(No Model.)

J. B. LYON.

ELECTRICAL SWITCH BOARD.

No. 449,685. Patented Apr. 7, 1891.

Fig. 1.

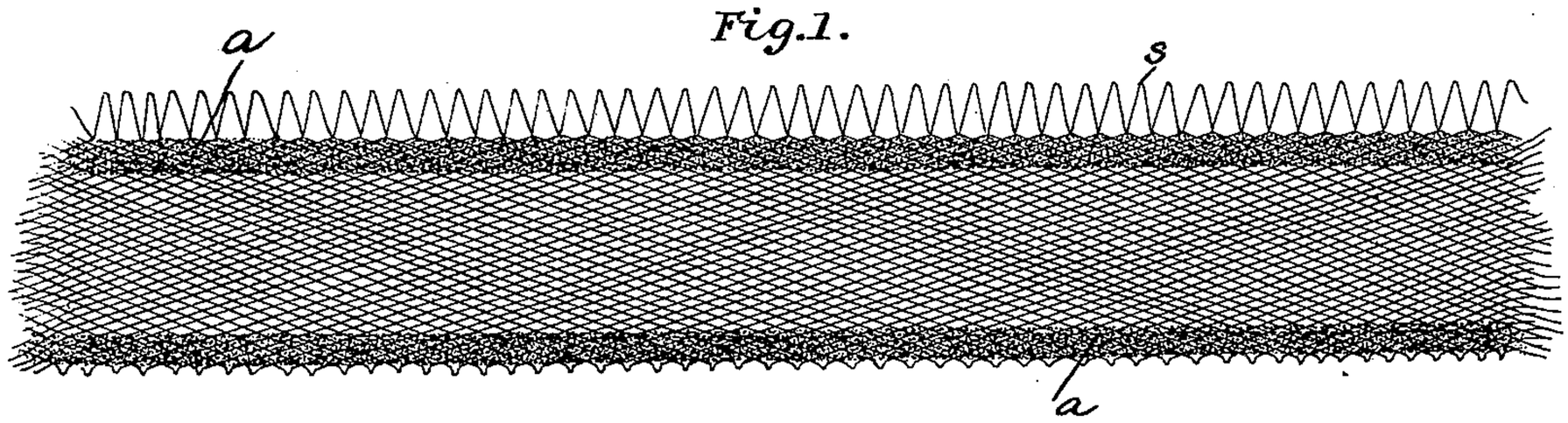


Fig. 2.

