Aug. 8, 1950 G. B. KNÖS 2,517,679

CROSS-ROD SWITCH FOR AUTOMATIC TELEPHONE SYSTEMS

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Fig. 1.

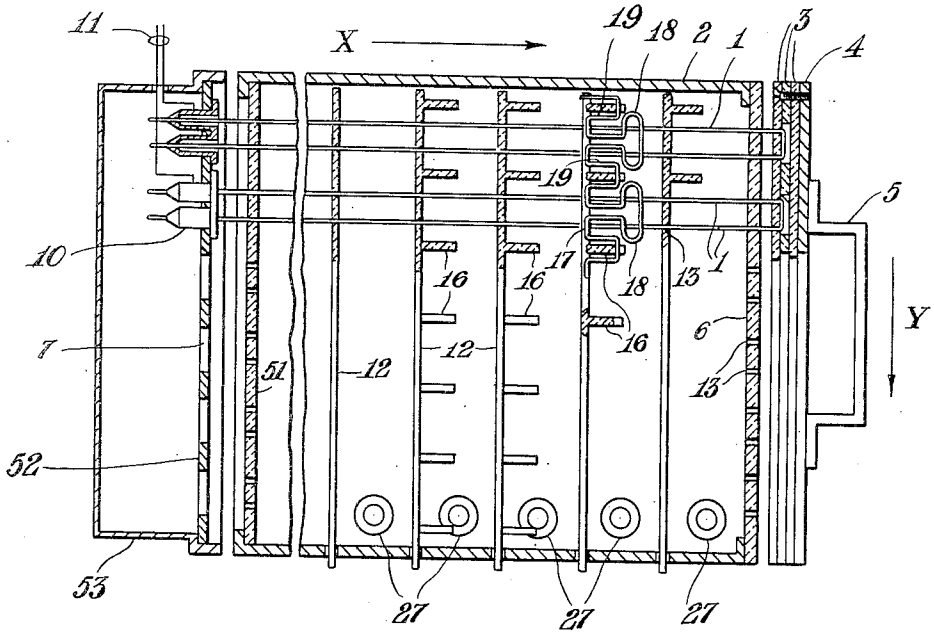
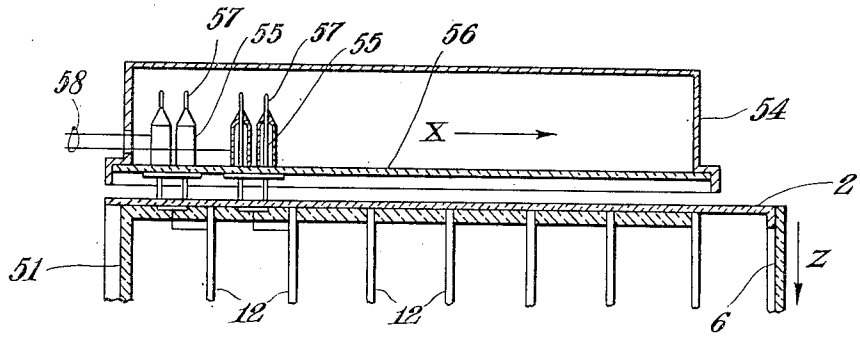


Fig. 2.



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Fig. 3.

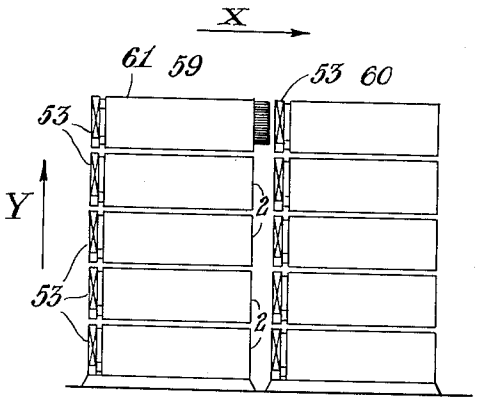


Fig. 4.

