Nov. 11, 1924. 1,514,850

H. W. GOFF

COORDINATE SWITCH

Filed April 13, 1922

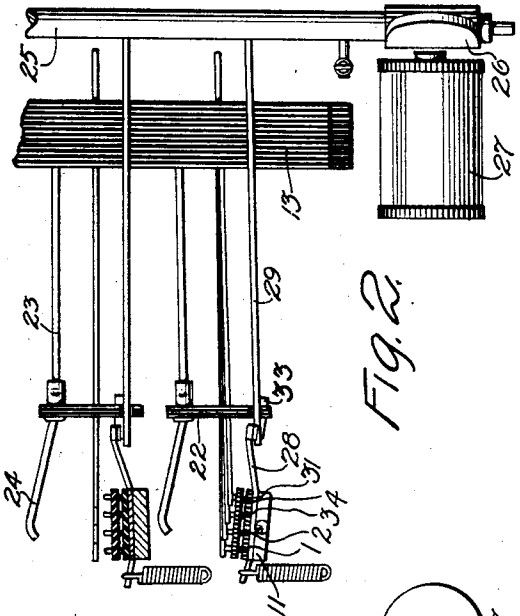


Fig. 2.

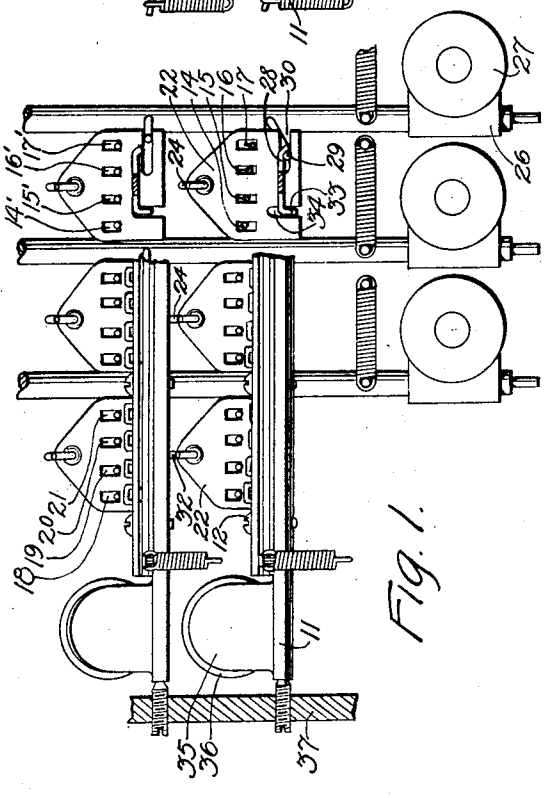


Fig. 1.

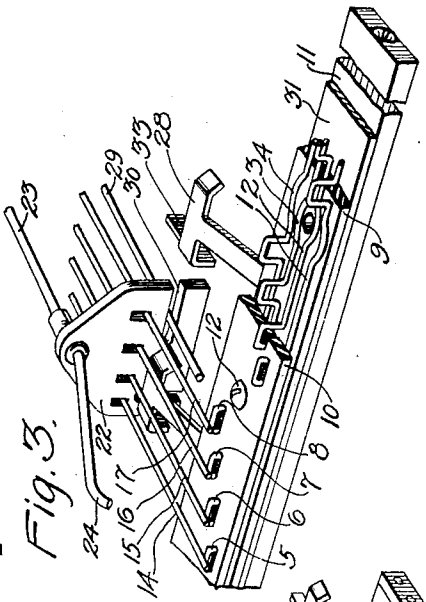


Fig. 3.

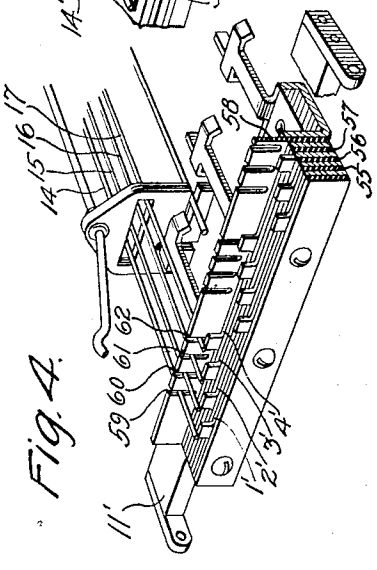


Fig. 4.

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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.

COORDINATE SWITCH.

Application filed April 13, 1922. Serial No. 552,222.

To all whom it may concern:

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

This invention relates to automatic telephone exchange switching apparatus and more particularly to the so-called coordinate switches of the type adapted for establishing connections in an automatic telephone exchange system.