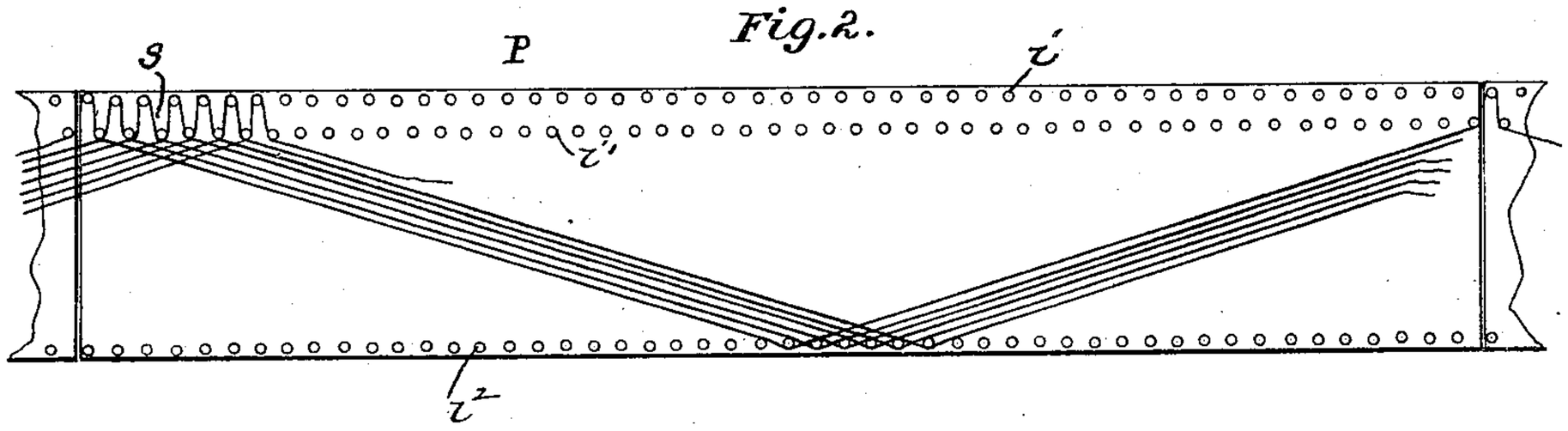


Fig. 3.

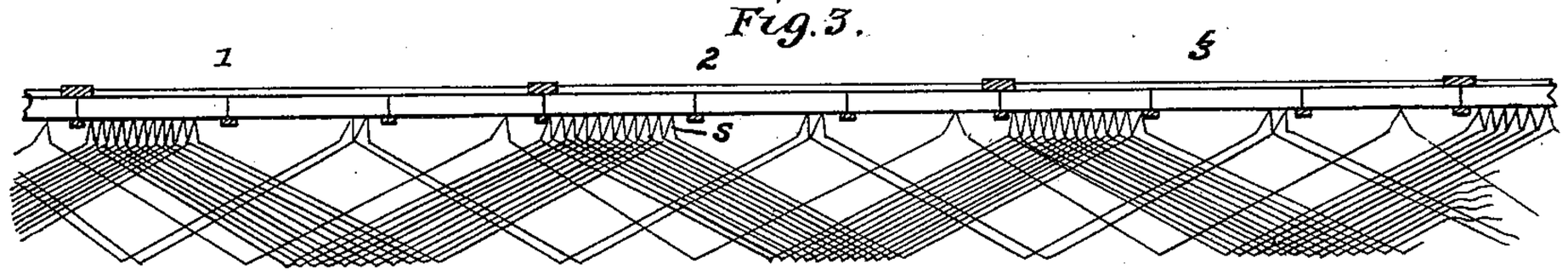
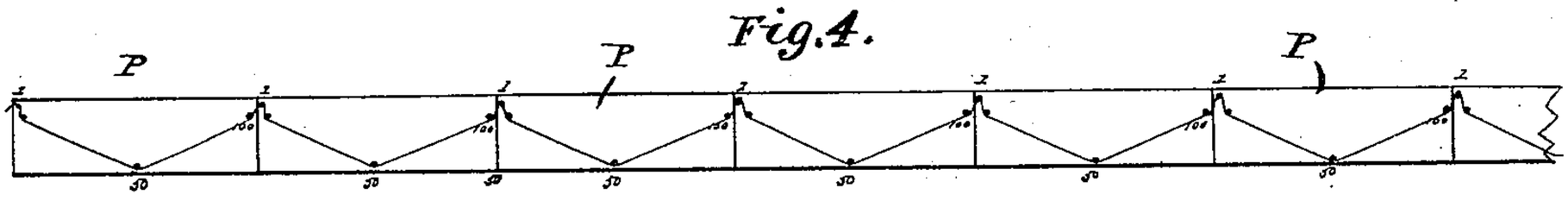


Fig. 4.



WITNESSES:
Frank A. Ober
Edward A. Wagner

INVENTOR
John B. Lyon.
BY W. J. Johnston
ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN B. LYON, OF BROOKLYN, NEW YORK.

ELECTRICAL SWITCH-BOARD.

SPECIFICATION forming part of Letters Patent No. 449,685, dated April 7, 1891.

Application filed November 20, 1890. Serial No. 371,995. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. LYON, a citizen of the United States, residing in Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Electrical Switch-Boards, of which the following is a specification.

My invention relates to switch-boards for telephonic, telegraphic, or other electrical purposes, the object being to cheapen the cost of construction and simplify the method of wiring, with a view to facilitating the work of repairing and economizing space.

