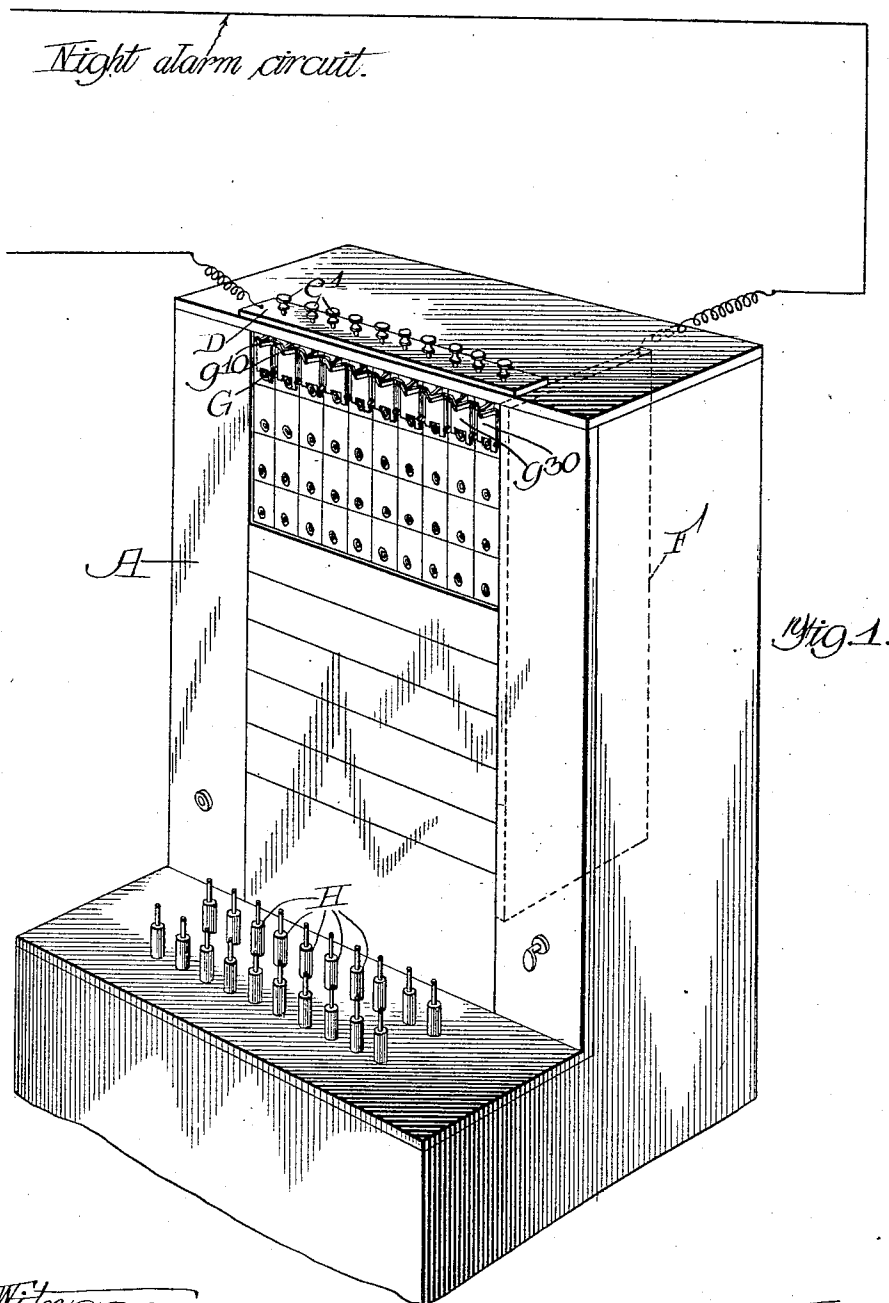


1,050,101.