This invention is particularly adaptable to a switching system of the type disclosed in the British Patent 183,438, issued to Western Electric Company, Limited, accepted September 6, 1923, but it will be apparent to those skilled in the art that this invention may be applied equally well to perform other switching functions with few changes in the operating circuit. In the switch as disclosed in the above mentioned application, operating cards or camming members are provided for each set of active wire conductors for moving the conductors into engagement with link conductors with a rubbing action. These camming members being necessarily made of insulation material, due to the great number of operations they are subjected to, are subject to considerable wear.

By this present invention, it is proposed to reduce the wear on the cards by relieving them of their camming action and by providing rotatable members each carrying a set of the link conductors common to the vertical rows of flexible conductors. The said link conductors being movable are adapted to effect a rubbing contact with their associated sets of flexible conductors.

The object of this invention is therefore to provide an economical and improved form of coordinate switch which will be compact, simple and reliable in operation.

In this switch both sets of conductors, the link conductors and the flexible conductors, are preferably in the form of bare wires, although one set of conductors may be in the form of strips of metal having lugs extending at intervals therefrom and arranged in staggered position relatively to one another. The flexible conductors cross the link conductors and are normally held out of contact with them by means of a plurality of guides in the shape of cards of insulation, one of which is individual to each set of flexible conductors. Selecting and operating mechanism comprising sets of bars is provided whereby any guide may be moved independently of the others to bring its associated conductors into engagement with the adjacent set of conductors.

It is thought that the invention will be best understood from the following detailed description, reference being had to the accompanying drawing in which Fig. 1 is a partial front assembly view of said switch, showing a set of flexed conductors in operated position.

Fig. 2 is a side view of Fig. 1 showing two sets of rotatable conductors one in normal and the other in operated position.

Fig. 3 is a perspective and partial assembly view of a rotatable operating member showing a set of link conductors thereon.

Fig. 4 is a perspective and partial assembly view of a modified form of rotatable operating member and link conductors.

The set of link conductors 1, 2, 3 and 4, Fig. 3, are assembled between two strips of insulation 9 and 10. In strip 10, there are a number of slots through which the laterally extending loops or lugs 5, 6, 7, 8, etc., protrude. The two strips are rigidly fastened together and held secure on the rotatable bar 11 by means of screws 12.

Supports 13 of insulating material are disposed at right angles to bars 11. On these supports are arranged the horizontally disposed sets of flexible wire conductors or contact springs 14, 15, 16, 17 and 14′, 15′, 16′, 17′, etc. The supports 13 may carry any desired number of sets of contact springs which depend upon the switch capacity desired. For simplicity of illustration, however, only two such sets are shown on support 13 in the cross sectioned view of Fig. 2 and the supports in Fig. 1 have been omitted. The free ends of conductors 14, 15, 16, 17, Figs. 1 and 3, extend through individual apertures 18, 19, 20, 21 of an insulating member or guide 22 which is mounted on a resilient support 23 fixed at one end portion to the upright support 13. The free end 24 of support 23 normally rests against the adjacent rotatable bar 11, as shown at 32 in Fig. 1. The supports 23

are adjusted normally to hold the guides 22 and flexed conductors up and out of contact with the link conductors with which they are associated.

Individually associated with each support 13 is a selecting bar 25 which is journaled at its end portions in bearings (not shown) in the switch frame 37. Securely attached to each bar 25 is an armature 26 which is arranged to be attracted by electromagnet 27 whereby the bar 25 is operated through a small angular displacement. Each bar 25 has a plurality of flexible arms 29, one individual to each guide 22 of the row with which it is associated.

Each of said rotatable bars 11 or operating bars as they may be properly termed, is provided with a plate 31, secured thereto by the screws 12, having a number of rigid arms 28. Each arm 28 is individual to a guide 22 and has a lug portion 33 which extends through the vertical slot 34 of its associated card 22 and serves as a guide therefor.

The guides 22 are each provided at their lower end with a horizontal slot 30 in which the free ends of arms 29 are located, but free to move therein to and from engageable position with arms 28. It will be noted that normally arms 29 are out of the path of said arms 28. When the vertical bar 25 is rotated out of its normal position by electromagnet 27 the end portion of arm 29 is driven into engageable relation with arm 28 and movement of bar 11 through the operation of armature 35 of magnet 36, results in lowering the operating guide 22 so as to permit the conductors 14, 15, 16, 17 to engage the loops 5, 6, 7, 8 of link conductors 1, 2, 3, 4, respectively. Continued movement of bar 11 causes a slight wiping action between the engaged flexible conductors and the link conductors. The operated link bar together with arms 28 thereof remain in their off-normal position throughout the duration of the connection, but the vertical bar 25 may be immediately restored to normal.

Referring to the modification of Fig. 4, the link conductors 1′, 2′, 3′ and 4′ are mounted on a rotatable channel-shaped bar 11′ and are insulated therefrom by means of insulation strips 55, 56, 57 and 58. The insulation strip 58 is provided with groups of lateral notches 59, 60, 61, 62, etc., in which the free ends of flexible wire conductors 14, 15, 16, 17, etc., are positioned in engageable relation with their respective link conductors.

