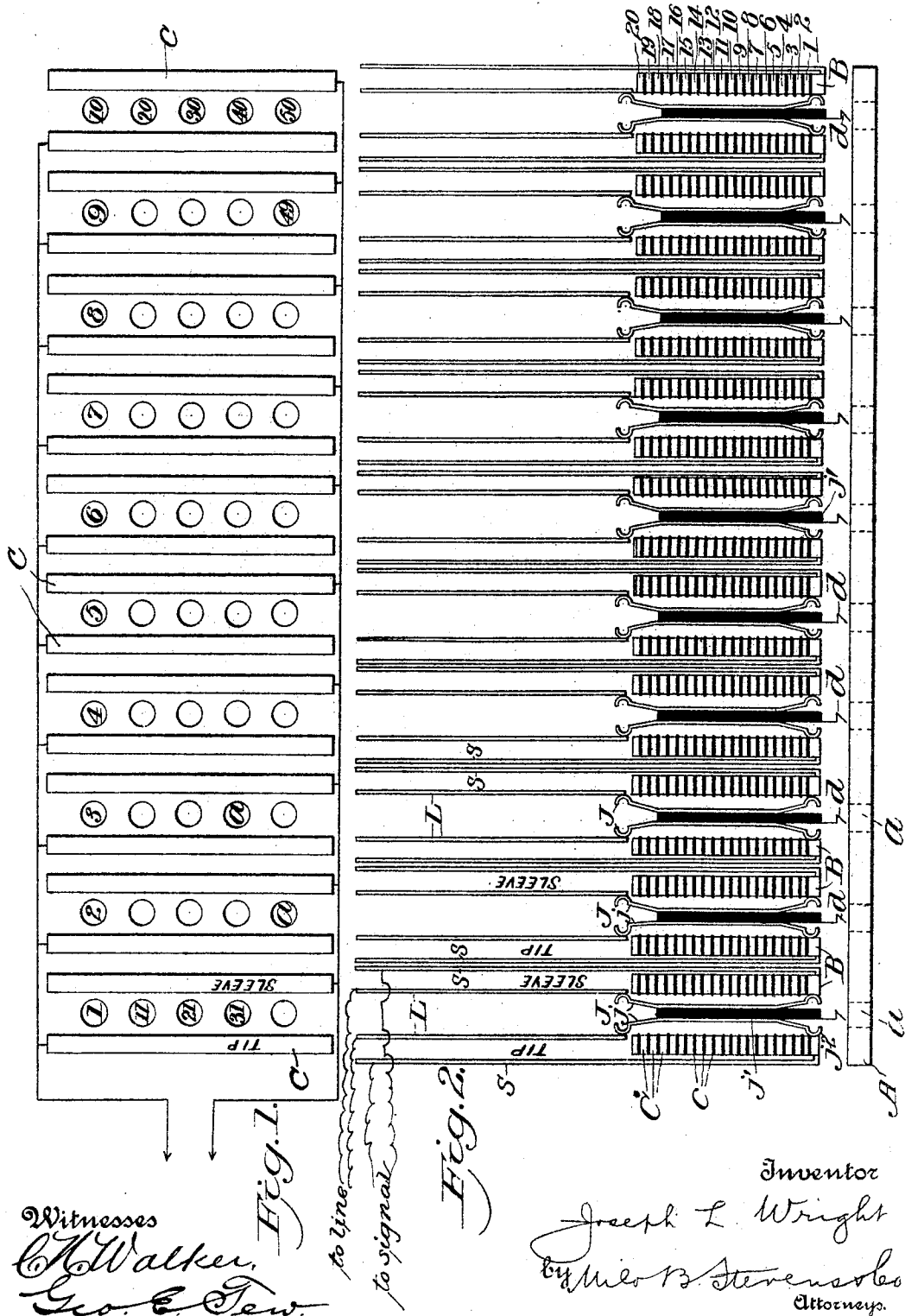


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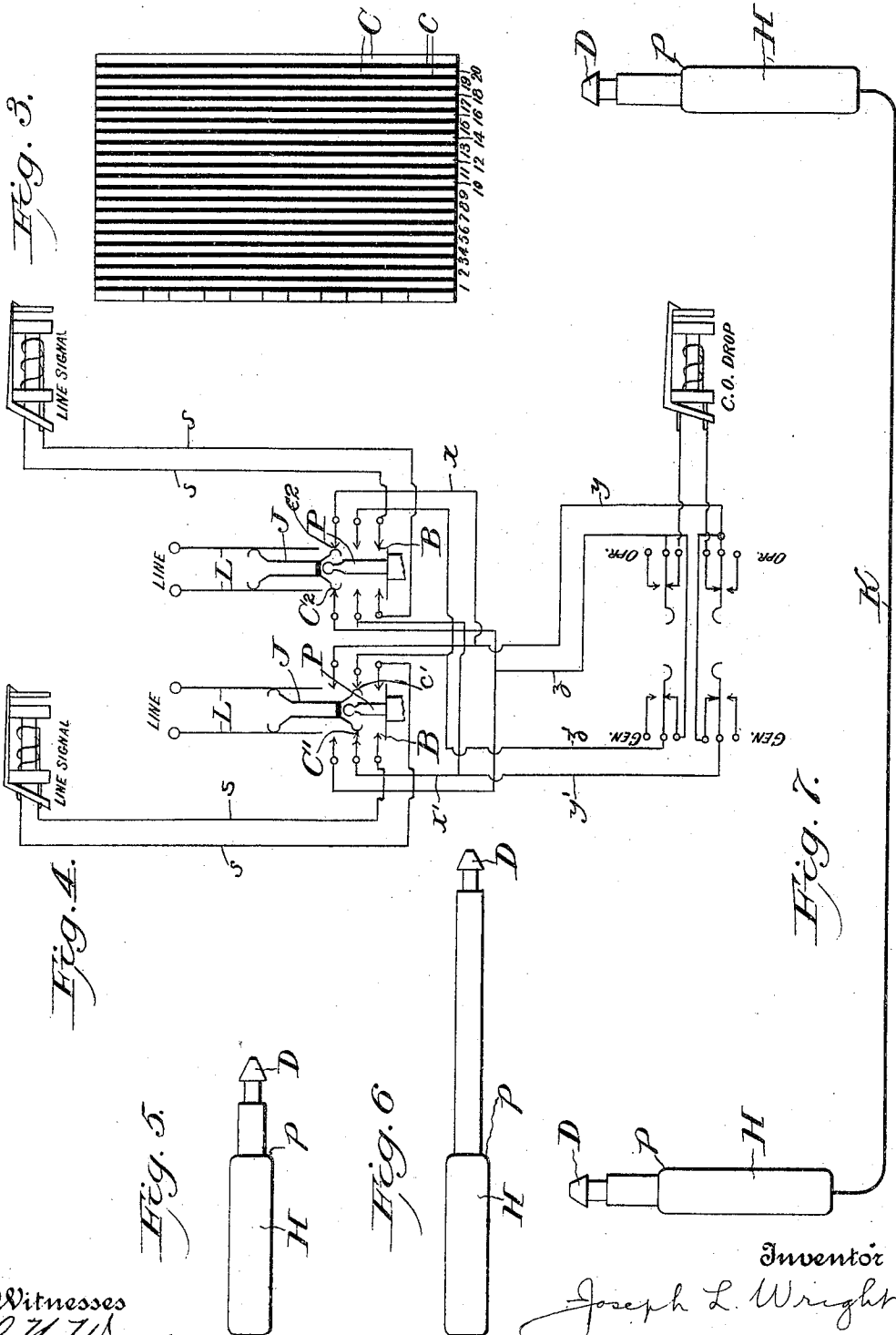
J. L. WRIGHT.
TELEPHONE SWITCHBOARD.
APPLICATION FILED JULY 28, 1904.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.



Witnesses
W. Walker
Geo. E. Jew

Inventor
Joseph L. Wright
by *Milo B. Stevens*
Attorneys

UNITED STATES PATENT OFFICE.

JOSEPH L. WRIGHT, OF CLEVELAND, OHIO.

TELEPHONE-SWITCHBOARD.

No. 798,123.

Specification of Letters Patent.

Patented Aug. 29, 1905.

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To all whom it may concern:

Be it known that I, JOSEPH L. WRIGHT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Telephone-Switchboards, of which the following is a specification.

This invention relates to telephone-switchboards, and has for a particular object the construction of a switchboard wherein the use of conductors connecting the plugs is avoided, and is characterized particularly by a construction wherein the connections instead of terminating in plugs and cords terminate in rows of connecting-strips made up in pairs. Jacks and plugs of novel construction are used with these strips. The jacks are sliding jacks, comprising two pieces of spring-metal insulated from each other and having contact at each end with the strips and the bus-bars on each side of the lines. These jacks are moved by plugs, which vary in length according to the number of connecting-lines and comprise pairs connected with a string to show which two parties are connected. The pairs of plugs move the sliding line-jacks, the first of the pairs to the first and second connecting-strips, the second to the third and fourth connecting-strips, and so on up to the last pair of plugs, which move the jack to the last pair of connecting-strips. The plugs have heads on the inner end, which catch behind springs on the outer ends of the jacks to restore them to normal position when the plugs are withdrawn.

The invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a diagrammatic elevation of a fifty-line switchboard, showing one layer of the talking-circuit connecting-strips. Fig. 2 is a horizontal sectional view showing the sliding jacks and talking-circuits. Fig. 3 is an end view showing the connecting-strips. Fig. 4 is a diagram of the various talking, listening, and signal connections, indicating the bus-bars B and the first two of the connecting-strips C of two lines. Figs. 5 and 6 are plans of two of the plugs, the shortest and longest, respectively. Fig. 7 is a plan of a pair of plugs attached together.

Referring specifically to the drawings, the sliding jacks are indicated at J, the connecting-strips at C, and the plugs at P. The lines end in strips L, and the bus-bars are connected to terminals S for convenience in wiring. Each jack consists of two spring-metal

pieces j , secured to and separated by pieces of insulating material j' . The spring-metal pieces j are flared at the ends, as at j'' , to contact with the strips L and the connecting-strips C. When in normal position, the jacks are in contact with the first bus-bar strip B and the strips L, which are thus connected with line-signal. The connecting-strips C are made up in pairs and rows and are separated by strips c of insulating material. All strips on each side are connected, as shown in Fig. 1, one side being marked "Tip" and the other side "Sleeve" on the drawings, and these strips are then wired to the regular ringing and listening keys, as marked on the diagram Fig. 4, by wires $x y z$ and $x', y',$ and z' . In other words, all the strips C in row No. 1 on the "sleeve" side are electrically connected to each other, and all of the strips in said row on the "tip" side are similarly connected to each other, (see Fig. 1,) and the same is true with respect to the strips in every row. Two rows of connecting-strips are required for each key, one on each side, as will be understood, the first row being wired to the calling part of first regular key and the second to the answering part, and the third and fourth row being, respectively, wired to the calling and answering parts of the second regular key, and so on. This is necessary to prevent central "ringing in the ear" of the calling party. There will therefore be twenty rows of connecting-strips, as shown in the drawings by the numerals 1 to 20, to ten key-circuits. The insulating material c between the connecting-strips preferably projects slightly to prevent the jack-contacts from touching the metal strips as it passes over them.

There is one pair of plugs to each ringing and listening key, and they are conveniently placed before the operator in front of the face of the jack-plate A, which is provided with holes a equal to the number of lines. Each pair of plugs is connected by a string K to show which two parties are connected. The plugs vary in length. The shortest is just long enough to move the sliding jack to the first row (row 1) of connecting-strips C, and the longest will be long enough to move the jack to the last row, (row 20.) The shortest pair are placed opposite the first key, and so on, the longest being opposite the last key. Each plug has a shoulder p where it joints its handle H, and the shoulder contacts with the face-plate A when the plug is shoved in the

hole, and thereby limits its movement. The difference in length between the two members of each pair of plugs is equal to the distance between the middle lines of the connecting-strips. Consequently each plug moves the jack to a particular strip and its mate to the next strip and the pair connect different strips from any other pair. Thus the plugs of the first or shortest pair move the jacks to the first and second rows, respectively, of connecting-strips, the second pair to the third and fourth rows, and so on. Each plug has a head D, adapted to catch over a spring d , projecting from the front end of the jack, to pull the jack back to original position, after which the spring will yield to allow the removal of the plug.

In operation supposing subscriber No. 10 wishes to talk to No. 1. He operates his line-signal through line connections L, jack J, bus-bars B, and connections S. The operator thus called may use any pair of plugs desired or available, since each pair will connect any two lines, one plug acting to connect one line to the calling part of the key corresponding to the pair of plugs and the other plug acting to connect the other line to the answering part of the key, so they are connected to each other. Assuming the pair shown in Fig. 7 and assuming that the lines shown in Fig. 4 are lines 1 and 10, the right-hand plug is placed in No. 10 and is of proper length to move the jack to the second row of connecting-strips, as shown in Fig. 4, which are wired to the operator's key and enables the operator to throw her lever to listening position and ask the number desired. On learning that No. 1 is the party wanted, she places the other plug of the pair in No. 1, which moves the sliding jack to the first row of strips, and as these strips are wired to the calling part of the first key movement of the lever to ringing position rings up No. 1. The necessity for the two rows of connecting-strips connected to each key can now be seen, since if both plugs were the same length and both lines connected to the same strip the operator would "ring in the ear" of the calling party. Hence, as said before, one of the strips is connected to the ringing part of the key and the other to the answering part. The lever is then thrown to normal position, leaving No. 10 and No. 1 connected in the ordinary manner. Any suitable known type of operator's key may be used. Fig. 4 shows in diagram the connections produced in the instance just described. Referring thereto—say the line on the right is line 10 and that on the left line 1—the circuit may be traced from 10 to 1 as follows: in one of the strips L, through one of the side pieces of the jack J, strip C^2 , wires $x y$, to and through the key, wires $y' x'$ to strip C' , one side of jack J, line-strip L, other side of jack J, other strip C' , line z' , to and through the key, line z , to, finally,

