July 20, 1926. 1,593,401

C. L. GOODRUM

TELEPHONE SWITCH

Filed July 31, 1923

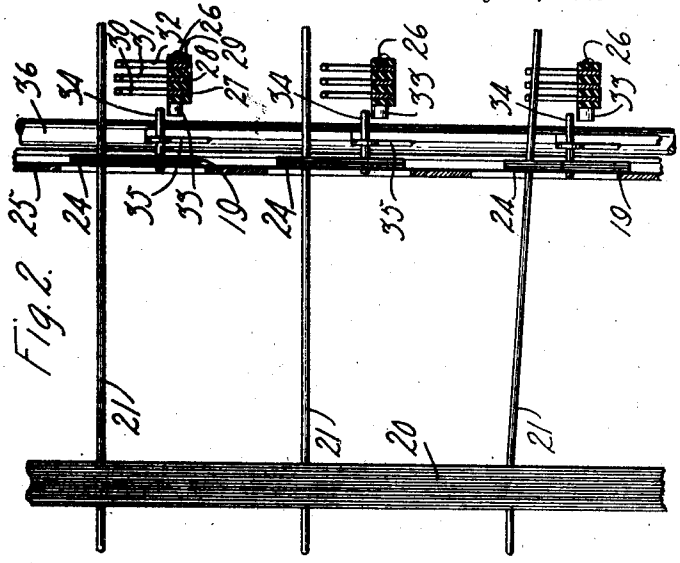


Fig. 2.

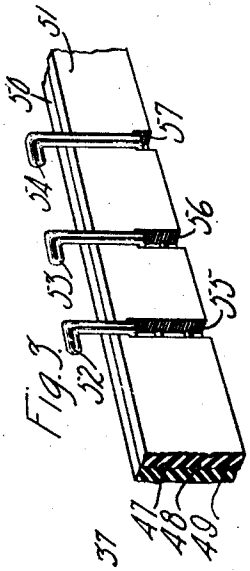


Fig. 3.

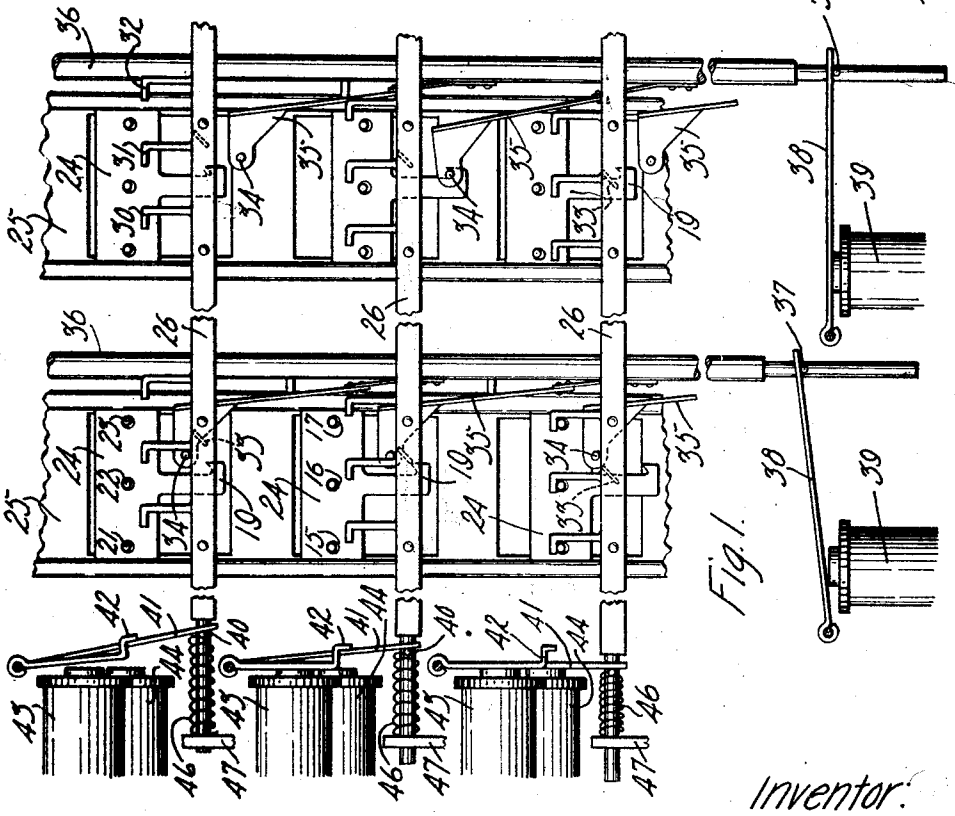


Fig. 1.

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Patented July 20, 1926. 1,593,401

UNITED STATES PATENT OFFICE.

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TELEPHONE SWITCH.

Application filed July 31, 1923. Serial No. 654,821.

