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Dec. 8, 1925. 1,564,231

H. W. GOFF

TELEPHONE SWITCH

Filed Sept. 18, 1923 2 Sheets-Sheet 1

Fig. 1

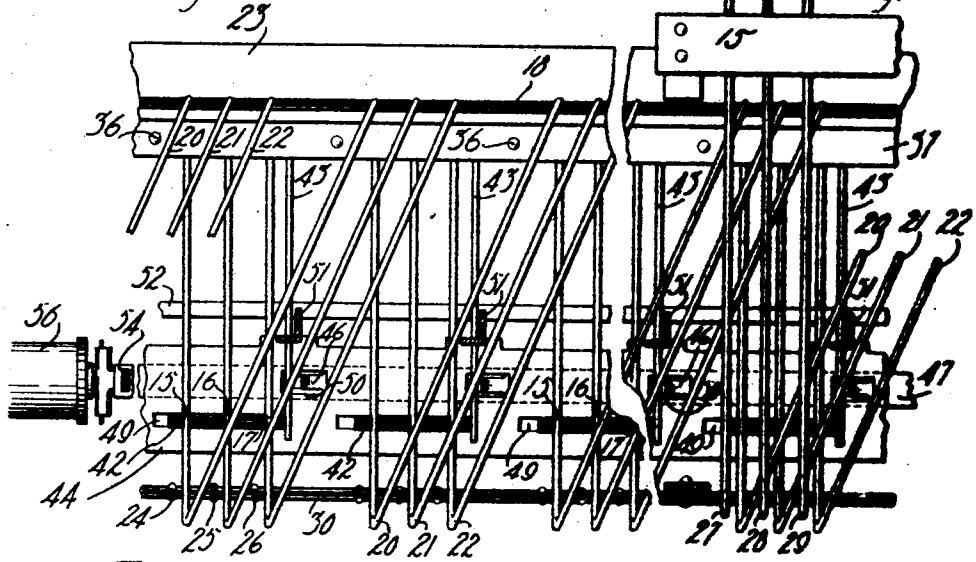


Fig. 3

Fig. 2

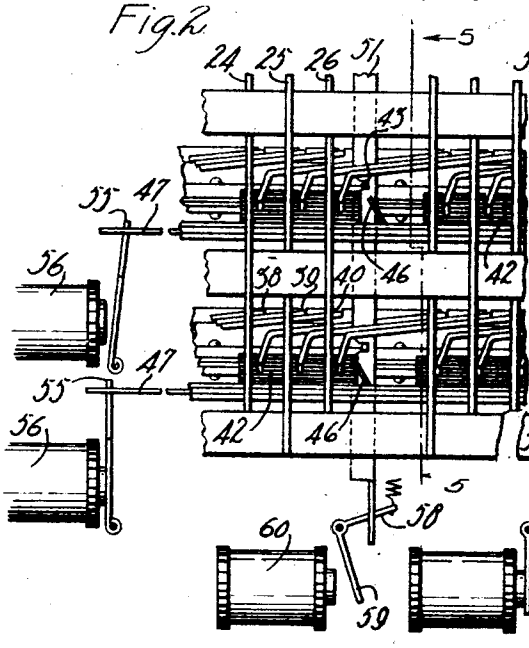
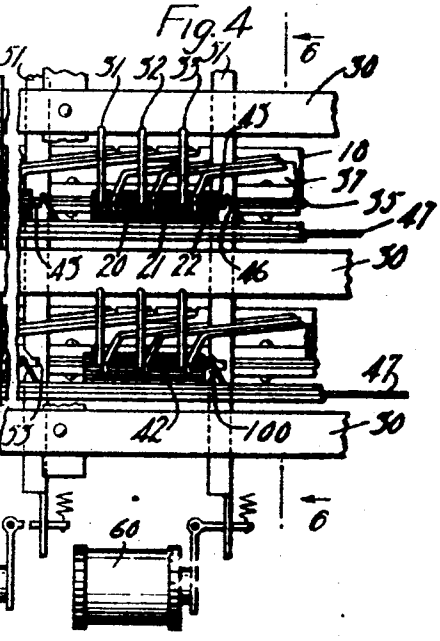


Fig. 4



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Fig. 5.