P. C. BURNS.
TELEPHONE SWITCHBOARD.
APPLICATION FILED JAN. 18, 1909.

Patented Jan. 14, 1913.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

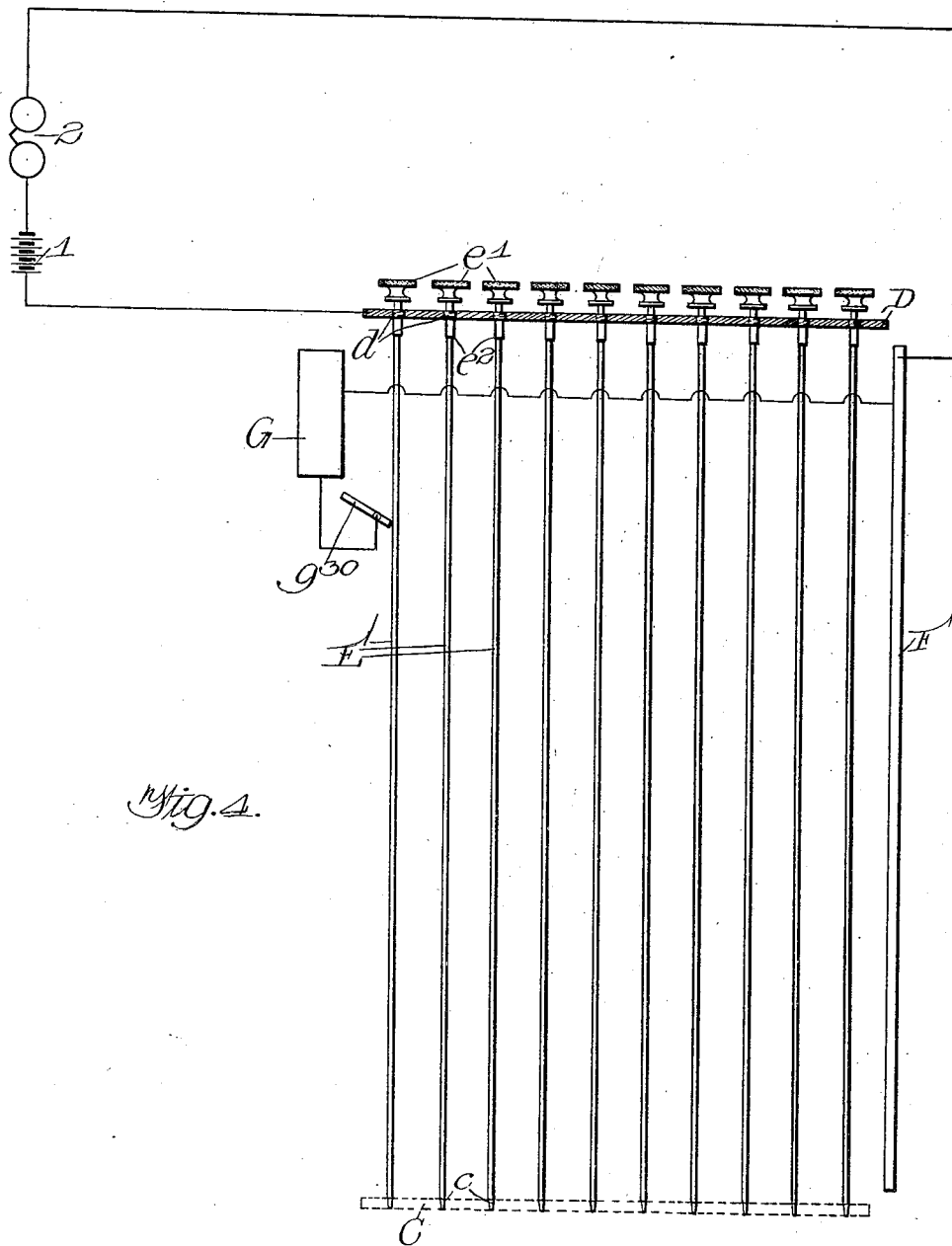


Fig. 4.

