Jan. 1, 1929. 1,697,222

K. BÖHME.

MULTIPLE CONTACT BANK

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Fig. 1.

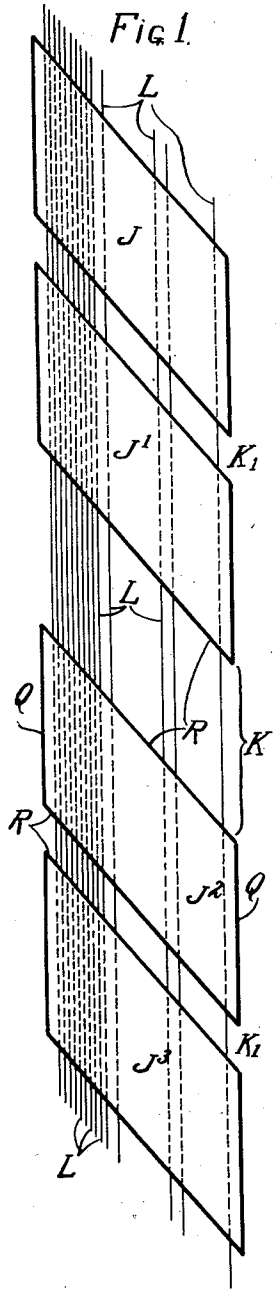


Fig. 2.

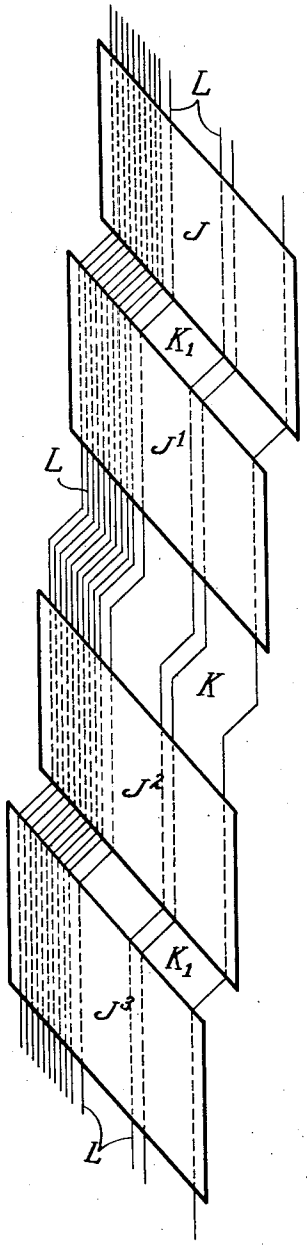
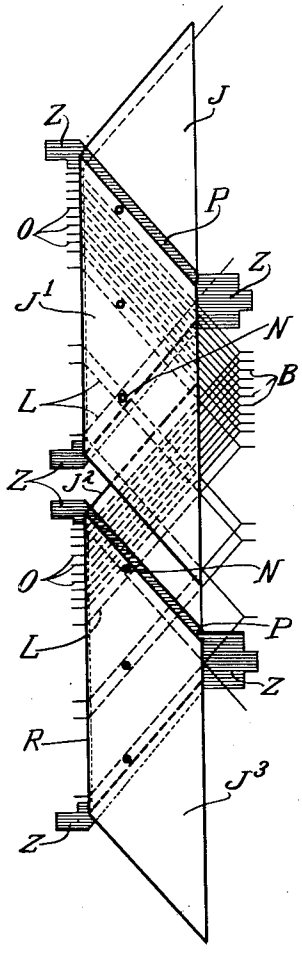


Fig. 4



Fig. 3.



