

(No Model.)

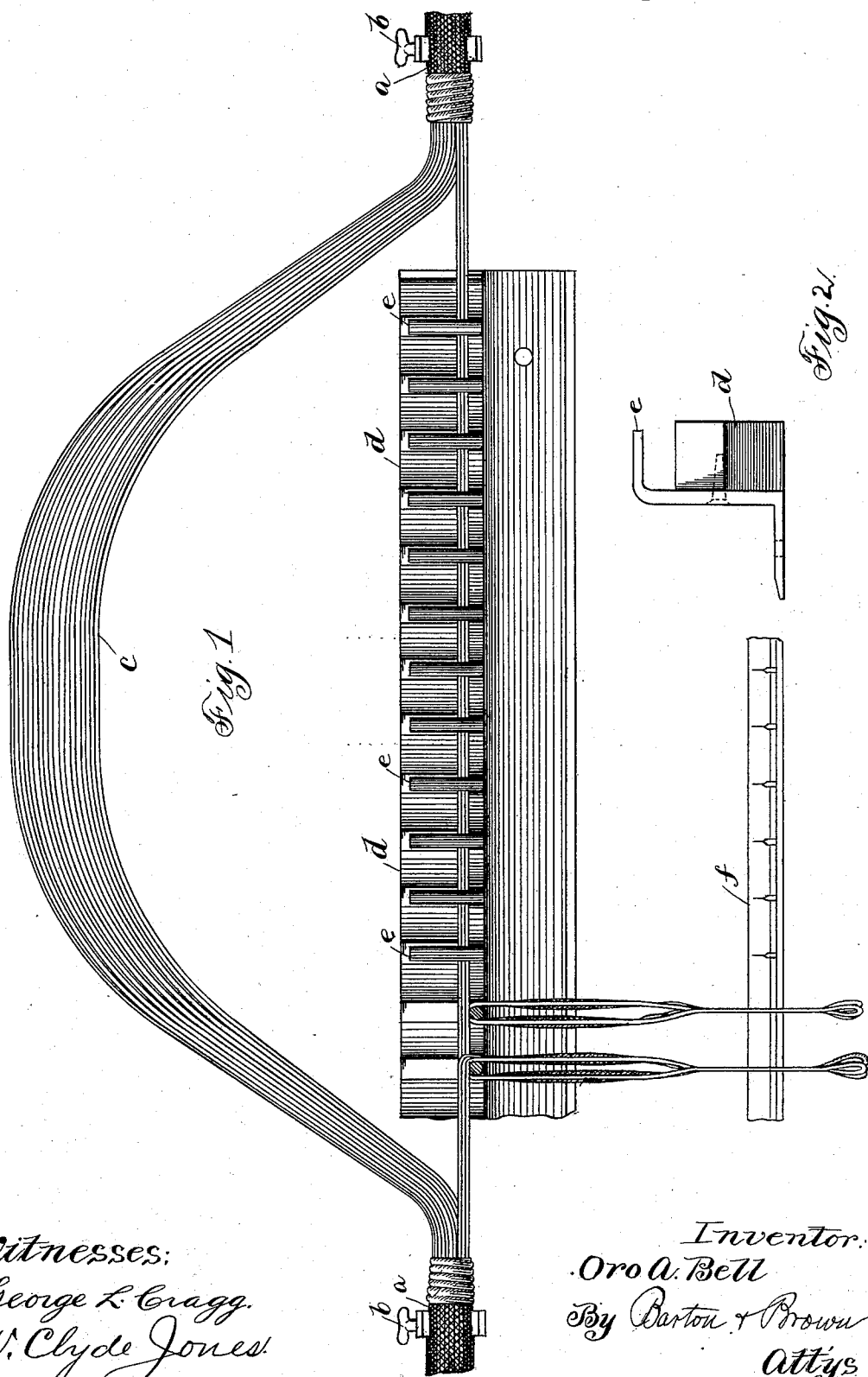
2 Sheets—Sheet 1.

O. A. BELL.

MANUFACTURE OF CABLES FOR MULTIPLE SWITCHBOARDS.

No. 505,798.

Patented Sept. 26, 1893.



Witnesses:

George L. Cragg.
W. Clyde Jones.