Witnesses:
H. D. Perry
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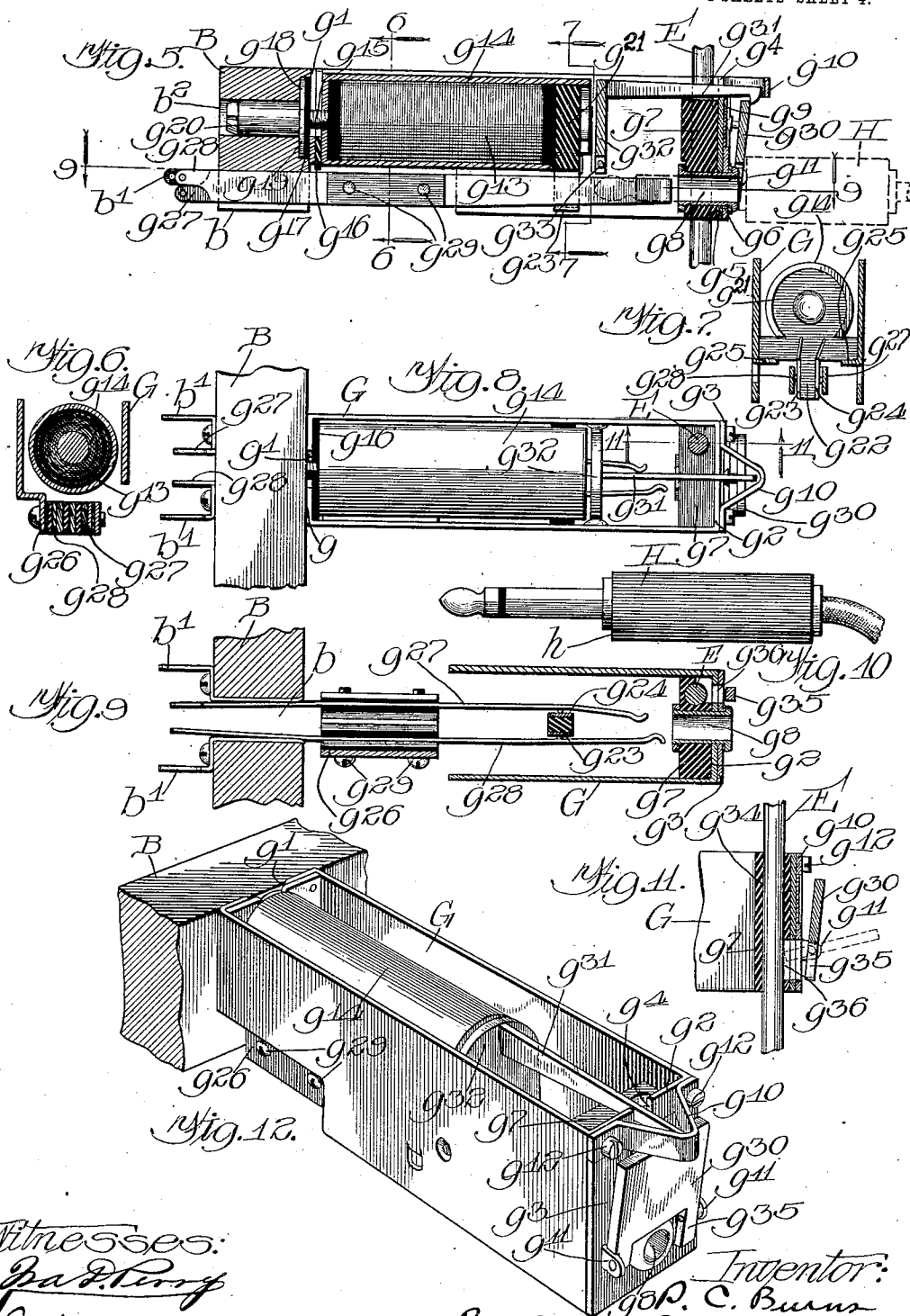
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4 SHEETS-SHEET 4.



