Dec. 1, 1925. 1,563,658

C. D. RICHARD

LINE SWITCH

Filed June 1, 1922 2 Sheets-Sheet 1

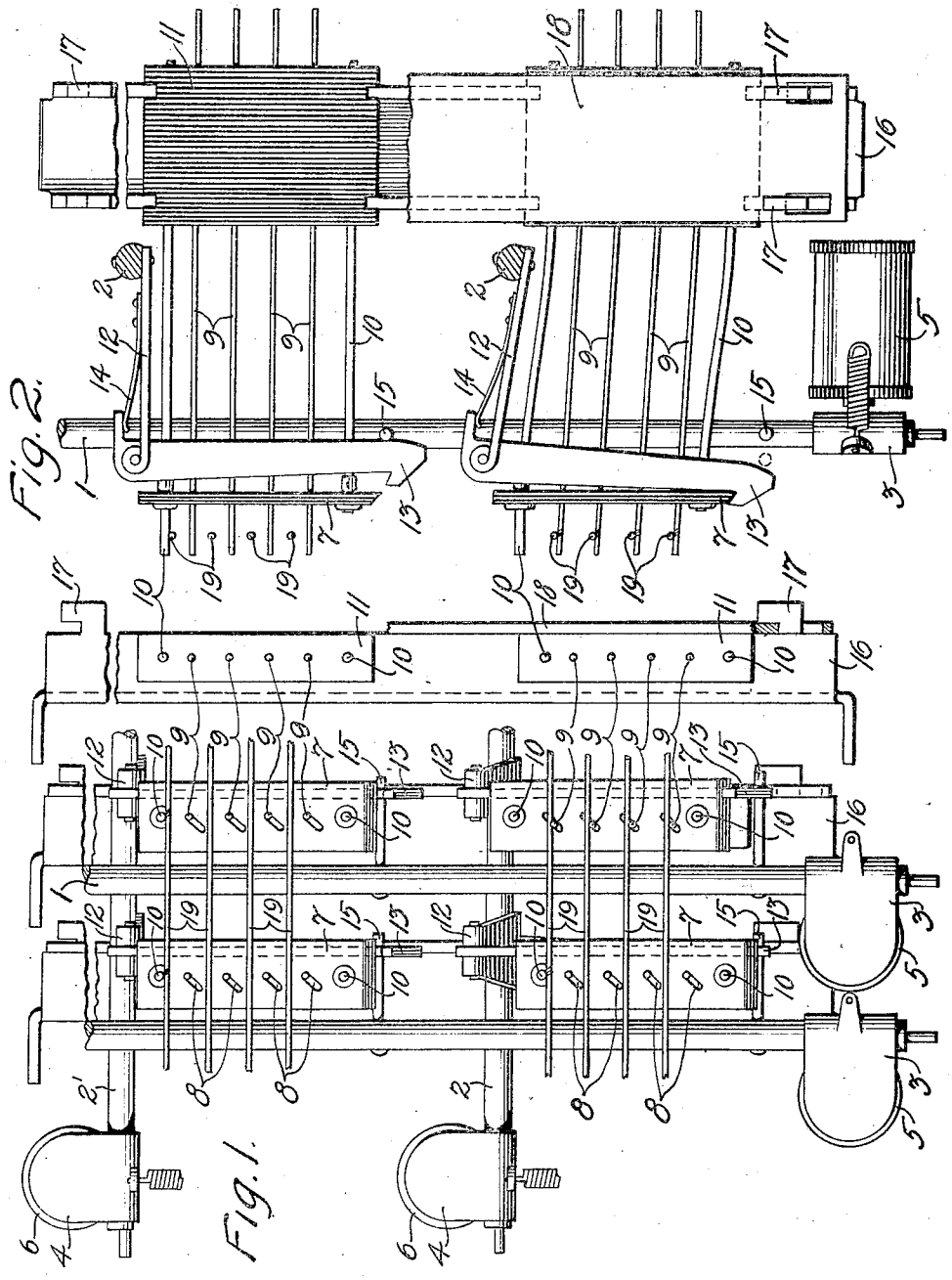


Fig. 2.

Fig. 1.