Inventor:
Oro A. Bell
By Barton & Brown
Attys

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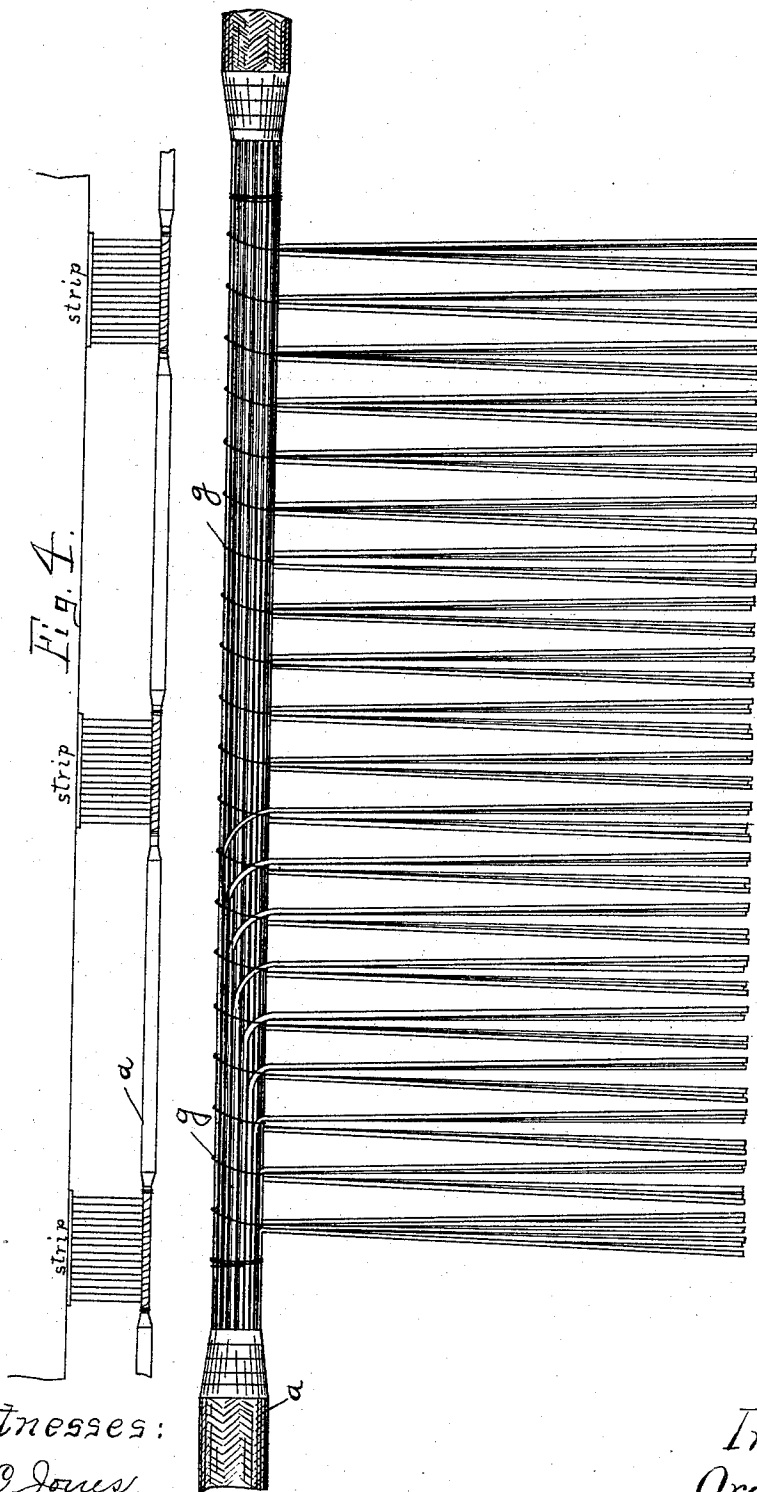
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UNITED STATES PATENT OFFICE.

ORO A. BELL, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

MANUFACTURE OF CABLES FOR MULTIPLE SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 505,798, dated September 26, 1893.

Application filed November 7, 1892. Serial No. 451,252. (No model.)

To all whom it may concern:

Be it known that I, ORO A. BELL, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Methods of Manufacture of Cables for Multiple Switchboards, (Case No. 7,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric cables, and its objects are to prevent waste of the cable when it is to be connected with series of switches on different switch boards, and at the same time to facilitate the work of taking out the wires preparatory to making the connections.

My invention consists in the method of taking out the wires from the separate cables to form a continuous cable provided with projecting wires or ends of wires at intervals corresponding to the strips of spring jack switches, these wires being bound together in the manner hereinafter specified.

A multiple switch board is provided with several duplicate sections, and each section is usually formed of strips of spring jack switches, each strip containing usually twenty. The cables carrying the wires are placed back of the switch board and it has been common to provide enough wires in each separate cable to afford proper connections with a strip of twenty spring jacks. Each cable will thus be connected with one strip of spring jacks on each section of the board; that is, each subscriber's telephone line and the test circuit of his line will be connected with a separate switch on each of the sections. A group of twenty telephone lines will be accommodated in one cable and will be severally connected with the switches of a series of corresponding strips upon the different sections. As to the prior state of the art, reference is made to Letters Patent No. 472,947, granted William M. Goodridge April 12, 1892, for cable rack.

