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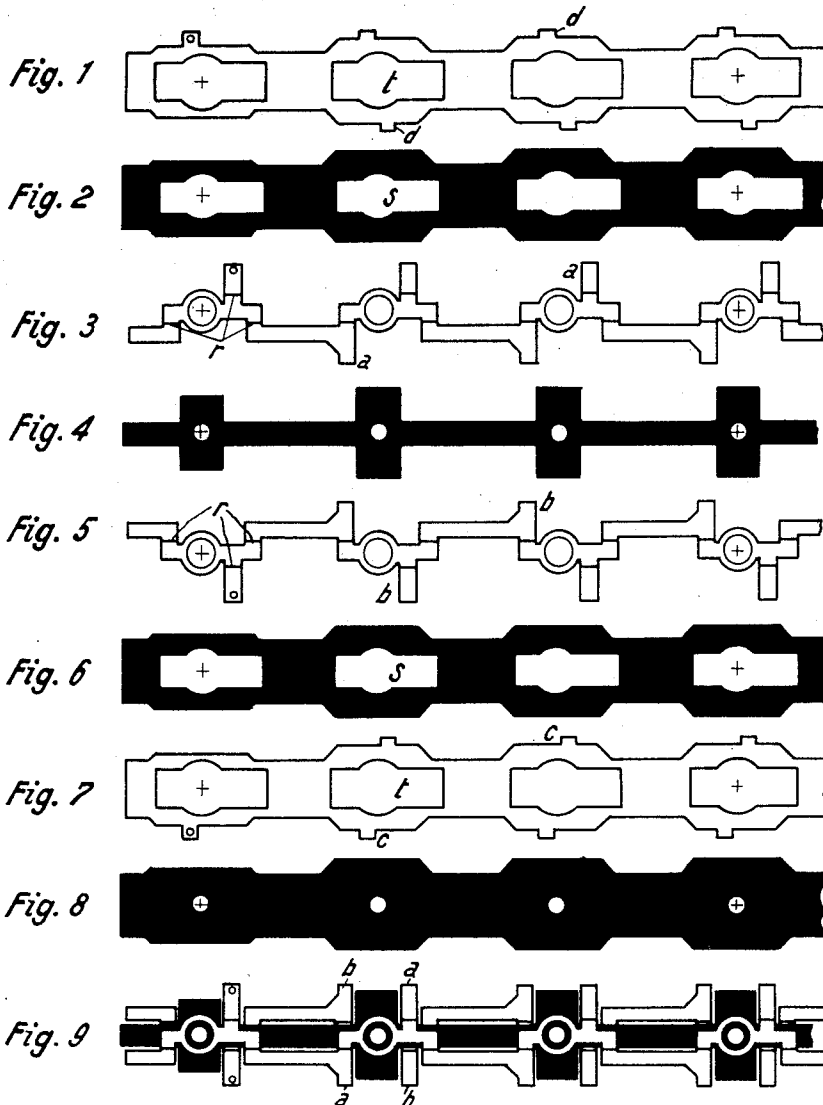
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1,938,752