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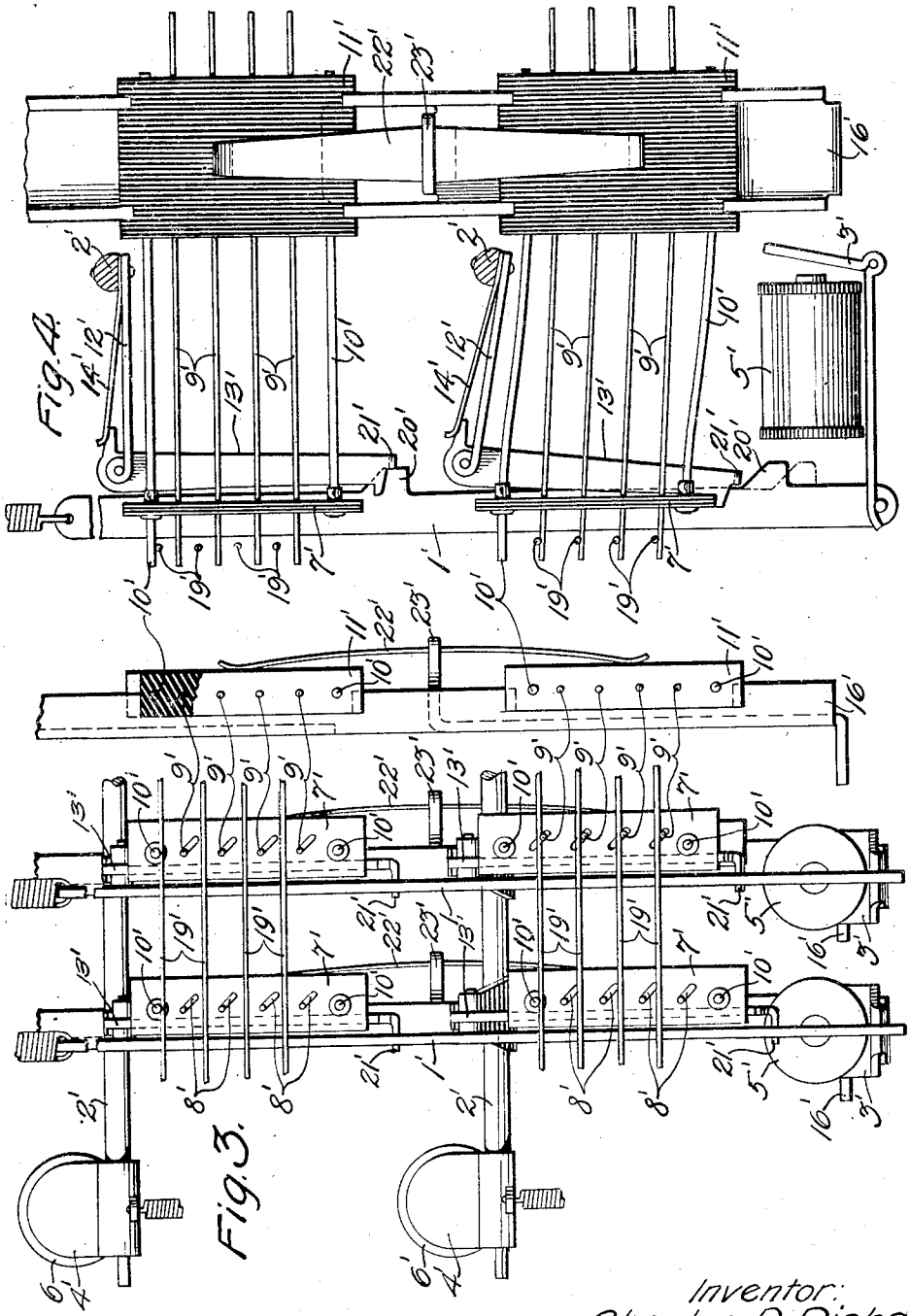


Fig. 4.

Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES D. RICHARD, OF WEST NEW BRIGHTON, NEW YORK, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

LINE SWITCH.

Application filed June 1, 1922. Serial No. 565,185.

To all whom it may concern:

Be it known that I, CHARLES D. RICHARD, a citizen of France, residing at West New Brighton, Staten Island, in the county of Richmond, State of New York, have invented certain new and useful Improvements in Line Switches, of which the following is a full, clear, concise, and exact description.