My invention relates more particularly to forming from a cable, or taking out from a cable at proper distances, wires of the required length, and arranging them in proper relation to one another so that the proper

connections may be made with the spring jack switches. This work is facilitated by arranging the wires of the cable, which are to be connected with a particular series of spring jack switches,—that is the wires required for a single subscriber,—in groups and having each group consist of a different combination of colors in order that the workmen may be able to arrange the wires back of each strip of a series of strips of spring jack switches in a particular order, and thus avoid the necessity of testing the wires electrically. Generally speaking, the method which I employ consists in removing the outside serving from the cable at different sections in the length thereof corresponding in distance to the distance between the strips of switches with which the particular cable is to be connected, then bending aside the portion or section of the cable at each of these points, and then separating the different wires of the cable from the body thereof and arranging the wires thus taken out in a particular order, and then cutting the loops to leave the ends of the wires protruding, ready to be connected. The cable should be flexed sufficiently so that the wires when taken out may protrude in loops, which, when cut, will be of sufficient length to extend from the line of the cable proper, placed back of the switch board, forward horizontally to the rear of the switches and with sufficient margin or slack, the excess being usually about an inch, to permit the ends of the wires to be soldered or otherwise connected with the proper parts of the switches. Cable of sufficient length to run the whole distance behind the switch board and to admit of being shortened by taking out the wires at each of the sections, may be unwound from the reel. Workmen corresponding in number to the number of sections may be arranged in line, one at each section where the wires are to be taken out, each being provided with similar forming apparatus and tools. Each workman bends the cable at his section and then clamps it in position and proceeds to take out the wires and arrange them according to colors, each in the same order at each section. After the loops are taken out the portion of the cable between the clamps at each section will be left straight, and is then bound by a cord between

the wires or loops which have been bent aside or taken out. By this method the wires or loops are caused to project each the same distance from the cable, and when the loops are cut the projecting ends will be left of the same length and there will be no waste of material, as has been the case heretofore.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a plan view showing a cable bent at one section and certain of the wires taken out, in connection with the forms for facilitating the work. Fig. 2 is an end elevation of one of the forms. Fig. 3 is a view showing a section after the wires have been taken out and the cable bound together again to leave the cable continuous and the wires projecting each the same distance. Fig. 4 is a view showing a continuous cable attached to a series of strips of spring jack switches.

Like parts are indicated by similar letters of reference throughout the different figures.

As shown in Fig. 1 the cable *a* is held by the clamps *b b* each side of the bent section *c* from which the serving has been removed. The former, *d*, consists of a series of hooks or teeth *e*, shown most clearly in Fig. 2, which may be numbered consecutively from 1 to 20 to correspond to a strip of twenty jacks.

In wiring switch boards a greater or less number of wires may be required according to the particular system employed. With metallic circuits and test circuits, according to the system at present thought best for large exchanges, sixty wires are required for each cable, which is to be connected with a series of strips having twenty jacks each. Thus there will be three wires for each spring jack; that is twenty groups of wires of three wires each, and consequently when the loops are taken out and cut there will be six ends projecting for each spring jack, or one hundred and twenty in all. A given combination of colors in a group will mean that these wires belong to the first jack of each of the series of strips; another color or combination of colors of a group will be understood to signify another jack, and so on, and thus the workmen, properly instructed as to the code or significance of the variations in coloring, will know in what order to arrange the different groups; that is, will know which wires to take out at a particular one of the pins *e*. A comb or clamp *f* is placed in proper position to hold the loops when they have been taken out. In case of metallic circuits there will be three loops taken out and the pin will be within loops. All of the wires of the cable having been properly disposed, they are bound together by a cord *g* which is wound helically around the cable, passing between the ingoing and the outgoing wires of each loop. The cord *g* thus binds the wires securely together and maintains the extending wires forming the loops in proper position. The loops are next cut at their ends to leave two extending

wires instead of a loop, after which the ends of the extending wires are removed from the comb and the body of the cable withdrawn from the former.

Prior to my invention from ten to twenty per cent. of the material of the cable was lost in taking out the ends. Thus by the use of my invention where cables are to be used for making the connections with multiple switch board switches, a great saving of material results, while at the same time the work is facilitated, since it is not necessary to make electric tests in picking up the wires to arrange them in the same order in making the connections with the spring jack switches.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The method of taking out the wires of a continuous cable without waste of material, which consists in bending a section of the cable at the point where the wires are to be taken out, clamping the cable at each side of the bent portion, taking the wires out in the loops in a particular order, binding the wires between the clamps into a straight cable, and cutting the loops, whereby the cable is left straight, while the wires are left projecting a uniform distance and in a particular order, substantially as and for the purpose specified.

2. The method of arranging the wires of cables for connecting therewith, which consists in laying bare a portion of the cable, bending aside the bared portion of the cable to shorten the same, and separating the different wires of the cable from the body thereof at different points, respectively; whereby the wires of the cable protrude therefrom at different points along its length, substantially as described.

3. The method of arranging the wires of cables for connecting therewith, which consists in laying bare a portion of the cable, bending aside the mass thereof to shorten the same, separating the different wires of the cable therefrom at different points along its length, and binding the cable between each two wires thus bent aside; whereby a continuous cable having its different wires projecting from it at different points along its length is formed without waste of material, substantially as described.

4. The method of forming continuous cables, which consists in shortening the length of a cable by forming each wire composing the same into a loop, binding the wires composing the cable together by a thread, passing said thread between an in and an outgoing wire of the loop, and severing the loop to form two wires emanating from the continuous cable, substantially as described.

In witness whereof I hereunto subscribe my name this 13th day of October, A. D. 1892.

ORO A. BELL.

Witnesses:

MILLS H. LANDON,
A. L. SALT.