The invention consists of the methods and constructions hereinafter described and claimed.

In order to overcome the difficulty experienced in those switch-boards known as "multiple switch-boards," wherein the electrical connections between the corresponding sockets of the various sections were made by loose wires which were placed in a tangled mass beneath or behind the switch-board or by stiff and cumbersome cables, it has been proposed to form the wires into mats or bands wherein the wires were arranged in some regular form, thus rendering it an easy matter to find, repair, or trace any wire in the group or groups. So far as known to me these mats have been made up of successive strips, each composed of the wires running from one sub-section of the board to the corresponding sub-section of the next adjacent section of the board, and the ends of these strips have been bent upward or laterally to run into the sockets. The wires of each board are laid in straight longitudinal lines, one above the other, and at the points where the lateral leads to the sockets are taken off the wires are carried outside and across one or both faces of the mat. At such points, therefore, the mat is increased in thickness by two layers of wires which occupy valuable space. Besides, owing to the fact that the mat is supported and suspended by these lateral leads, their promiscuous points of connection with the mat throws it out of balance and causes wabbling. Again, it has been the custom to make as many mats as there are sub-sections in a single row in each section—that is to say, if there are three sub-sections in a row in each section which are numbered, say, 1, 2, and 3, respectively, then there will be three mats hanging side by side, one containing the wires connecting all the sockets in the "1" sub-sections, and another connecting those in the "2" sub-sections, and another connecting those in the "3" sub-sections. Owing to the amount of space required for three mats, an arrangement which requires less space becomes a desideratum. It is the design of this invention to overcome all of these objections and others which will be brought out in the description.

My invention contemplates but a single web or mat for each row of sub-sections—that is to say, each mat or web contains all of the wires forming the connections between all of the sockets in one longitudinal row of sub-sections—and as this web is no thicker than one of those where a plurality of webs is used for a single row, as above mentioned, the economy of my plan in space alone is obvious. Other points of advantage of my invention will appear in the following description.

In the accompanying drawings, Figure 1 represents a portion of a mat constructed on my improved plan. Fig. 2 represents a board or plate upon which the mat is made. Fig. 3 represents a side view of a row of sub-sections of a number of sections of a switch-board, showing the connections from one to the other through the mat. Fig. 4 is a diagram showing the course of a single wire through a mat or band.

Referring to the drawings by letter, P represents a plate or former over which my improved mat or web of wires is formed. It consists, preferably, of a heavy iron plate having about the same width as the finished mat and provided with three rows of pins i i' i^2, and sometimes a fourth row adjacent to the row i^2 and corresponding to the row i'. These pins may or may not be integral with the plate. They should, however, be rigid and stiff and placed at regular intervals of about one-half of an inch. This dimension, however, should be made in accordance with the distances between the sockets on the switch-board, as will appear later on. Two of the rows of pins are placed, respectively, close to the two long edges of the plate, while the third row i' is placed about two inches from one of the other rows. The rows are parallel

with one another. The length of this plate is preferably the same as the length of one section of the switch-board, which ordinarily is in the neighborhood of three feet. If the number of sub-sections in each row of the sections is ten and the number of sockets in each sub-section is ten, then there will be one hundred pins in each row and there will be one hundred continuous wires running from one end to the other of the switch-board connecting the sockets of one row. If a multiple switch-board containing six sections is to be wired, then six of these plates P are to be placed end to end in a straight row and the wires strung over them to form one complete web, band, or mat.