This invention relates to telephone switches. More particularly it relates to that type of coordinate switch adapted for establishing connections in an automatic or semi-automatic telephone exchange system.

The object of this invention is to provide a switching device of the character above referred to in which sets of disengaged contacts are moved selectively into contacting engagement in a simple and positive manner and wherein the operating parts are readily accessible for adjustment or repairs.

A feature of the invention resides in the provision of an improved mechanism whereby sets of primary contacts are moved into contacting relation with associated contacting lugs through the release of a longitudinally movable bar therefor.

Another feature is the provision of longitudinally movable bars for moving contacting lugs and camming members carried thereby in position wherein pins carried by another bar operatively engage with insulating cards for moving sets of primary contacts in engageable relation with associated contacting lugs.

Another feature relates to the manner in which the sets of contacts are selectively operated. Briefly, the operation consists in first, moving the selecting bar together with the contacting lugs and the cams carried thereby in operable relation with associated operating pins carried by the operating bars; second by moving the operating bar in position wherein the pins carried thereby are diverted from their normal path in engageable relation with the primary contacts operating cards; third by imparting another movement to the selecting bar for moving the contacting lugs in engageable relation with their associated primary contacts; and fourth by replacing the operating bar and the active contacts served thereby for engaging their associated contacting lugs.

Other features and advantages will appear from the following description and from the claims appended thereto, reference being had to the accompanying drawings, in which Fig. 1 is a partial front assembly view of said switch. Fig. 2 is a left hand side view thereof. Fig. 3 is a perspective view of a modified form of a bank of secondary contacts.

Similar reference characters refer to similar parts throughout the different views.

The switch structure shown in Fig. 1 generally consists of a plurality of coordinately disposed rows of primary and secondary contact sets, the primary contact sets being arranged in a horizontal plane and projecting through parallely disposed upright supports 20 shown in Figs. 1 and 2. Each set of primary contacts generally consists of a plurality of bare wires 21, 22 and 23, the free ends of which extend through their respective apertures 15, 16 and 17 in an operating card 24. The cards 24 are slidably arranged into suitable channel-shaped guiding members 25 each associated with an upright support 20 and securely fastened on portions of the switch frame (not shown). The switch structure may comprise any number of upright supports 20 and as many sets per row according to the switch capacity desired.

For each horizontal row of primary contacts 21, 22, 23, etc., there is provided a sequentially movable bar 26 on which the conducting strips 27, 28 and 29 are insulatedly arranged. Each strip 27, 28 and 29 carries a plurality of sets of hook-shaped contacting lugs 30, 31, 32, etc., which extend therefrom in juxtaposition with their respectively associated primary contacts 21, 22 and 23. On each bar 26 there is provided a plurality of camming members 33 each associated with a pin 34 projecting from one side of a resilient member 35 in operable relation with a cam 33 and projecting from the other side of member 35 in operable relation with a hook-shaped portion 19 of operating card 24.

For each vertical row of active contacts 21, 22 and 23, there is provided a vertically disposed operating bar 36 provided in its lower end portion with a pin 37 disposed in operable relation with an armature 38 adapted to move the bar 36 and the resilient members 35 carried thereby in response to each energization of an electromagnet 39. It is to be noted that normally the pins 34 are free to move along side of the catches 19 without engaging them. On one end portion of each horizontal bar 26 there is provided a pin 40 disposed in operable relation with a pair of armatures 41 and 42 hinged on a common axis and adapted to move the bar 26 in a two-stage movement in response to the successive energization of electromagnets 43 and 44. Armature 42 is

operatively associated with electromagnet 43 and loosely connected to armature 41 adapted to move the bar 26 and the cams 33 carried thereby in operative relation with the pins 34 in response to the energization of magnet 43.

Upon a movement of a bar 36 following a preliminary movement of a bar 26, the actuating pin 34 engages its associated cams 33 and is moved thereby in operative relation with the catch portion 19 of its associated operating card 24 whereby the primary contacts served thereby are moved in engageable relation with their associated contacting lugs 30, 31 and 32 as illustrated by the middle set of contacts of the right hand row in Fig. 1. The subsequent longitudinal movement of bar 26 imparted by the armature 41 through the energization of electromagnet 44 results in moving the contacting hooks 30, 31 and 32 to a point wherein the release movement of the vertical bar 36 is effective to engage the primary contacts 15, 16 and 17 with their associated contacting lugs 30, 31 and 32 respectively. It is to be noted that when the bar 36 is restored to normal position the resilient member 35 is retracted to normal position through the medium of its own tension and the bar 36 may be operated to participate in the establishment of other co-existing connections without disturbing the connection already established. When magnet 44 deenergizes the bar 26 is returned to normal position by means of spring 46 which has one end resting against the bar supporting member 47 and the other end against the pin 40. The movement of bar 26 from operated to normal position is effective to disengage the secondary contacts 30, 31 and 32 from their respectively associated primary contacts 21, 22 and 23 which return to normal position through the medium of their own tension and to effect therebetween a wiping action due to the tension of the primary contacts.