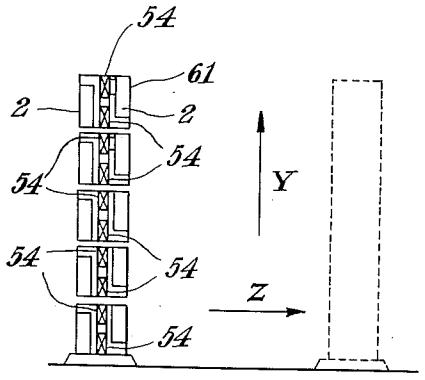


Fig. 5.

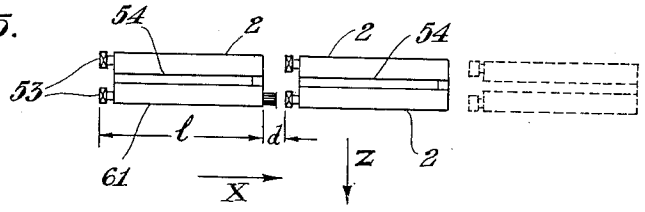
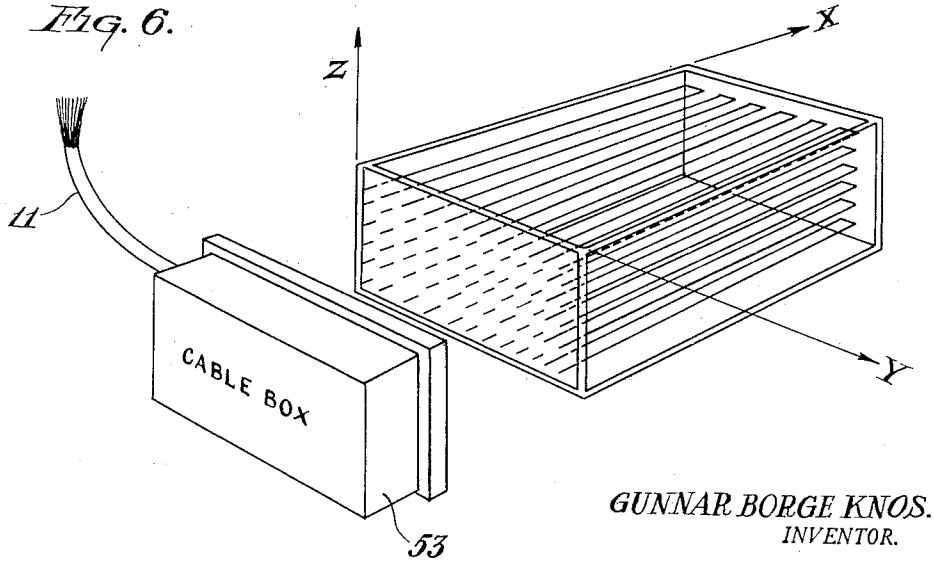


Fig. 6.



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CROSS-ROD SWITCH FOR AUTOMATIC TELEPHONE SYSTEMS

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In the Netherlands September 16, 1947

6 Claims. (Cl. 179—27.54)

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This invention relates to an improvement in or modification of the invention described and claimed in copending application Serial No. 790,085 filed December 6, 1947. In the copending application a crossbar switch for automatic telephony systems is described, in which the contact members of the elementary switches are made up of metal wires. The fixed contact members are formed by one or more gratings or grids of parallel straight wires (fixed contact wires) located in a plane, about which wires the points of contact are distributed and which are supported between the points of contact. The movable contact members (movable contact wires) are formed by metal wires crossing all fixed contact wires of a grating opposite the points of contact, supported between the latter and adapted to be bent adjacent the fixed contact wires by catches which may be referred to as ladders, and thus brought into or out of contact with each of the fixed contact wires of the grating. The catches are adapted to be moved by a magnet (contact or bridge magnet) in a direction transverse to the fixed contact wires.