FLAT BANK MULTIPLE FOR SELECTORS IN TELEPHONE EXCHANGES

Filed May 20, 1932

2 Sheets-Sheet 1



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Fig. 10

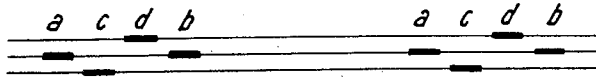
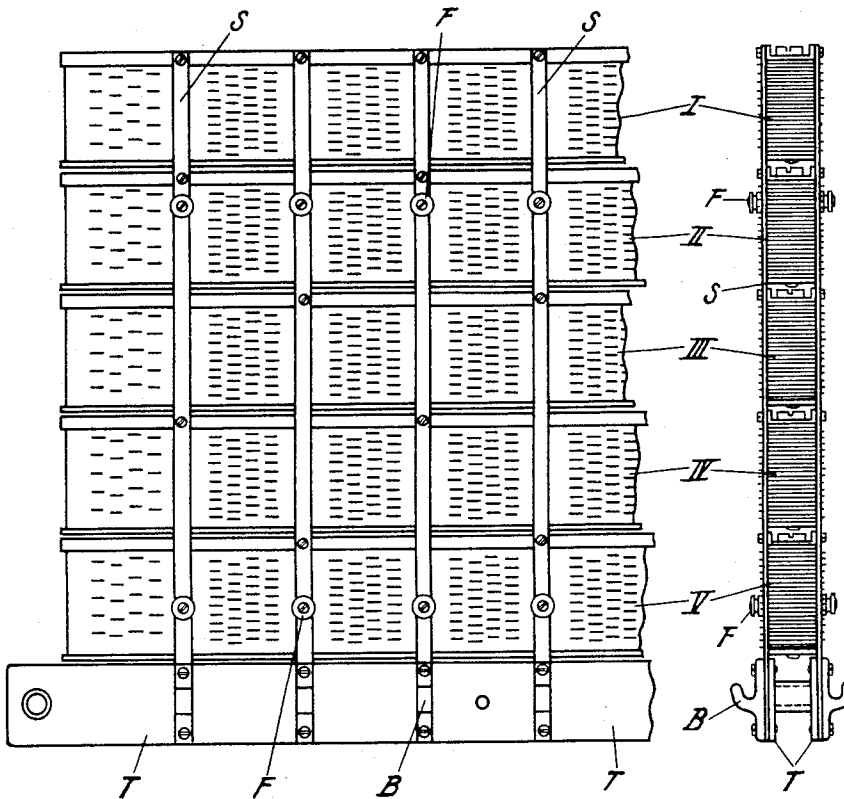


Fig. 11

Fig. 12



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TELEPHONE EXCHANGESFriedrich Merk, Frankfurt-on-the-Main,
GermanyApplication May 20, 1932, Serial No. 612,584, and
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8 Claims. (Cl. 175—306)

This invention relates to flat bank multiples in which sheet metal strips with laterally projecting lugs are arranged one above the other and insulated from one another so as to form contacts extending transversely of the strips. These contacts, as is well known, may be formed in a number of rows by suitably displacing the projecting lugs or the sheet metal strips. However, the greater the number of contact rows in the field, the greater will become the spacing between the contacts in the rows when using materials of a predetermined strength and thickness sufficient for the operation of the selectors. However, as the contact spacing itself must not exceed a predetermined amount, having due regard to the operation of the selectors, there is a limit to the permissible number of contact rows, which in flat multiples heretofore employed has already been reached by the use of contact banks with three rows.

The object of the invention, having requirements in view, is to enlarge or increase the contact banks from three to four rows, this increase in the number of rows of contacts being brought about without increasing the height of the bank multiples or reducing the thickness of the material of the sheet metal strips and insulating parts.

According to the invention, this problem is solved by giving a special shape to the sheet metal strips and insulating parts. Two of the superimposed sheet metal strips are constructed so that their contact lugs will lie side by side in one layer or plane. The two other sheet metal strips, which lie in different planes parallel to one another, are provided with longitudinal slots or cut-away portions in which to receive the superimposed portions of the two first-mentioned sheet metal strips, located side by side, as is necessary for distributing the contact lugs on both sides in the same plane.

An example of construction according to the invention is illustrated in the accompanying drawings wherein:—

Figures 1 to 8 show the separate sheet metal and insulating strips belonging to one layer set; Figure 9 represents an assemblage of the strips shown in Figures 3 to 5;

Figure 10 represents the arrangement of the contact lugs in the assembly of Fig. 9; and

Figures 11 and 12 represent an assembled flat bank multiple in front and side elevation respectively.

In the illustrated construction, the bank multiple is made in the usual simple manner by alter-

nately piling separate strips of sheet metal and insulating material one upon the other. The contact lugs and rows are arranged in the same sequence on the front and rear side of the bank multiple. The pair of sheet metal strips used for the speaking circuit are electrically screened from each other by the other corresponding sheet metal strips. Errors in the spacing of contacts due to small deviations in the thickness of the material are no greater than those occurring in three row banks or fields.

