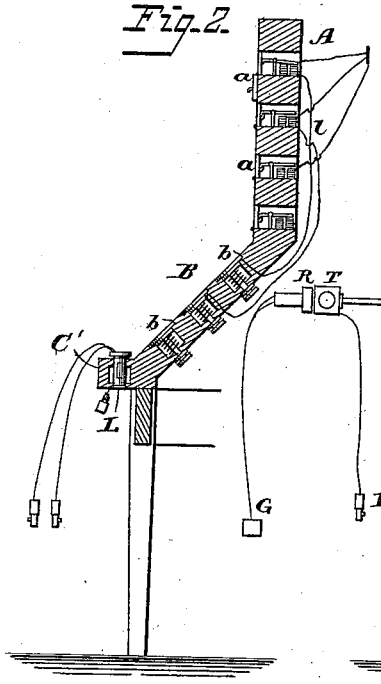


Fig. 1.

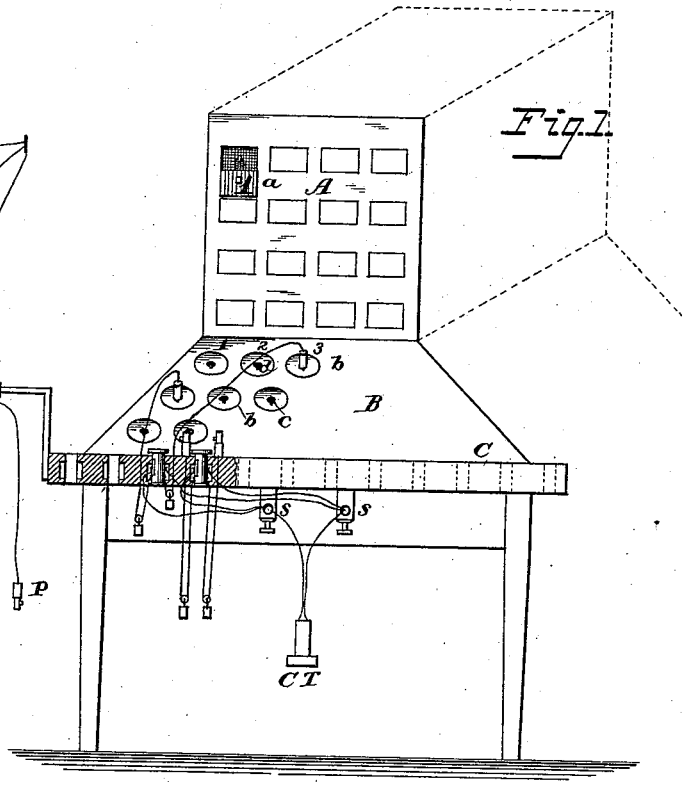


Fig. 3.

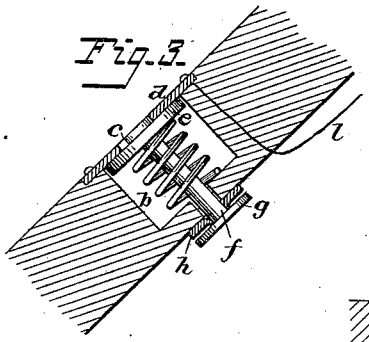


Fig. 4.

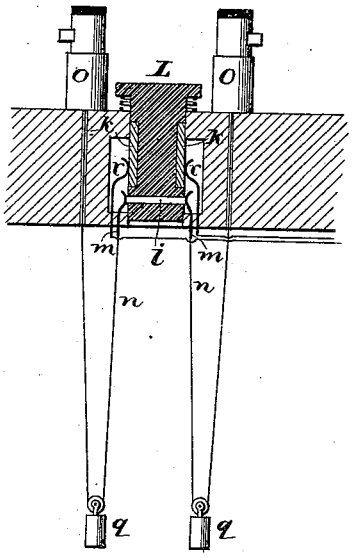
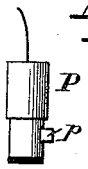


Fig. 5.



Attest:
Court. A. Cooper
Wm. F. Sayers.

Inventors:
H. E. Waite & S. H. Bartlett
by Foster & Freeman
Attys

UNITED STATES PATENT OFFICE.