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UNITED STATES PATENT OFFICE.

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TELEPHONE-SWITCHBOARD.

1,050,101.

Specification of Letters Patent.

Patented Jan. 14, 1913.

Application filed January 18, 1909. Serial No. 472,832.

To all whom it may concern:

Be it known that I, PETER C. BURNS, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Telephone-Switchboards, of which the following is a specification.

My invention contemplates certain improvements on the telephone switchboard disclosed in my prior application Serial Number 405,206, filed December 5, 1907.

Objects of my present invention are to improve the method of securing the electromagnet in place in the combined drop and jack; to improve the construction and method of releasing and restoring the shutter or annunciator of each combined jack and drop; to improve the arrangement and method of securing the units in place, each unit consisting of a combined jack and drop; to simplify and improve the arrangement for closing the night alarm circuit when the shutter or annunciator of any combined jack and drop is released; to simplify and improve the construction of the front plate of each unit—that is to say, the plate upon which the shutter or annunciator of the combined jack and drop is mounted; to provide an improved and more direct electrical connection between the forward ends of the jack springs and the terminals of the magnet of each unit, whereby each combined jack and drop is provided with less jack springs than heretofore; to provide an arrangement whereby the magnetic circuit between the two poles of the electromagnet of each unit—that is to say, of each combined jack and drop—is completed through the medium of a metal shell or casing of the magnet, as well as through the rectangular frame of the combined jack and drop; to provide means for more firmly supporting and holding in place the rear ends of the units; and the provision of certain combinations and specific features tending to increase the general efficiency and serviceability of a telephone switchboard of this particular character.

To the foregoing and other useful ends, my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings:—Figure 1 is a perspective of the upper portion of a telephone exchange switchboard embodying the principles of my invention. Fig. 2 is a horizontal section on an enlarged scale,

through the upper portion of said switchboard. Fig. 3 is a vertical section of the same. Fig. 4 is a diagrammatical view illustrating the method of closing the night bell circuit by direct contact between the shutter of the drop and the rod or key by which the units are held in place. Fig. 5 is a longitudinal section, on an enlarged scale, of one of the units—that is to say, of a combined jack and drop embodying the principles of my invention. Fig. 6 is a cross section on line 6—6 in Fig. 5. Fig. 7 is a cross section on line 7—7 in Fig. 5. Fig. 8 is a top plan view of the device shown in Fig. 5. Fig. 9 is a horizontal section on line 9—9 in Fig. 5. Fig. 10 is a side elevation of one of the plugs employed in conjunction with the jacks of the units for establishing connection with subscribers' lines and restoring the shutters or line signals. Fig. 11 is a detail section on line 11—11 in Fig. 8. Fig. 12 is a perspective, on an enlarged scale, of the unit or combined jack and drop shown in the preceding figures.

As thus illustrated, the frame or body A of the switchboard may be of any suitable known or approved character. As illustrated, it has a back composed of strips B provided with openings *b* in which are secured the subscribers' line terminals *b'*. Above these openings, in each strip, there are provided openings *b*², the purpose of which will hereinafter more fully appear. The switchboard preferably has a bottom plate or support C provided with sockets *c*, and a metallic top plate D having threaded openings *d* which register with the sockets *c* in the bottom plate. The rods or keys E have their lower ends adapted to fit and rest within the sockets *c*, while their upper ends are provided with enlarged threaded portions *e* adapted to engage the threaded openings *d*, as illustrated. These rods or keys are provided with handles or thumb portions *e'*, by which they are inserted and withdrawn, and are also provided with shoulders *e*², the purpose of which latter will hereinafter more fully appear, it being observed that these shoulders are immediately below the threaded portions *d* at the upper ends of said rods or keys. At one side of the switchboard there is provided a metal plate F, and by reference to Figs. 1 and 4, it will be seen that this plate, as well as the plate D and the rods or keys E, are all included in the

night bell circuit containing the source of current 1 and the night alarm 2, the purpose of which is well understood.