For the four conductors of a line in this case, there are used four sheet metal strips according to Figures 1, 3, 5, 7, and four insulating strips according to Figures 2, 4, 6 and 8. The insulating strips are shown in solid black so as to distinguish them clearly from the sheet metal strips. The sheet metal strips are formed respectively with lugs *a*, *b*, *c*, *d*, projecting laterally from each side of the same, those at the left hand end being soldering lugs and the rest being contact lugs. The sheet metal strips shown in Figures 1 and 7 are of the same shape, but arranged in inverse relation, i. e., one of them is turned over through 180° upon its longitudinal axis so as to lie opposed to the other. Similarly, the sheet metal strips shown in Figures 3 and 5 are the same and are inversely arranged. The insulating strips in Figures 2 and 6 are likewise similar to each other and differ from the insulating strip of Figure 8 only in respect to the slots with which they are formed. The insulating strip of Figure 4 is however of a different shape. All the strips with the exception of those illustrated by Figures 3 and 5 are flat. The last mentioned strips are bent at right angles along the lines *r* to bring their portions showing in plan into step arrangement or different levels, those portions containing the openings being raised above the other portions of the same. As the two strips are arranged, with one turned through 180° relative to the other, the bends of that of Fig. 3 are upward and those of Fig. 5 are downward relative to the remaining portions of the strips which are flat (see Fig. 9).

The object of shaping the strips as described will be apparent from the following description of the mode of their assembly into layer form. Figs. 1 to 8 show the strips in the order in which they are placed upon one another. It will be seen at once that the contact lugs of the sheet metal strips, after assembly, will form four-part contact raws *a*, *c*, *d*, *b* projecting from both sides beyond the insulating strips. The insulating strip of Fig. 8 is placed at the bottom and the

strips of Figs. 7 to 1 are then placed successively on it to build up the complete bank. Care must be taken to see that the parts of the strips marked "+" lie in registration or accurately above one another. This is assured in a simple manner by the use of an assembling device which provides stops for the side edges of the strips and has pins engaging with the round holes in the strips shown in Figs. 3, 4, 5 and 8.

The strips shown in Figs. 8, 7 and 6 rest smoothly one upon the other. The same also applies to the strips shown in Figs. 2 and 1. All these strips together therefore occupy the space of five layers. As the assembly of four sheet metal and four insulating strips is to have the same height as the usual assembly of only three sheet metal strips and three insulating strips, each of which is of the same thickness, as hereinbefore stated, the intermediate strips shown in Figs. 5, 4 and 3 must be housed in the space usually occupied by a single layer. This is accomplished in the following manner.

Owing to their peculiar shapes, the strips shown in Figs. 5, 4 and 3 can be arranged side by side in the same plane with only their bent portions superposed. The insulating strip of Fig. 4 is flat along its whole length, while the two corresponding sheet metal strips (of Figs. 5 and 3) cross one another at the juncture of their bent portions below and above the insulating strip. The three strips as assembled together are shown in Fig. 9, so as to enable their relative disposition to be better understood. The necessary space to allow for the superimposition of the three strips is obtained by the provision of the slots *s*, *t* in the strips of Figs. 6 and 7 and Figs. 2 and 1. In this manner, the three strips shown in Figs. 5, 4 and 3 are assembled so as to occupy only the same amount of space as is normally required by a single layer.

Owing to their relative dispositions, contact lugs on the sheet metal strips appear in the same arrangement and sequence on the front and rear side of the assembly as illustrated in Fig. 10.

As is well known, the retention of this sequence is desirable for the operation and construction of the selectors. The lugs *a* and *b*, in accordance with the above explanations, appear in the same middle plane of the assembly. If the corresponding sheet metal strips of Figs. 3 and 5 are used for the speaking circuit, this circuit is screened toward the outside by the other sheet metal strips bearing against both sides thereof as shown in Figs. 1 and 7.