In a particular form of the crossbar switch of the above-identified copending application one of the ends of the fixed contact wires serves as a contact plug, which fits in a contact socket, through which the current is supplied to the wire.

The invention relates to an improvement in the latter form of the crossbar switch according to said copending application. The provision of contact sockets into which the ends of the fixed contact wires are introduced enables temporary removal of these wires without the necessity of removing the supply leads to the switches, so that inspection or repair may be readily carried out.

This construction has a disadvantage in that a large space must be left between two adjacent switches to allow complete withdrawal of the fixed contact wires from the switch, the width of said space being required to equal at least the length of the wires together with the contact plugs.

The invention obviates the said disadvantage, while retaining the advantages obtained. For this purpose the contact sockets of the crossbar switch according to the invention are housed in a wall which is arranged separately from the cabinet or the frame of the switch. The fixed contact wires may be removed as hereinafter described. The entire wire bunch is withdrawn till the contact ends have issued from the contact sockets and are clear of them. This permits of the entire switch being moved sideways, the supply leads and the contact sockets remaining in place, and when the switch is completely clear of the adjacent one of the fixed contact wires, being withdrawn further and, if desired, being removed completely.

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In order to assist in laterally displacing the switch, the connections of the movable contact wires with their connecting wires may, as an alternative, pass via wall sockets, the counter-contact member of which is also secured to a wall which is arranged separately from the cabinet or the frame of the switch. This dispenses with the necessity of catching the bunch of wires passing to the movable contact wires during the lateral displacement of the switch.

In order that the invention may be more clearly understood and readily carried into effect it will now be described more fully with reference to the accompanying drawing, which illustrates the economy in space realised by the invention and in which

Fig. 1 shows, by way of example, a crossbar switch according to the invention, which primarily corresponds with that of Fig. 2 of the drawing pertaining to the above-identified copending application, the reference numerals used being the same.

Fig. 2 is a projection in the direction Y and shows a contact box for the connection to the movable contact wires.

Figs. 3, 4 and 5 show, in three projections, the arrangement of a group of crossbar switches according to the invention.

Fig. 6 shows the crossbar switch of Fig. 1 in a perspective view.

The fixed contact wires are designated by 1, the frame or the cabinet in which they are secured by 2, the metal drawplate by 4 and the layers of insulating substance by which the wires are insulated from one another and from the drawplate by 3. The handle 5 permits of the drawplate 4 and the wires 1 being drawn out of the front wall 6 of the cabinet 2.

The wires are supported between the points of contact by partitions 12, which for this purpose are provided with holes 13, similarly to the

front wall 6. The partitions are provided with combs 16, around which the movable contact wires 17 are secured with the use of stay straps 19. Between these stay straps the movable contact wires have contact straps 18, which are adapted to move with the use of catches or ladders 21 by the contact or bridge magnets 27.

In contradistinction to the construction of Fig. 2 of the copending application, the rear wall 51 is equal to the front wall 6, i. e. perforated in such manner that the fixed contact wires pass through it with ample latitude, the contact sockets 10, which were mounted in the rear wall in the figure of the copending application, being arranged in holes 7 in the wall 52 of a contact box 53. The connecting wires 11 consequently do not lead directly to the cabinet of the switch but to the contact box 53, which is arranged separately from the cabinet of the switch in a tray (not shown). In the form shown by way of example there are 6 groups of fixed contact wires. As a rule, this number will be greater, for example 10.

A similar contact box is provided for the connections to the movable contact wires and is designated 54 in Fig. 2. It is also arranged separately from the cabinet of the switch and contains contact sockets 55, arranged in a wall of insulating material 56, in which are introduced contact studs 57, which are connected to the movable contact wires and which are secured to the wall of the cabinet 2. These contact sockets have connected to them connecting wires 58 coming, for example, from subscribers. The switch in the example shown is intended for 7 subscribers, but as a rule this number will be larger, for example 20.