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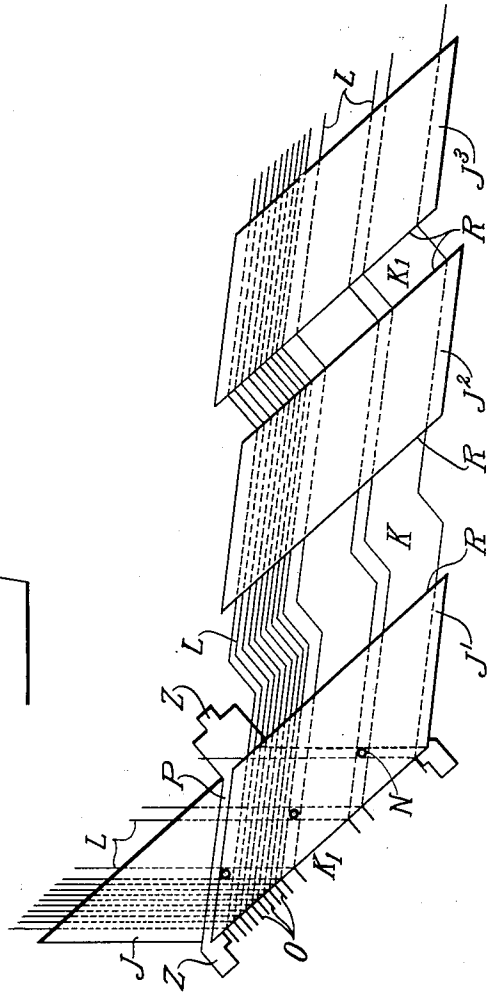


Fig. 2-A

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Atty.

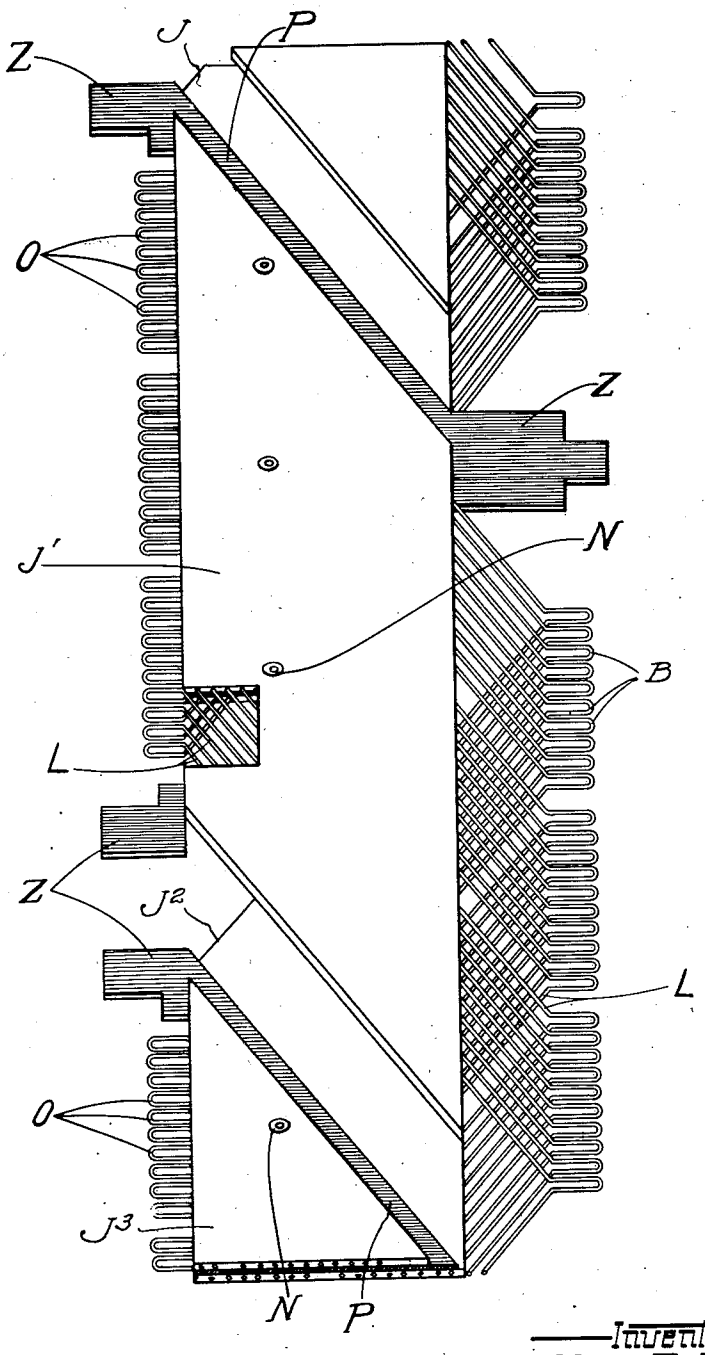
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Fig. 5