Referring now more particularly to Figs. 5 to 12 inclusive, it will be seen that each unit or combined jack and drop comprises a rectangular frame or body G, preferably of steel or iron, which frame is provided with a rear wall g having a notch g' , and a front wall g^2 upon the outer surface of which is secured a front plate g^3 . In the upper edge of the front wall g^2 there is provided a notch g^4 , and lower down the said wall is provided with an opening g^5 which registers with a similar opening g^6 in the front plate g^3 . A block of insulation g^7 is secured to the back of the wall g^2 , the means for so doing consisting of the ferrule g^8 which has its outer end provided with a head and its inner end provided with a nut, in the manner shown. In this way the said ferrule, which constitutes the socket for guiding the plug H into the jack, constitutes the means for clamping the block g^7 and the plate g^3 upon opposite sides of the front wall g^2 . It will be seen that this front plate g^3 is provided with an opening g^9 in which is located the number or other indication for the subscriber's line, and above this opening there is a guard g^{10} , all of which is integral with the ears g^{11} , which latter are located at opposite sides of the ferrule or socket g^8 , in the manner illustrated. The front plate g^3 thus formed from one integral piece of sheet metal is also held in place by screws g^{12} inserted through the upper corners of the same and into the front wall g^2 , thereby holding the same firmly in place. The electromagnet g^{13} is provided with a tubular shell g^{14} , preferably of steel or iron, and its core is provided with a rear threaded portion g^{15} that extends through the notch or opening g' in the rear end of the frame.

Insulation g^{16} is secured to the inner surface of the rear wall g , and a washer of insulation g^{17} is applied to the outer surface of the said wall g , this washer and the metal washer g^{18} , which latter is applied to the outer surface of the former, being adapted to enter the shallow socket g^{19} , formed in the inner surface of the strip or bar B, at the inner end of the socket or opening b^2 , in the manner shown in the drawings. To this threaded portion g^{15} , upon which the said washers are applied, there is an outer cylindric clamping nut g^{20} , which bears upon the said washers to clamp the magnet firmly upon the rear wall g of the frame, the outer end of said clamping nut being provided with a slot for a screw driver. With this arrangement the loosening of the said clamping nut g^{20} will permit the magnet g^{13} to be readily removed from the top of the frame G, whenever it

is necessary to inspect or repair the same. The forward end of the said magnet is provided with a block of insulation g^{21} having a depending portion g^{22} upon the opposite sides of which are secured the terminals g^{23} — g^{24} of the winding of said magnet. This block g^{21} rests upon the inwardly turned lugs g^{25} that are formed integral with the frame G of the combined jack and drop. At its rear end the said frame G is provided with a longitudinally extending and inwardly displaced bracket portion g^{26} , to which are secured the jack springs g^{27} — g^{28} , the same being clamped in place on said bracket portion by means of screws g^{29} , said springs being separated and insulated from each other by suitable strips of insulation. The rear ends of said jack springs are adapted to be inserted between and engage the terminals b' , in the manner shown more clearly in Fig. 9. The forward ends of said jack springs are adapted to rest upon the terminals g^{23} — g^{24} of the magnet, thus putting the coil or the winding of the magnet directly in bridge of the forward ends of the jack springs, and obviating the necessity of providing extra springs in the said jack. With this arrangement the removal of the magnet is accompanied by the removal of the terminals of the winding or coil, the coil or winding and the terminals constituting a unit and being removable as such from the balance of the structure. When the plug is inserted in the jack, it lifts or moves the two jack springs out of contact with the two terminals of the winding of the magnet, thus cutting the latter out of circuit. Upon the ears g^{11} of the front plate, there is pivoted a shutter or annunciator g^{30} which is held in place by a hook-shaped arm or finger g^{31} on the armature g^{32} , which latter is pivoted in front of the magnet and carried by a pivot or axis g^{33} extending through the two sides of the frame G, as shown in the drawings. It will be seen that the said arm or finger g^{31} normally engages the upper edge of the shutter g^{30} , thus holding the latter in its normal or elevated position, preparatory to giving a signal in response to a call by the subscriber. When the armature g^{32} is attracted by the magnet, the arm or finger g^{31} is thereby lifted, and the shutter g^{30} is thus released and allowed to fall forward by gravity. This exposes the numeral or other indication conspicuously affixed to the front plate behind the shutter, and gives the operator the desired signal. It will be seen that the rods or keys E extend through openings g^{34} in the blocks g^7 , and that the shoulders e^2 bear upon the blocks of the uppermost units, whereby the units are held one on top of the other and caused to bear firmly upon each other, in the manner shown in Fig. 3. In this way