HENRY E. WAITE AND SAMUEL H. BARTLETT, OF NEW YORK, N. Y., ASSIGNORS TO CHARLES F. LIVERMORE, TRUSTEE, OF SAME PLACE.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 306,789, dated October 21, 1884.

Application filed March 28, 1884. (No model.)

To all whom it may concern:

Be it known that we, HENRY E. WAITE and SAMUEL H. BARTLETT, citizens of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

Our invention pertains to telephone central-office or exchange switch-boards; and it consists in the construction and arrangement of the switch-boards, and the means for making the various constructions thereon, as more particularly pointed out hereinafter.

Referring to the drawings, forming part of this specification, for a more particular description of our invention, Figure 1 is an elevation of a part of the switch board or table. Fig. 2 is a section of the same, and Figs. 3, 4, and 5 are details.

The switch board or stand consists, essentially, of an upright rectangular portion, A, an inclined portion, B, which spreads or widens toward its base, and a narrow flat or horizontal portion, C, the devices for making the various connections being arranged on the various portions as hereinafter set forth. In small exchanges such a board or stand may be used alone; but where there is a larger number of subscribers than can well be accommodated upon one such stand several of them may be arranged, as indicated in dotted lines, so as to form a hollow square, hexagon, octagon, or other figure, according to the needs of the office. By such an arrangement it will be seen that space is economized, and at the same time every part of the board is accessible to the operators, and the cables or bundles of subscribers' wires may be brought into the room from above or below, and the connections conveniently made to the operating devices, and, if it is desired to change the arrangement or grouping of the various subscribers' wires, access to all parts of the board can be obtained without trouble. The board is preferably arranged in the middle of the room, so that there is space for the various operators to move around or work upon any and all parts.

Upon the upright A are placed the annunciators *a*, which may be of any desired construction and arranged in any desired order, the subscribers' lines being each connected to an annunciator bearing the proper designating character or number.

Upon the inclined portion B are placed the spring jacks or connectors *b*, each being numbered to correspond to the proper annunciator to which it is connected. The portion B is made of wood or other good insulating material, and has a number of holes or recesses, into each of which is fitted a connector.

In a shallow recess or mortise is secured by suitable screws or pins an annular disk of metal, *d*, having a circular opening, with a slot or recess, *c*, in one side thereof. This disk or ring is permanently connected to the line-wire *l* of the particular subscriber to which it belongs. In a deeper recess in the board and under the ring is a disk, *e*, of some conducting material, having a stem or shank, *f*, extending through a hole in the bottom of the recess, provided with a head, *g*, and around the stem or shank is placed a coiled spring, which, normally bearing upon the bottom of the recess, presses the disk *e* in contact with the ring *d*.

On the rear side of the board B are preferably placed longitudinal strips *h*, of metal, connected to the ground; or separate plates for each connector may be provided, all being grounded. These plates or strips are of comparatively thin metal, and have holes, corresponding to the holes in the board, punched through them. These holes are made with a dull instrument or other device, so as to leave a ragged edge around the hole; or tongues may be formed in the punching or otherwise, that will project slightly above the plate, so as to present an uneven and somewhat elastic face to the head *g*, to secure bright electrical contact. It will be seen that normally each subscriber's line-circuit *l* enters the board and passes through the annunciator-magnet, thence to the ring *d*, thence by disk *e*, stem *f*, and disk *g*, to the strip or plate *h*, and to ground.

Located in any convenient position on the board or otherwise are the operators' instru-

ments, those in the drawings, T R, being shown as connected to ground at one side, and the other side being connected by a flexible conductor to a plug, P, the small end of which has a projection, *p*, adapted to fit the recess *e* in the ring or disk *d*, and when the plug is inserted in the opening in said ring the projection passes through the recess, and upon the plug being turned partially around it will engage upon the under side of the ring and hold the disk *e* away from the ring, and consequently the disk *g* away from the strip *h*, breaking the ground-circuit and completing the subscriber's circuit through the operators' instruments. The end of the plug may be of insulating material; but this is not necessary, as the ground-connection will be broken by the disk *g* being forced out of contact with the ground-strip.