Fig. 3 shows a modified form of a bank of secondary contact sets which generally consists of a plurality of bare wires 47, 48 and 49 arranged between insulating strips 50 and 51 which may be fastened on the bar 26 in any suitable manner. The contacting lugs 52, 53 and 54 of conducting wires 47, 48 and 49 are arranged in their respective notches 55, 56 and 57 disposed along one edge of the insulating strip 51 in staggered relation and protruding therefrom in parallel alignment with reference to the upper surface of the insulating bars 50 and 51.

What is claimed is:

1. In a switching device, sets of disengaged movable contacts arranged in coordinate rows, a selecting mechanism therefor comprising coordinately disposed longitudinally movable bars, means cooperating with one of said bars for moving one of said contact sets into a predetermined position, a plurality of means operable in sequence and cooperating with another of said bars for positioning another of said contact sets in an engageable relation with said positioned set, and means for releasing the said first means to effect an interengagement of said positioned sets.

2. In a coordinate switch structure, rows of sets of normally disengaged contacts, a longitudinally movable bar for each of said rows, cams carried by said bars, an operating card for each of the said sets, a catch member carried by each of said cards, and means cooperating with said cams for operatively engaging said catches for inter-engaging said contacts.

3. In a coordinate switch structure, a stationary support, sets of primary contacts arranged on said stationary support, a sequentially movable bar, sets of secondary contacts arranged on said sequentially movable bar, a pair of electromagnets for moving the bar in a plurality of selective movements with respect to said primary contacts, and means for moving said primary contacts to a position wherein they are effective to engage their associated secondary contacts.

4. In a coordinate switch structure, sets of primary contacts, a longitudinally movable bar, sets of conductor members arranged on said longitudinally movable bar, sets of hook-shaped contacts laterally extending from said bars and adapted to be moved in contacting relation with said primary contacts, an operating card for each set of primary contacts, hook-shaped portions integrally formed with said cards, cams carried by said bar one for each of said cards, an operating bar common to a plurality of sets of primary contacts, and means carried by said operating bar for operatively engaging said cards to move the primary contacts served thereby wherein they are effective to engage said second mentioned contacts.

5. In a coordinate switch structure, sets of primary contacts arranged in rows, insulating supports therefor, conductor members having sets of contacting hooks associated with said contacts, a longitudinally movable bar for moving said members, cams carried by said bar, a two-stage mechanism for moving said bar first one step for positioning said hooks and said cams with reference to said primary contacts, an operating bar disposed coordinately to the first mentioned bar, means carried by the last mentioned bar for operatively engaging said card through the medium of said cam, and means for moving the first mentioned bar another step to a position wherein the release of said means is effective to interengage said contacts with said hooks.

6. In a switching device, sets of primary

contacts, sets of secondary contacts associated therewith and arranged insulatedly on a longitudinally movable bar, cams carried by said bar one for each set of said primary contacts, another longitudinally movable bar disposed coordinately to the first mentioned bar, resilient members carried by the last mentioned bar one for each set of said primary contacts, means for operating the first mentioned bar to move said cams in operative relation with said resilient members, means for operating the second mentioned bar for moving said primary contacts in the path of their associated secondary contacts, and means for moving the secondary contacts wherein the release of the second mentioned bar is effective to interengage said primary and secondary contacts.

7. In a switching device, sets of primary contacts arranged in rows, a longitudinally movable bar associated with each row of said contacts, other bars disposed coordinately to the first mentioned bars, hook-shaped contacts carried by the last mentioned bars, means for moving each of said last mentioned bars in a plurality of sequential movements for causing the inter-engagement of said first and second mentioned contacts, and means for effecting a wiping action between said primary contacts and the hook-shaped contacts when one of the last mentioned bars releases.

8. In a coordinate switch structure, sets of primary contacts, other contacts associated therewith, a longitudinally movable bar for moving the second mentioned contacts toward said primary contacts in a first selective movement of said bar, cams carried by said bar, and means cooperating with said cams for moving the first mentioned contacts in position wherein another movement of said bar is effective to cause the interengagement of said first and second mentioned contacts when said means release.

9. The combination in a switching device of primary and secondary contact sets arranged in rows, coordinately disposed operating bars, means for moving a bar to impart a preliminary movement to a particular set of secondary contacts, means for thereupon moving a set of primary contacts into operative relation with such set of secondary contacts, means for then imparting a further movement to said particular set of secondary contacts, and means for releasing the primary set of contacts into operative engagement with such secondary contacts.

In witness whereof, I hereunto subscribe my name this 21 day of July A. D., 1923.

CHARLES L. GOODRUM.