What is claimed is:

1. In a switching mechanism, rotatable members, sets of conducting elements arranged in parallel on said members, sets of flexible conductors arranged on stationary supports and in rows coordinate to said sets of conducting elements, an operating card for each set of said flexible conductors, means for selectively establishing connections between said sets of elements and said sets of conductors through the movement of said cards, and means in said cards for holding said flexible conductors in adjusted position with reference to said elements.

2. In a switching mechanism, a plurality of rotatable members, sets of conducting elements insulatedly arranged on said members and brought through said insulation at intervals, sets of flexible conductors arranged on stationary supports in rows coordinate to said sets of conducting elements, an insulating card for each set of said flexible conductors, and means for selectively establishing connections between said sets of elements and said sets of conductors through the movement of said cards and said members.

3. In a switching mechanism, movable members, sets of conducting elements arranged in parallel on said members, each of said elements having contact lugs formed integrally therewith, sets of flexible conductors arranged on stationary supports for cooperation with said contact lugs, a card for each set of said flexible conductors and a common mechanism for establishing connections between said sets of elements and said sets of conductors.

4. In a switching mechanism, movable members, sets of conducting elements arranged in parallel on said members, each of said elements having upwardly extending contact lugs formed integrally therewith, sets of flexible conductors arranged on stationary supports and in rows coordinate to said sets of conducting elements, an operating card for each set of flexible conductors, and a common mechanism for selectively establishing connections between said sets of conductors and the lugs of said sets of elements.

5. In a switching mechanism, sets of parallel conducting elements, having contact lugs formed integrally therewith, sets of flexible conductors arranged on stationary supports and in rows coordinate to said sets of elements, coordinately disposed sets of selecting and operating bars, and means operative through the conjoint operation of said sets or bars for selectively establishing connections between said sets of conductors and the lugs of said sets of elements.

6. In a switching mechanism, sets of parallel conducting elements, each having lugs formed integrally therewith, the lugs of the conductors of each set being staggered relatively to each other, sets of flexible conductors arranged on stationary supports and in rows coordinate to said sets of elements, coordinately disposed sets of selecting and operating bars, and means operative through

the conjoint operation of said sets of bars for selectively establishing connections between said sets of conductors and the lugs of said sets of elements.

7. In a switching mechanism, a plurality of rotatable members, two plates of insulating material secured on each of said members, one of said plates having staggered slots therein, a set of conducting elements secured between said plates having portions extending through said slots to form contacts, sets of flexible conductors arranged on stationary supports in rows coordinate to said sets of conducting elements, and means for selectively establishing connections between said sets of conductors and the contact portions of said elements through the movement of said members.

8. In a switching mechanism, a plurality of rotatable members, sets of conducting elements arranged in parallel and carried insulatedly by said members, said conducting elements being brought through said insulation at intervals in staggered relation to one another, sets of flexible conductors arranged on upright supports and in rows coordinate to said sets of conducting elements, a selecting bar for each row of flexible conductors, a plurality of arms on each of said selecting bars, said arms associated with said sets of flexible conductors individually, but normally out of operable relation therewith, and means operative through the conjoint operation of said members and the arms of said bars for selectively establishing connections between said sets of elements and said sets of conductors.

9. In a switching mechanism, a plurality of rotatable members, sets of conducting elements insulatedly arranged thereon, sets of laterally extending contact lugs disposed at intervals in staggered relation to one another on said elements, horizontally disposed sets of flexed conductors arranged on stationary supports and in rows coordinate to said sets of conducting elements, a bar individual to each row of flexible conductors, a plurality of laterally extending arms on said bars, each of said arms associated individually with one of said sets of flexible conductors, means for rotating said bars individually, and a plurality of laterally extending arms on each of said rotatable members, the conjoint rotation of any one of said members and any one of said bars being effective to release a set of said flexed conductors into engagement with its associated set of said conducting elements.

10. In a switching mechanism, a plurality of rotatable members, sets of conducting elements arranged in parallel and insulatedly carried by said members, sets of laterally extending contact lugs on said elements, horizontally disposed sets of flexible conductors arranged on supports and extending over said contact lugs, each flexed conductor crossing one of said contact lugs but normally out of contact therewith, a movable support for each set of flexible conductors normally maintaining said conductors out of contact with said sets of conducting elements, a selecting bar individual to each row of flexible conductors, and means acting on said movable support and brought into operation by the conjoint actuation of one of said selecting bars and one of said rotatable members to release the conductors supported thereby into engagement with a set of contact lugs.

In witness whereof, I hereunto subscribe my name this 11th day of April, A. D. 1922.

HAROLD W. GOFF.