The method of stringing the wires is as follows: One wire is strung at a time. The first one is passed around the first pin in the row *i*. Thence it is carried down around the first pin in the row *i'*, then diagonally across plate P to the fiftieth or middle pin of the row i^2, then around this pin and diagonally across the plate P again to the last pin in the row *i'* of plate P, thence up and over the first pin in row *i* of the second plate P, thence over the first pin of row *i'* in said second plate P, thence diagonally across the plate to the fiftieth or middle pin in row i^2 of the second plate P, thence diagonally across the plate to the last pin in row *i'* of the third plate P, and so on throughout the entire length of the six plates P. This one wire is traced in Fig. 4, and every other wire in the mat or web is run in exactly the same manner, except that the wires succeed each other regularly. For instance, the second wire that is strung is started at the second pin of the row *i*, thence carried down around the second pin of the row *i'*, thence diagonally across to the fifty-first pin in i^2, and so on. The running of the wires over the two rows of pins *i i'* forms a loop at that point in each wire, and it will be seen from an inspection of Fig. 3 and the description just given that there will be as many of these loops in each wire as there are sections on the switch-board, one loop for a socket in each section, and, further, that the loops of any one wire will correspond with one another as to their position or location in each section—that is to say, if the loop of any particular wire is the fifth one counting from the beginning of the first plate P, then the next loop in that wire will be the fifth one in the second plate P, and the next loop will be the fifth one in the third plate P, and so on. When all the wires have been strung upon the plates, the lower edge and the edge adjacent to the row of pins i^2 are secured by a binding of rubber, cement, or similar material, as represented at *a* in Fig. 1, the intermediate or body portion of the web being left free. Cement is more easily applied and holds the wires in proper relation to one another better than other forms of fastening. When properly secured, the mat is lifted from the plates P and is ready to be attached to the sub-sections of the switch-board. The loops, which I letter *s*, correspond in position with the sockets in any one row of the switch-board, and the mat may therefore be applied to any row therein. The loops are connected successively with a contact piece or pieces in the respective sockets, and when so connected the mat is suspended and supported by the sockets. In the form of switch-board which I build the loops are left continuous, and the electrical connection is made by removing the insulating material from the wire at the apex of the loop and then connecting it with one of the contact-pieces of the socket. In all multiple switch-boards, however, wherein webs or mats are used the wires are continuous only for the length of a section and there are no complete loops.

Some of the advantages which I claim for my invention are as follows: In the first place the mat is a continuous structure both as regards its body and the individual wires. The mat is therefore stronger, requires less labor in its fabrication than those mats which are made up of sections, and is more conveniently portable. It is very compact—that is, the wires which heretofore have been put into a plurality of mats are here all placed in a single mat occupying the same space as one of them. It is more symmetrical than other mats, because its thickness is the same throughout its entire length and its loops are all attached to the edge. Again this method of running the wires through the web requires less wire than those methods in which the wires are horizontal and one above the other with the ends bent laterally, and less wire also means a lower static capacity and less induction.

My improved web also has another advantage when used in connection with some forms of switch-board, and that is that every wire in it is exposed at or runs to both edges of the mat or web, and therefore connections may be made with the wires of the web at both of its edges. To facilitate these connections I propose to make a row of loops *s* along both edges of the mat. So far as known to me it is new to run the wires from edge to edge of the web.

Having thus described my invention, I claim—

1. The combination, with a multiple switch-board, of the wires which connect all the sockets in any given row of the switch-board united into a web or band.

2. The combination, with a multiple switch-board, of the wires connecting the sockets in a single row, said wires being united into a mat or web through which they pass in continuous lengths back and forth from edge to edge.

3. The combination, with a multiple switch-board, of the wires connecting the sockets in a single row, said wires being united into a mat or web through which they pass in con-

tinuous lengths back and forth from edge to edge, loops being formed in the wires at the edge of the mat.

4. The combination, with a multiple switch-board, of the wires connecting the sockets in a single row united into a continuous mat or web and secured together by cement.

5. The combination, with an electrical switch-board containing a plurality of rows of sockets or switches, of a plurality of mats or webs made of electrical conductors united together, the mats or webs being respectively connected with the rows of sockets or switches of the switch-board and each mat containing all the wires necessary to make the proper connections between the sockets of the row to which it is attached.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN B. LYON.

Witnesses:
WM. A. CHILDS,
FRANK S. OBER.