This invention relates to switching mechanisms and more particularly to a coordinate switch which is adapted for use in automatic telephone systems wherein telephonic connections between subscribers are effected under the control of the calling subscriber and without the intervention of intermediate operators.

In switches of the above mentioned character operating cards are provided for the sets of active contacts and by the conjoint operation of coordinately disposed bars, the cards are moved in such a manner as to carry the active contacts into engagement with the passive or grid conductors, thereby effecting telephonic connections between calling and called for subscribers' lines associated with the switch contacts.

Heretofore, it has been customary with switches of this type to provide an insulating member which extends the entire length of the switch whereby the sets of active contacts were mounted collectively. This method necessitates the disturbance of all sets of active contacts associated with the insulating member whenever one or more sets were to be repaired or replaced.

An object of this invention therefore is to mount each set of active contacts individually and to permit the removal and replacement of each set as the occasion may be, without disturbing any other sets of contacts mounted on the switch.

Another object of this invention is to provide new and practical means for effecting an engagement between a set of active conductors and a set of passive conductors by the conjoint operation of selecting bars and maintaining this engagement after one of the selecting bars has returned to its normal position.

According to the foregoing objects, this invention provides individual blocks for each set of active contacts and provides means for removably mounting them. The invention also provides a horizontal rotatable bar with a plurality of lifting arms extending laterally therefrom and each arm having secured at its end portion a right angularly disposed member, the latter being provided at its lower end with a hook, which may be selectively moved to engage the lower portion of an operating card associated with a set of active contact wires.

A clear understanding of this invention will be had from the following detailed description and by reference to the accompanying drawings in which Fig. 1 is a front view of a section of a coordinate switch disclosing the features involved in this invention; Fig. 2 is a side view of Fig. 1; Fig. 3 is a front view of a coordinate switch showing modified forms of the invention; Fig. 4 is a side view of Fig. 3.

In the following detailed description similar reference characters designate similar parts throughout the several views.

Considering Figs. 1 and 2 particularly, coordinately disposed bars 1 and 2 are securely attached to the armatures 3 and 4 of electromagnets 5 and 6, respectively. Operating cards 7 are arranged in vertical and horizontal rows, each row having an operating bar associated therewith. The cards 7 are provided with a plurality of obliquely disposed apertures 8 through which the free ends of the active contacts 9 protrude. Passive or grid conductors 19 extend horizontally along the entire length of the switch. Flexible spring members 10 are provided for mounting the cards 7 and are embedded in blocks 11 of insulating material, there being one such block for each set of active contacts. A plurality of lifting arms 12 is mounted on bars 2 and each of which has pivotally mounted on its free end a hook 13 which engages the base of the operating cards 7 upon actuation of the bar 2. A spring member 14 is provided for each hook 13, which engages a projection on the upper end of the hook 13 and by exerting a constant pressure thereon, the free or operating end of the hook is held normally in engagement with the pin 15 mounted on the operating member 1.

Each armature is provided with a restoring spring to return the operating bars to normal positions upon the deenergization of their respective magnets.

A channel member 16 is provided with a plurality of projections 17 which engage

notches in a clamping member 18, which serves to hold the insulating blocks 11 in place. The blocks 11 are provided with notches which engage the flanges of the channel member 16, so that each block may be easily slipped in or out of position as the case may be.

In Figs. 3 and 4, the operating bar 1′ instead of being rotatable is adapted to be moved downward upon the energization of the magnet 5′, and is provided with a plurality of camming surfaces 20′. The spring 14′ keeps the hook 13′ in constant engagement with the operating bar 1′ through the instrumentality of a lug 21′ located on the lower end of the hook. By the cooperative effects of the spring 14′ on the upper end of hook 13′, and the cam on the lower end, the hook is guided into operable relation with the cards 7′ upon the actuation of bar 1′. The insulating blocks 11′ are held in position by spring members 22′ which are inserted in apertures 23′ and are held compressed against the blocks 11′.

The following is a complete description of the operation of the switch, reference being made first to Figs. 1 and 2.

In the lower central portion of Fig. 1, an engagement between a set of active contacts 9 and the grid conductors 19 is shown completed, having been effected in the following manner.