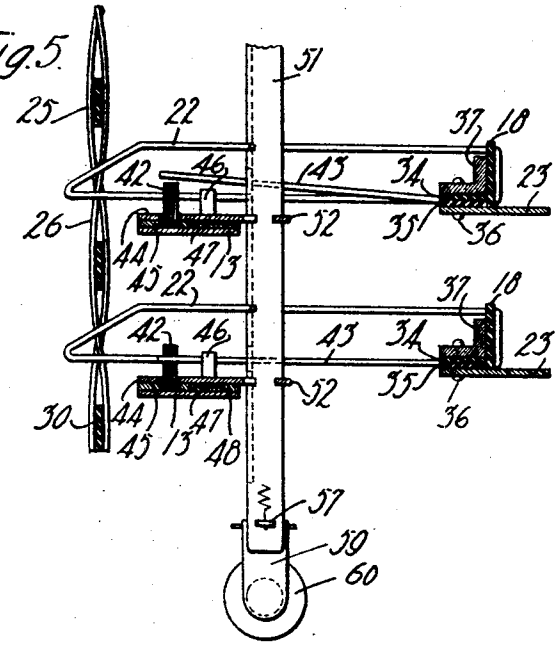
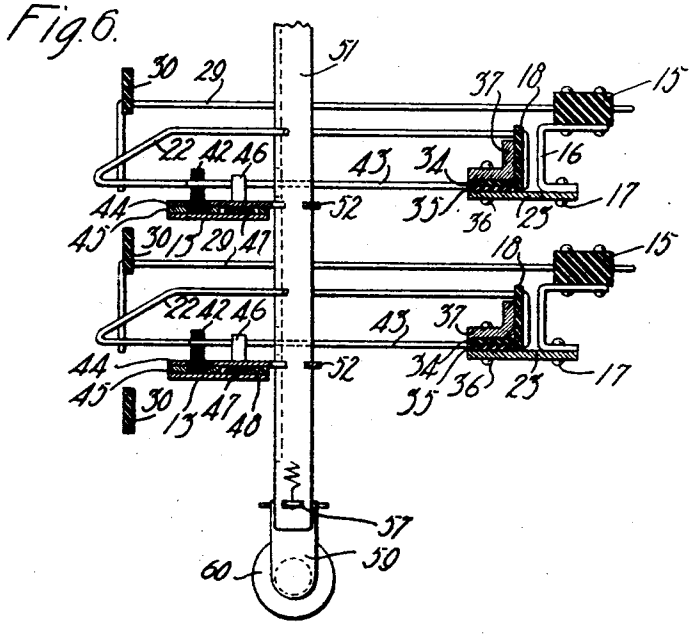


Fig. 6.



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Patented Dec. 8, 1925. 1,564,231

UNITED STATES PATENT OFFICE.

HAROLD W. GOFF, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TELEPHONE SWITCH.

Application filed September 18, 1923. Serial No. 663,464.

To all whom it may concern:

Be it known that I, HAROLD W. GOFF, a citizen of the United States of America, residing at New York, in the county of New York, State of New York, have invented certain new and useful Improvements in Telephone Switches, of which the following is a full, clear, concise, and exact description.

This invention relates to telephone switches and more specifically, to a coordinate switch adapted for establishing connections in an automatic or semi-automatic telephone system.

The object of the invention resides in the provision of a switching device which will be simple, efficient, and wherein the number of operating parts is reduced to a minimum.

In accordance with the foregoing object, a feature of the invention resides in the provision of multipled sets of helically arranged active contact wires whereby the usual number of soldered connections is materially reduced, thus providing a switch in which both the active and passive contacts are respectively multiplied as integral parts of continuous conductors.

Another feature resides in the arrangement of multiplied sets of active contacts adapted to be moved selectively in contacting relation with sets of passive contacts of different character through the conjoint movement of longitudinally movable selecting and operating bars, together with the provision of means whereby any subsequent movement of the selecting bar is ineffective to disturb the connection already established.

Another feature resides in the provision of means whereby the card operating fingers are moved collectively in to engageable relation with their associated cards through the movement of cooperating bars.

Other features of invention and advantages will appear from the following description and by the claims appended hereto, reference being had to the accompanying drawings in which Fig. 1 is a plan assembly of said switch; Fig. 2 is a front elevation thereof; Fig. 3 is a modified form of Fig. 1; Fig. 4 is a front elevation of Fig. 3; Fig. 5 is a vertical section taken approximately on line 5—5 of Fig. 2; and Fig. 6 is a vertical section taken approximately on line 6—6 of Fig. 4.