the metal frames G are all in electrical contact with each other, being in engagement with each other at their upper and lower edges, as well as at their sides, and the frames at the ends of the horizontal rows being in electrical engagement with the side plate F, as illustrated.

The shutter or annunciator g^{30} is provided with a finger or movable contact g^{35} adapted to work in an opening g^{36} in the front plate structure of the combined drop and jack, which opening exposes the side of the rod E, as shown more clearly in Figs. 9 and 11. It follows, therefore, that the said annunciator or shutter makes an electrical contact with the rod E when the magnet is energized, the electrical connection being closed by the engagement of the finger or contact g^{35} with the side of said rod or key E, as indicated in dotted lines in Fig. 11. The shutters or annunciators are all, of course, in electrical connection with their respective front plates, and therefore, with the frames G of the units, and consequently each shutter is electrically connected with the side plate F. Consequently the engagement of any shutter or annunciator with its allotted rod or key E results in the closure of circuit through the night alarm circuit, as illustrated in Fig. 4. In other words, the rods or keys E are connected in multiple to one terminal of the night alarm circuit, while the units, each consisting of a combined drop and jack, and their various shutters are all connected to the other terminal of said circuit. Consequently, the engagement of any shutter with its allotted rod or key closes the circuit through the rod and through the plate D to the night alarm, and thence to the plate F and through the frame of the drop and jack to the said shutter by which the circuit was closed.

With the foregoing construction and arrangement, it will be seen that the electromagnets are easily removable from the different units, without removing the jacks therefrom. It will also be seen that the shutter is readily restored by the shoulder h of the plug when the latter is inserted in the jack, in the manner indicated in dotted lines in Fig. 5. The rods or keys E are easily inserted downwardly through the units, as their lower ends are smooth and unthreaded, and thus the threaded portions of the rods or keys are only required to pass through the top plate of the switchboard, as illustrated. Moreover, these rods or keys extend through portions which are rigid with the frame of the units, whereby each combined jack and drop is held firmly in place, and no strain is imposed on the magnet structure thereof. The night alarm circuit is closed by direct contact between the shutter and the vertical rod or key. With this arrangement the closure of the night alarm circuit is more cer-

tain and less mechanism is necessary for so doing than heretofore. The front plate g^3 of the unit is formed from one integral piece of sheet metal and has the guard g^{10} for the armature finger, and the ears g^{11} for the pivots of the shutter, and thus constructed is secured flatwise upon the front wall of the frame G, as previously explained. As the terminals for the magnet winding are rigid with the front end of the magnet, and arranged in position to be engaged by the line springs of the jack, it follows that no additional springs are necessary for the jack,—that is to say, no additional springs are necessary as terminals for the winding of the magnet; and in this way simplicity of construction is obtained and a decrease in the cost of manufacture. Furthermore, with this arrangement the jack springs are arranged as a part of the frame structure of the unit, being carried by the frame G, rather than by the magnet itself. This is all true, it will be seen, notwithstanding the fact that the insertion of the plug serves to disconnect both terminals of the magnet from the jack springs, thus completely cutting off the bridge which said coil or winding normally forms between the two sides of the subscriber's line. The magnetic circuit between the two poles and the magnet is completed through the shell g^{14} , as well as through the frame G, the two together serving to form a substantial conductor for the magnetism between the two poles of the magnet. The nut g^{20} for the rear end of the magnet serves as a means for supporting the unit on the back strip or bar B, it being observed that the washers g^{17} — g^{18} occupy the seat or shallow recess surrounding the opening b^2 , and that the said nut is long enough to give sufficient bearing to prevent the combined drop and jack from falling down, even when the drop and jack immediately below it is removed. Thus the rear end of each unit or combined jack and drop is held against lateral displacement, and the said nut g^{20} also serves as means for the ready removal of the magnet from the frame of the unit.