Secured to the platform C of the board are a series of "looping-in" connectors, L, each consisting of a block of insulating material, having a bar or band of conducting material, *i*, and plates of conducting material *k k* located upon its sides. These plugs are preferably supported upon springs, as shown. On opposite sides of the plug or connector are contact-springs *m m*, to each of which is secured one end of the connecting-cords *n n*, the other ends of which pass through holes in the platform at each side of the connector, and terminate in plugs *o o*, similar in construction to the plugs P. These plugs rest upon the platform, and the slack cord between them and the springs *m m* is preferably held taut by a weight, *q*, attached to a pulley supported on the cords. Any other suitable arrangement of connectors or cords may be used.

When it is desired to put two subscribers' lines into communication, one of the plugs *o o* is inserted into the spring jacks or connectors corresponding to the subscribers' lines, and the connection is made through the cords *n n*, springs *m m*, and bar or band of conducting material on the connector L.

It is desirable that the attendant at the central office may determine when the subscribers are through using the lines, in order that they may be disconnected and restored to their normal condition. To do this without disturbing the communication of the subscribers, one or more "clearing-out" telephones, C T, are provided, and connections are made so as to include this telephone in the working or line circuit, in order that the operator may listen to determine whether the lines are still in use, and this is accomplished without breaking said circuit.

On opposite sides of the connectors L are fixed the conducting-strips *k k*, and contact springs or terminals *r r* are so placed as to bear upon such strips, and are connected to the loop-circuit containing the clearing-out telephone-instruments C T.

When the operator desires to listen, he presses the connector included in the desired circuit, so as to cause the conducting-strips *k k* to make connection with the terminals *m m* and break the circuit through the bar or ring *i*, thereby including the clearing-out telephone in the line-circuit, and this is accomplished without actually breaking said circuit, the conductors *k k* being so arranged that they will make connection with the terminals *m m* before the depression of the connector actually breaks the connection through rod *i*, the connectors *k k* being long enough to permit both the terminals *m m* and *r r* to bear upon them at the same time.

In order that one clearing-out instrument may be used for a number of circuits, the conductors leading to it are preferably connected to the binding-posts *s s*, preferably secured to the under side of the platform, and each of these posts is connected to one of the spring-terminals *r* on each side of a number of the connecting-plugs, as clearly shown in Fig. 1.

In the drawings only a small number of the subscribers' lines and connecting devices are shown; but it is evident that the number is only limited by the size of the switch-board, and that the general arrangement and operation are the same.

Having thus described our invention, without limiting ourselves to the precise arrangement shown, what we claim is—

1. A telephone central-office switch-board consisting of the upright rectangular portion, the inclined spreading portion, and the horizontal portion, the arrangement being such that a number of such boards may be arranged around a central space, as and for the purposes set forth.

2. A telephone switch-board consisting of the upright rectangular portion supporting the annunciators, the inclined spreading portion containing the spring-jack connectors, and the horizontal portion supporting the spring-connectors and the operators' instruments, as set forth.

3. The spring-jack connectors consisting of a ring connected to line and fixed to the switch-board, a spring-actuated disk normally bearing upon said ring, a ground connecting strip or plate, and connections between said plate and disk, substantially as described.

4. The spring-jack connectors consisting of a ring connected to line, a ground connecting strip or plate, and a stem having a disk or plate at each end and adapted to complete the connection between the ring and ground-plate.

5. The combination, with a connecting-strip having perforations the edges of which are made ragged or projecting, of a conducting-disk adapted to bear upon said ragged edges, and thereby maintain good electrical contact, as set forth.

6. A connecting-plug consisting of a body of insulating material having a narrow bar or band and longitudinal strips of conducting material on opposite sides, and circuits and connections, substantially as described, where-

by the operator's telephone may be included in the line-circuit without interrupting the same, substantially as described.

7. The combination, with a listening-telephone, of a series of plug-connectors each consisting of an insulating body having a narrow bar or band and longitudinal strips of conducting material, one of the terminals of each of the connectors being connected to each one of the terminals of the telephone, as and for the purpose set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HENRY E. WAITE.
SAMUEL H. BARTLETT.

Witnesses:
CHARLES SPARMAN,
WM. H. WOODHULL.