strip C^2 and line L of line 10. Although only two rows of strips C, rows 1 and 2, are shown in Fig. 4, it is obvious that the same connections would be established with any pair of plugs, since the jacks would simply be pushed in farther and instead of connecting rows 1 and 2 would connect 3 and 4 or 5 and 6, or otherwise, according to the pair of plugs used. To disconnect, the operator pulls out the plugs, which by means of the head and spring-catch described restore the jacks to original position in contact with signal bus-bars B. The line-signal being connected to the bus-bar B in front of the first row of connecting-strips will be disconnected at first movement inward of sliding jack. This arrangement does away with the tinsel conducting-cords between plugs, which are continually wearing and cutting out.

The plugs can be made in one solid piece and are cheaper than the plugs with insulated parts. Only one weight will be needed to a pair of plugs instead of two.

The sliding jack can be made cheaper than the ordinary spring-jack. There is no danger of the line-signal being left on during conversation, because the bus-bars B are disconnected as soon as the plugs are pushed in. The contacts are positive, all strips in each row of connecting-strips being joined by a solid piece of metal, and this in turn is connected direct to the ringing and listening key.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a switchboard, the combination with a plurality of conducting-strips arranged in pairs and insulated from each other, and line-terminals, of jacks having contact with the terminals and movable over the strips to connect desired pairs thereof.

2. In a switchboard, the combination with bus-bars and operators' devices connected thereto, line-terminals, and a plurality of pairs of conducting-strips, of jacks having contact with the terminals and normally with the bus-bars, and movable over the strips to connect desired pairs thereof.

3. In a switchboard, the combination with a plurality of line-terminals, of a plurality of pairs of conducting-strips made up in rows, the opposite members of the various pairs being electrically connected, and jacks having connection with the terminals and movable over the strips to connect the terminals with desired rows of pairs.

4. In a switchboard, the combination with a series of pairs of conducting-strips, and line-terminals, of a jack having conducting-pieces, insulated from each other, between the terminals and strips, and movable to connect the terminals with any desired pair of strips.

5. In a switchboard, the combination with line-terminals, and a plurality of pairs of conducting-strips, of jacks slidable along the terminals and over the several pairs of strips,

and plugs engageable with the jacks to move the same, the plugs being of different lengths.

6. In a switchboard, the combination with line-terminals, and a plurality of pairs of conducting-strips, of jacks having contact with the terminals and movable contact with the several pairs of strips, and plugs engageable with the jacks to move the same, the plugs being arranged in pairs, each pair having a member of different length from a member of any other pair.

7. The combination with the line-terminals, and the insulated conducting-strips arranged in a series opposite the same, of a jack slidable along the terminals and across the strips, said jack having conducting-contacts between the terminals and any of the strips, respectively on opposite sides of the circuit.

8. The combination with the line-terminals and the insulated conducting-strips arranged in a series opposite the same, of a jack slidable along the terminals and across the strips, said jack having conducting-contacts between the terminals and strips, respectively on opposite sides of the circuit, and a plug having detachable engagement with the jack, to move the same back and forth.

9. In a switchboard, in combination, a plurality of lines and their terminals, a plurality of pairs of conducting-strips, the opposite members of each pair being all electrically

connected with each other, a plurality of jacks each of which is electrically connected with the terminals of one of the lines and is movable over the pairs of conducting-strips to connect the respective members of any pair thereof with the terminals, and plugs arranged in pairs and engageable with the jacks to move the same, each pair having members of different lengths.

10. In a switchboard, in combination, a plurality of lines, a plurality of pairs of conducting-strips arranged in rows, the opposite members of each pair being electrically connected with the similar members of the other pairs, a jack connected to each line, and movable across the rows to connect the same with any pair of strips, an operator's key the ringing part of which is connected to one pair of strips and the answering part of which is connected to another pair of strips, and a pair of plugs corresponding to the key and engageable respectively with the jacks to move the same to the pairs of strips so connected.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH L. WRIGHT.

Witnesses:

JOHN A. BOMMARDT,
LOTTIE NEWBURN.