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Patented Jan. 1, 1929. 1,697,222

UNITED STATES PATENT OFFICE.

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MULTIPLE CONTACT BANK.

Application filed November 25, 1922, Serial No. 603,141, and in Germany January 6, 1922.

The invention relates to a method of constructing and interconnecting bank contacts, which is specially suitable for forming the multiple cable, and contact banks for telephone switches. The new construction enables the manufacture of cable and contacts to be simplified and cheapened.

For its construction, use is made of bare conductors located in parallel. According to the invention these conductors are provided at intervals with insulating pieces, which preferably are made stiff and so shaped that their edges which cross the conductors are located at an acute angle to the latter, while the two side edges run parallel to the conductors.

After the insulating pieces have been fixed on the conductors, the parts of the uncoiled cable that have no insulation are first of all so kinked that the direction of the conductors at the bends departs from the direction of the uncoiled band. Thereupon the band is folded at the points where there is no insulation, thus forming loops at both sides of the band located crosswise, these loops forming the fixed contacts, which can be used for the switch wipers at one or both sides of the cable according to the arrangement of the contact bank.

For the purpose of easily mounting and dismantling the cable at the supports of the switch racks, the insulating pieces of the folded cable are preferably interconnected in pairs by intermediate plates. These plates are provided at the sides of the band with projecting end pieces which serve for fixing the cable to the switch racks.

The drawing shows by way of example a cable constructed according to the invention. Figure 1 shows a front view of the cable before it has been kinked or folded. Figure 2 shows a cable that has been kinked. Figure 2^A shows a cable that has been kinked and partly folded, while Figure 3 shows a cable that has been completely kinked and folded for the purpose of forming the contact bank in combination with the intermediate plates. Figure 4 is a plan view of the cable shown in Figure 3. Figure 5 is a top view, enlarged three times, of a section of the bank shown in Figure 3, with the lower end raised about 35° from the horizontal. At the left-hand edge the insulating plates and the stiffening plate are cut away for a short distance so that the conductors can be easily traced.

The bare and parallelly located conductors L are first of all embedded in plates J, J^1, J^2, and J^3 (Figure 1) located at a distance from one another, these plates being formed out of a plastic insulating mass, which has been solidified by a process which does not affect the present invention and therefore need not be further explained. The insulating plates J, etc., are so arranged that their side edges Q run parallel to the conductors L, while the other two edges R of each plate run at an acute angle to these conductors. In the example shown the cable contains three groups of conductors, each group containing 10 conductors. In the example shown, those parts of the cable that are not covered by the insulating pieces are made of different widths, a wide space K succeeding a small space K^1. The reason for this will be explained hereinafter.

The insulating plates J, etc., having been formed on the conductors, the conductors L are kinked in the manner shown in Figure 2 at the parts K, K^1 that have no insulation. This is done so that in the coiling or folding operation that subsequently takes place bank contacts will be formed which lie in planes perpendicular to the plane of the bank.

The flat cable is now coiled in the manner shown in Figs. 2^a, 3 and 5 by folding the insulating plates J, etc., against one another. Thus in succession every two plates are so folded against one another that their edges R, between which the spaces K^1 in Figures 1 and 2 are located, cover one another. The free points of these plates overlap the adjacent plates. Between the plates, where the two edges R cover one another, intermediate metallic stiffening pieces P are provided for the purpose of forming a stiffening. These pieces preferably comprise iron plates, which are connected with the plates J, etc., by means of rivets.