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

The switch structure shown in Fig. 1 generally consists of a plurality of multipled active contact sets arranged in coordinate rows, the active contact sets of each row being adapted to be moved selectively in contacting relation with a plurality of individually arranged sets of grid wires through the conjoint operation of selecting and operating bars therefor.

The active contact sets generally consist of a plurality of bare wires 20, 21 and 22 each secured at a plurality of points to a horizontally disposed support 23. Each wire is wound or bent into a form approximating a helix whereby contacts are formed at a plurality of points along the wire. Each such contact is arranged in association with a contacting point of a grid conductor so that an associated plurality of such active contact wires form a plurality of multipled active contact sets each associated with a different set of passive contacts.

The passive contacts are of two forms, the preferred and modified, shown respectively in Figures 5 and 6 respectively. The preferred form shown in Fig. 5 is the grid contact and consists generally of a plurality of grid wires 24, 25 and 26 which are held in spaced relation to each other by means of a plurality of insulating weft bars 30. The active contacts extend into this grid so that each grid wire comprises a plurality of multipled contacts associated with a corresponding plurality of different active contacts.

The individually arranged sets of passive contacts in the modified form shown in Fig. 6 generally consists of a plurality of bare wires 27, 28 and 29, which are molded into the insulating block 15 secured on an oblong shaped bracket 16 and which in turn is held securely on support 23 by means of rivets 17. The free end portions of passive contacts 27, 28 and 29 are held in spaced relation with reference to their associated active contacts 20, 21 and 22 by means of indentures 31, 32 and 33 made into one side of their respectively associated insulating

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weft bars 30. The free end portions of passive contact wires 27, 28 and 29 are bent at right angles relative to their longitudinal axes and extend downwardly in engageable relation with their associated active contacts 20, 21 and 22 shown in Fig. 4.

The active contact wires 20, 21 and 22 are arranged between two insulating strips 34, 35 which are secured on the support 23 by means of the right-angled bar 37 held on the supports 23 by means of rivets 36. The wires of each loop 20, 21 and 22 are inserted into their respectively associated indentures 38, 39 and 40 which are made into two opposite sides of an insulating strip 18 provided for insulating the wires 20, 21 and 22 from the angle shaped bar 37 and for holding them in adjusted position with reference to their associated grid wires 24, 25, 26 and the passive contacts 27, 28 and 29, respectively.

The switch structure may comprise any number of rows of active contact sets 20, 21 and 22 and any number of sets per row depending upon the switch capacity desired.

With each set of active contacts 20, 21 and 22, there is provided an operable card 42 having a plurality of notches 15, 16 and 17 in which the contact wires 20, 21 and 22 are positioned. Each card 42 is slidably arranged in registering apertures 49 made in the superposed strips 44 and 45 which are held on the support 13 by any suitable means.

For each card 42 there is associated an operating finger 43 which is secured at one end between the active contact insulating strips 34 and 35.

For each vertical row of active contacts 20, 21 and 22, there is provided an angle shaped bar 51 slidably arranged in registering recesses in the strips 44 and 52 shown in Figs. 1, 5, and 6 respectively. On one side of bar 51, there is provided a plurality of chamfered recesses 53 in which the free end portions of operating fingers 43 are positioned and adapted to be moved collectively in operable relation with their respectively associated cards 42, as shown by the two sets in the right hand side of Fig. 2 and the two sets in Fig. 4.

For each horizontal row of active contacts 20, 21 and 22, there is provided an operating bar 47 which is slidably arranged in a rectangular-shaped channel 48. The bar 47 carries a plurality of obliquely disposed lugs 46 which protrude through apertures 50 in the strip 44 into engageable relation with the free end portion of their respectively associated operating fingers 43. It is to be noted that normally the lugs 46 are free to pass under their associated operating fingers 43 without engaging them.

On one end of each bar 51, there is provided a slot 57 through which the arm 58 of an armature 59 protrudes and is adapted for moving the bar 51 and the operating fingers 43 served thereby in engageable relation with their associated cards 42 in response to each energization of magnet 60.

For each bar 47, there is provided an armature 55, (shown in Figs. 1 and 2) the free end of which extends through a slot 54 made in one end portion of the bar 47 and is adapted for moving the bar 47 longitudinally in response to each energization of an operating magnet 56.