The calling subscriber on initiating a call causes the energization of magnet 5 which attracts its armature 3. The selecting bar 1 being firmly secured to the armature 3, rotates through a small arc carrying the pins 15 with it. The hooks 13 held in constant engagement with pins 15 by the action of spring 14, rotate about their pivoted ends, the lower ends thereof being positioned beneath the lower ends of cards 7. Next a circuit may be completed for operation of magnet 6, which attracts its armature 4, causing bar 2 to rotate through a small arc.

The manner in which magnets 5 and 6 are operated is shown in Patent No. 1,515,735 granted to C. L. Goodrum et al. on November 18, 1924.

The lifting arms 12 securely attached to the operating bar 2 move through similar arcs and carries the hook 13 in a vertical direction, causing a card 7 to travel upward, the mounting springs 10 flexing under this action. The active contacts 9 are carried upward with the card 7 and effect a wiping engagement with the permanently mounted grid conductors 19, thereby effecting the desired telephonic connection. The magnet 5 may be deenergized as described in the above mentioned Patent No. 1,515,735 granted to C. L. Goodrum et al. without disturbing this connection as long as magnet 6 remains energized. This enables the operating bar 1 to return to its normal position and should the magnet 5 be again energized prepare another set of contacts for engagement with another set of grid conductors upon the subsequent energization of the corresponding magnet 6.

In Figs. 3 and 4, the fundamental principle covering the operation of the switch disclosed therein is the same as embodied in Figs. 1 and 2. The mechanical differences in the structures and their effect on the operation of the switch will be described.

Upon the operation of bar 1′ the lug 21′ associated with the hook 13′ slides along the camming surfaces 20′ and is held in constant engagement therewith by the influence of spring 14′. The downward movement of bar 1′ positions the hook 13′ under the card 7′ so that the subsequent operation of bar 2′ causes the wiping engagement between the active and passive contacts as before.

The lower portion of Fig. 4 shows how the telephonic connection just effected is maintained after the deenergization of magnet 5′. It is shown that the cam 20′ is so positioned on bar 1′ that the upward movement of bar 1′ upon the deenergization of magnet 5′, does not bring the cam into engagement with the lug 21′ of hook 13′ to throw the hook out of engagement with card 7′.

What is claimed is:

1. In a switch structure, a plurality of sets of stationary conductors arranged in horizontal rows, a plurality of sets of movable contacts arranged in vertical rows for cooperation with said stationary conductors, and insulative mounting blocks one for each of said sets of movable contacts mounted on said structure and separately removable therefrom.

2. In a switch structure, a plurality of sets of stationary conductors arranged in paralleler rows, a plurality of sets of movable contacts arranged in rows coordinate to rows of said sets of stationary conductors and in intersecting relation thereto, a plurality of rows of insulative mounting blocks for said sets of movable contacts individual thereto and removably mounted on said structure, and a plurality of plates removably mounted on said structure arranged to lock said mounting blocks in fixed position.

3. In a switching mechanism, active and passive contacts, an operating member for said active contacts, operating bars, lifting arms on one of said bars, and a member pivotally mounted on each of said lifting arms, whereby said operating members are raised upon the conjoint operation of said bars, to effect engagement between said active and passive contacts.

4. In a switching mechanism, active and passive contacts, an operating member for said active contacts, operating bars, means pivotally mounted on one of said bars for actuating said operating member and effect-

ing engagement between said active and passive contacts upon the conjoint operation of said bars, and means for maintaining said engagement after one of said bars has returned to normal.

5. In a switching mechanism, active and passive contacts, an operating member for said active contacts, operating bars, a pivoted member associated with one of said bars, means associated with said bars for positioning said pivoted member in operable relation with said operating member upon a conjoint operation of said bars, and means associated with another of said bars for maintaining said pivoted member in its operated position after one of said bars has returned to normal.

6. In a switching mechanism, operating bars, an operating member and a lifting member, means associated with one of said bars for holding said lifting member in constant engagement with another of said bars, and means associated with said last mentioned bar for placing said lifting member in operable relation with said operating member upon the conjoint operation of said bars.

In witness whereof, I hereunto subscribe my name this 29th day of May, A. D. 1922.

CHARLES D. RICHARD.