The method of forming the cable as shown in Figures 3 and 5 from the form as shown in Figures 1 and 2 will now be described more in detail. Referring to Figure 2^A the insulated plate J is held in the same position as shown in Figures 1 and 2. The plates J^1, J^2 and J^3 are then bent up and around to the right through an arc of 180 degrees so that

the edges R of the plates J and J^1 lie flat against one another. The wires that formerly were in the space K^1, in Figure 2, are formed into loops O on the left side by a rod having first been inserted to form them when the plates were turned. The stiffening piece P is then inserted between the plates J and J^1 where they overlap one another and is then fastened to the plates by the rivets N. The cable is now in the position as shown in Figure 2^A with the plates J^2 and J^3 extending to the right of the partly formed cable. In the next step the plate J^2, together with the plate J^3 are moved back and around so that J^2 lies back of and under the lower end of plate J^1 with the wires that formerly were in space K forming the loops B on the right as seen in Figures 3 and 5. The last plate J^3 is then turned up and around, from the left, on top of the lower end of plate J^2 and is now in a similar position to plate J^1. Another stiffening piece P is then inserted and the parts riveted together. The whole cable has now assumed the shape of a flat spiral with the bank contacts O on the left and the multiple contacts B on the right.

When the cable is coiled by folding the insulating plates J, J^1, J^2 and J^3 against one another the parts of the conductors L that lie in the spaces K, K^1 and which have been kinked in the manner shown in Figure 2 are bent in the manner shown in Figures 2^A, 3 and 5, thus forming loops O and B at opposite edges of the flat cable. The loops O lie directly on the edge of the insulating plates and are comparatively short. These loops form the contacts of the bank field, that is to say, the loops serve as the fixed contacts over which the wipers of the switches are moved. The loops B, which are remote from the edge of the insulating plates and are longer than the loops O, serve as a multiple to connect corresponding contacts in different groups together and can be used for attaching multiple bank cables where necessary.

The stiffening plates P are provided with end pieces Z for the purpose of fixing the cable to the switch racks.

A number of stiff frames are formed by the process of folding the insulating plates J, J^1 J^2 and J^3 against one another during the coiling of the cable and by at the same time inserting the stiffening plates P. These frames carry the contact loops O. The use of stiffening plates P is not essential, however. If the insulating plates are sufficiently stiff the end pieces Z can be fixed to them, thus avoiding the use of separate stiffening plates. The insulating plates can be made elastic if stiffening plates P are used.

The gap in the insulating material at the point K (Figures 1 and 2) is greater than is required for coiling the cable, as pointed out before. This larger gap in the insulating material renders the loops B very flexible; hence inaccuracies in the manufacture of the racks can be neutralized by pressing frames towards or away from one another when mounting the frames on the switch racks.

What I claim and desire to protect by Letters Patent is:—

1. A multiple contact bank comprising a row of insulated plates, a second row of similar plates superimposed on said first row, the plates of the second row overlapping those of the first, means securing said plates together in pairs, each pair comprising plates in different rows, a metal plate secured between the insulating plates of each pair, said metal plates having extensions for use in attaching the bank to a frame, and continuous parallel wires extending diagonally through all said plates in series.

2. A multiple contact bank comprising pairs of overlapping insulating plates arranged in two rows opposite one another, parallel wires extending through said plates alternately in each row to form a flat spiral, means for securing each pair of said plates together, a metal plate secured to and between each of said pairs of plates, and means on said metal plate for attaching said contact bank to a frame as a unit.

3. A multiple contact bank comprising pairs of overlapping insulating plates arranged in parallel rows and fastened together at the portion where they overlap, parallel wires extending through said plates alternately in each row to form a spiral shaped unit, and a metal plate secured between each of said plates where they overlap, said metal plate having extensions for attaching said unit to a frame.

Signed by me at Berlin, Germany, this 11th day of October, 1922.

KURT BÖHME.