What I claim as my invention is:

1. A telephone switchboard having lines leading thereto, and a combined jack and drop for at least one of said lines, said combined jack and drop being provided with a rectangular frame of magnetic material, a magnet having its rear end removably secured to the rear end of said frame, said magnet thereby removable by itself from the top of said frame and a jack removably secured to one side of said frame.
2. A telephone switchboard having lines leading thereto, a magnet for at least one of said lines, an armature for the forward end of said magnet, a shutter in front of said armature, a finger reaching from the

top of the armature to the top of the shutter, adapted to release the shutter when the armature is attracted, a jack disposed below the magnet and armature, with the mouth of the jack exposed to view below the shutter, and a plug insertible in said jack and provided with a shoulder for engaging the shutter to restore the same in locked engagement with the said finger on the armature.

3. A telephone switchboard having lines leading thereto, a device for each line, vertical rods or keys extending downwardly through the said devices to hold the same in place, a shutter on each device, each shutter disposed in position to directly engage one of said rods when released to signaling position, and a night alarm circuit including said rod and shutter.

4. A telephone switchboard having lines leading thereto, a combined drop and jack for at least one of said lines, said combined drop and jack comprising an electromagnet provided at its forward end with a pair of terminals for the winding thereof, a jack having line springs normally engaging said terminals, said terminals and magnet being removable as a unit, a signal controlled by said magnet, and a plug insertible in said jack to move said springs out of contact with said terminals, said plug provided with means for restoring the said signal to normal condition.

5. A telephone switchboard having lines leading thereto, a front wall, a front plate applied to said wall, a shutter or visual signal carried by said front plate, means back of said front wall for operating said shutter or visual signal, a spring jack, and a ferrule or socket for said jack extending through said wall and plate, adapted to clamp the plate upon the said wall.

6. A telephone switchboard having lines leading thereto, an electromagnet for at

least one of said lines, the forward end of said magnet being provided with stationary terminals for the winding thereof, and a spring jack below said magnet, said jack provided with springs having the forward ends thereof normally engaging said terminals, said magnet and its terminals being readily removable independently of the jack, and the said springs being adapted to be disengaged from said terminals by an insertion of the plug in said jack.

7. A telephone switchboard having lines leading thereto, a frame for each line, a block of insulation on the forward end of each frame, a shutter on the forward end of each frame, a magnet within each frame, disposed back of the block of insulation on the forward end thereof, each magnet provided with means for controlling its allotted shutter, rods or keys extending through said blocks of insulation to hold the frames in place, means on the shutters for engaging said rods, and suitable circuits controlled by the means on the shutters for engaging said rods.

8. A telephone switchboard having lines leading thereto, an electromagnet for at least one of said lines, said magnet being provided with stationary terminals for the winding thereof, and a spring jack associated with said magnet, said jack provided with springs normally engaging said terminals, said magnet and its terminals being readily removable independently of the jack, and the said springs being adapted to be disengaged from said terminals by an insertion of the plug in said jack.

Signed by me at Chicago, Illinois, this 28th day of November 1908.

PETER C. BURNS.

Witnesses:

CLARENCE E. TAYLOR,
E. H. CLEGG.