The size of the box 54 in the direction Y will preferably not exceed half that of the cabinet 2. This offers the advantage that two switches may be arranged back to back, the associated contact boxes for the movable contact wires being located in the same plane. This permits of making an arrangement as shown in Figs. 3, 4 and 5 in three projections, the direction Y being vertical. In these figures the contact boxes are designated by rectangles having diagonals designated by the numerals of Figs. 1 and 2 drawn in them.

Fig. 3 shows a tray comprising two piles 59 and 60, each of which contains five superposed cross-bar switches arranged pairwise back to back. The two piles are slightly spaced apart and this permits of the drawplates of the switches being drawn away to the extent that the other ends of the fixed contact wires are caused to be clear of the contact box 53. This is carried into effect with the switch designated 61 and this switch may thus be displaced, as a whole, in the direction Z and removed from the tray, the contact plugs located on the rear side discharging from the contact sockets of the contact box 54.

Fig. 4 shows the contact boxes superposed, which is made possible by extending the contact boxes only for part of the height of the switches. This results in economy in space in the direction Z. In Fig. 4 a subsequent tray is shown in dotted lines.

Obviously, the width of the trays in the direction X may be increased at will by adding more piles, as shown in Fig. 5 in dotted lines. The space *d* required between the piles is considerably smaller than in the case of arrangement of the contact sockets on the wall of the cabinet of the switches itself. In this case, in order to enable removal of the fixed contact wires an intermediate space l of at least the total length of a switch would be required.

What I claim is:

1. In an automatic telephone system, the combination comprising a cross-bar switching unit including a frame, a planar grid supported by said frame and constituted by a multiplicity of conductors disposed in parallel relation, said conductors acting as the passive contacts of said switch, one end of said conductors extending through one wall of said frame to define external contact plugs for the connection of said conductors to a current supply, a plurality of resilient wires supported by said frame and disposed at spaced positions transversely with respect to said conductors, each of said wires being sinuously shaped to define a plurality of spaced bows acting as the active contacts of said switch, means fixedly to support each of said wires at points intermediate said bows and means mechanically coupled to said bows for rotating them into and out of engagement with said conductors, and a detachable cable box for connecting said unit to a current supply, said cable box including a like multiplicity of contact sockets disposed for engagement with said contact plugs.

2. An arrangement, as set forth in claim 1, further including a series of male contact members secured to another wall of said frame, each of said male contact members being connected to respective wires in said unit, and a second detachable cable box for connecting said wires to a current supply, said second cable box having mounted therein a like series of female contact members for engagement with said male contact members.

3. An assembly of cross-bar switching units, as set forth in claim 2, characterized in that the cross-bar units are arranged in pairs side by side, the walls containing the male contact members facing one another, the second cable boxes cooperating with said male contact members being arranged therebetween.

4. In an automatic telephone system the combination comprising a cross-bar switching unit including a rectangular frame, a planar grid supported by said frame and constituted by a multiplicity of conductors disposed in parallel relation, said conductors acting as the passive contacts of said switch, one end of said conductors extending through one short wall of said frame to define contact plugs for the connection of said conductors to a current supply, a plurality of resilient wires supported by said frame and disposed at spaced positions transversely with respect to the said conductors, each of said wires being sinuously shaped to define a plurality of spaced bows acting as the active contacts of said switch, means fixedly to support each of said wires at points intermediate said bows, means mechanically coupled to said bows for rotating them into and out of engagement with said conductors and a pull plate exterior to said frame at the opposing short wall thereof and attached to said conductors whereby the grid may be removed from said frame, and a detachable cable box for connecting said unit to a current supply, said cable box including a like multiplicity of contact sockets disposed for engagement with said contact plugs.

5. An arrangement, as set forth in claim 4, further including a series of male contact members secured to a long wall of said frame, each of said male members being connected to a respective wire in said unit, and a second detach-

able cable box for connecting said wires to a current supply, said second cable box having mounted therein a like series of female contact members for engagement with said male members.

6. An arrangement, as set forth in claim 5, wherein said second box is rectangular and has a width less than one-half of the width of said frame.

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