The general operation of the switch mechanism for establishing connections between a set of active and passive contacts consists in moving the selecting bar 51 and the operating fingers 43 served thereby into operable relation with their associated operating lugs, 46, and cards 42 through the energization of its respective electromagnet 60. A movement of an operating bar 47 imparted thereto through the energization of magnet 56 is then effective to engage the operating finger 43, disposed at the intersection of the two bars, through its engagement with its respectively associated lugs 46, thereby moving the card 42 and the active contacts 20, 21 and 22 served thereby in contacting relation with their associated set of passive contacts 24, 25 and 26, or 27, 28 and 29 as the case may be. Bar 51 may be immediately returned to normal to participate in the establishment of other coexisting connections but the bar 47 and the operating card 42 remain in operated position throughout the duration of the connection.

When a bar 47 is moved into an operated position as shown at 100 in Fig. 2, the free end portion of the selected operating finger 43 is moved entirely clear of its recess 53 into a position wherein any subsequent movement of the bar 51 is ineffective to disturb the connection already established.

This invention is an improvement of the type of switch disclosed in Patent 1,515,735 issued to C. L. Goodrum, et al., on November 18, 1924.

What is claimed is:

1. In a switching device, a multiple contact arrangement comprising a continuous conductor bent into a form approximating a helix, means for anchoring said conductor at a plurality of similarly situated points, and means for selectively moving particular sections of said conductor for contacting purposes.

2. In a switching device, sets of passive contacts, sets of multipled active contacts helically arranged on stationary supports and having sets of contacting loops associated with said passive contacts, an insulating card for each set of said loops, and coordinately disposed bars each movable longitudinally for operating said cards for engaging said loops with said passive contacts.

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3. In a switching device, sets of multipled active contacts helically arranged on stationary supports, sets of passive contacts normally disengaged from said active contacts, longitudinally movable bars, and means carried by said bars for moving certain portions of said active contacts in contacting engagement with said passive contacts.

4. In a switching device, a multiple contact arrangement comprising continuous conductors, each bent into a form approximating a helix, sets of passive contacts associated with said conductors but normally out of engagement therewith, cards for moving certain portions of said helical conductors, an operating finger for each of said cards, a mechanism consisting of a plurality of longitudinally movable bars, means carried by one of said bars for moving said fingers collectively in operable relation with the other bars, and a catch member carried by said other bars for engaging said fingers for moving said cards for establishing connection between said conductors and passive contacts.

5. In a switching device, a multiple contact arrangement comprising a continuous conductor having movable portions bent into a form approximating a helix, sets of passive contacts associated with said conductor, a mechanism for operating said conductor, said mechanism consisting of coordinately disposed bars, guiding members common to each of said bars, cards slidably arranged in said members, one for each set of said movable portions, and electromagnetic means for actuating each of said bars for moving said cards in said members for engaging said conductor with said contacts.

6. In a switching device, sets of helically arranged conductors having sets of contacting loops, sets of passive contacts associated therewith, a mechanism for selectively operating said loops, said mechanism comprising a plurality of selecting and operating bars, common supporting members for each of said bars, cards slidably arranged in said members and each in operable relation with a number of said loops, an operating finger for each of said cards, means for moving said selecting bars for moving said fingers collectively in engageable relation with said cards, and means for moving said operating bars for moving said fingers for engaging said loops with said passive contacts.

7. In a switching device, sets of helically disposed active contacts, sets of passive contacts arranged in engageable relation with said active contacts, a selecting mechanism for operating said active contacts, said mechanism consisting of a card, an operating finger disposed in operating relation with said card, a pair of longitudinally movable bars, a common support for said bars and means carried by one of said bars for positioning said finger with reference to the other bar, which when operated is effective to interengage said active and passive contacts.

8. In a switching device, sets of multipled contacting loops arranged in coordinate rows, sets of passive contacts associated therewith, a notched selecting bar for one of said rows, an operating bar for the other row, a plurality of obliquely disposed lugs carried by said operating bar, resilient members associated with each of said contacting loop sets, and disposed in engageable relation with said lugs, means for moving the notched bar for positioning said members collectively in selected position with reference to said lugs, and electromagnetic means for moving said operating bar for engaging said contacting loops with said passive contacts at their crossing points.

In witness whereof, I hereunto subscribe my name this 7th day of September, A. D. 1923.

HAROLD W. GOFF.