The strips may of course, within the scope of the invention, be given a somewhat different shaping from that herein illustrated and various modifications may be made, for example as regards the provision of the contact lugs, the bending of the middle sheet metal strips and so forth.

The manner of bending the strips described in the present example has the advantage that it makes no effect on the spacing of the contact lugs in the longitudinal direction of the strips, as would be the case if the bent portions were provided transversely to the direction of the strips.

By a continuous piling in the manner indicated, each time with eight strip assemblies according to Figs. 8 to 1, it is possible to produce flat banks for any desired number of lines having four conductors. The uppermost strip is always an insulating strip like that of Fig. 8. The banks are bounded by bars at the top and bottom as usual and are held together by means of screws.

Figs. 11 and 12 illustrate a bank multiple composed of five partial banks I-V for a large number of lines with four conductors divided into groups. The partial banks are mounted on a support T serving as their outer support. These partial banks and the supports are held together on the front and rear sides by transverse (vertical) bars S. On the bars, guide members F are provided for switch members with sets of brushes (not shown), which move over the contact fields located between the bars. At the bottom of the bars there is shown a further supplementary arrangement of the bank multiple suspension members B for supporting the setting mechanisms for the switch members.

I claim:—

1. A flat bank multiple for selectors, comprising sheet metal strips having contact lugs and insulating strips placed alternately one upon the other, two of the sheet metal strips having portions bent in opposing elevations so that when superimposed in a crossing relation upon one another their contact lugs will lie in the same plane, and two other of the sheet metal strips being provided with slots for the reception of the elevated portions of the first mentioned sheet metal strips.

2. A flat bank multiple for selectors, comprising sheet metal strips having contact lugs and interposed insulation strips superimposed one upon the other, two of the sheet metal strips being formed with raised crossing portions in opposite relation such that their contact lugs in the superimposed arrangement will lie side by side in the same plane, and said crossing portions thereof are adapted for the interposition of an insulation strip, and two other of the sheet metal strips being provided with recesses for the reception of the raised crossed portions of the first mentioned sheet metal strips.

3. A flat bank multiple for selectors, comprising sheet metal strips having contact lugs and insulating strips superimposed alternately one upon the other, two of the sheet metal strips being bent in opposing relation at a plurality of points along their longitudinal axes so as to cross each other in the superimposed arrangement with their contact lugs side by side in the same plane and with their crossing portions adapted to fit over one of the interposed insulation strips without touching; and two other of the sheet metal strips being provided with slots for the reception of the crossing portions of the first mentioned sheet metal strips.

4. A flat bank multiple for selectors, comprising sheet metal strips having contact lugs projecting from both sides and interposed insulation strips superimposed one upon the other, two of the sheet metal strips being formed correspondingly but inversely with a plurality of bent portions along their longitudinal axes crossing each other so that in the superimposed arrangement their contact lugs will lie side by side in the same plane while said crossing portions will fit oppositely upon one of the insulation strips and two other of the sheet metal strips likewise correspondingly formed being provided with slots for the reception of the crossing portions of the first mentioned sheet metal strips.

5. A flat bank multiple with a four-row contact field formed by four sheet metal strips insulated from each other and having contact lugs projecting from both sides, two of said strips being shaped so that when superimposed their contact lugs lie in the same plane and the other two of

said strips being provided with cut-away portions in which the superimposed portions of the first two strips are located, so that the height of the four-row contact field is no greater than that of the normal three-row field.

wherein the two strips which have their contact lugs in the same plane have a plurality of bent raised longitudinal portions.

5 6. A flat bank multiple according to claim 5, wherein the two strips which have their contact lugs in the same plane are shaped so as to allow for the insertion of an insulating member between
10 their superimposed portions.

8. A flat bank multiple according to claim 5, wherein the two strips having their contact lugs
80 in the same plane lie between the other two strips and wherein said lugs are formed and the strips assembled so that a like and symmetrical arrangement of the lugs is provided on each side
85 of the multiple.

7. A flat bank multiple according to claim 5,

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