

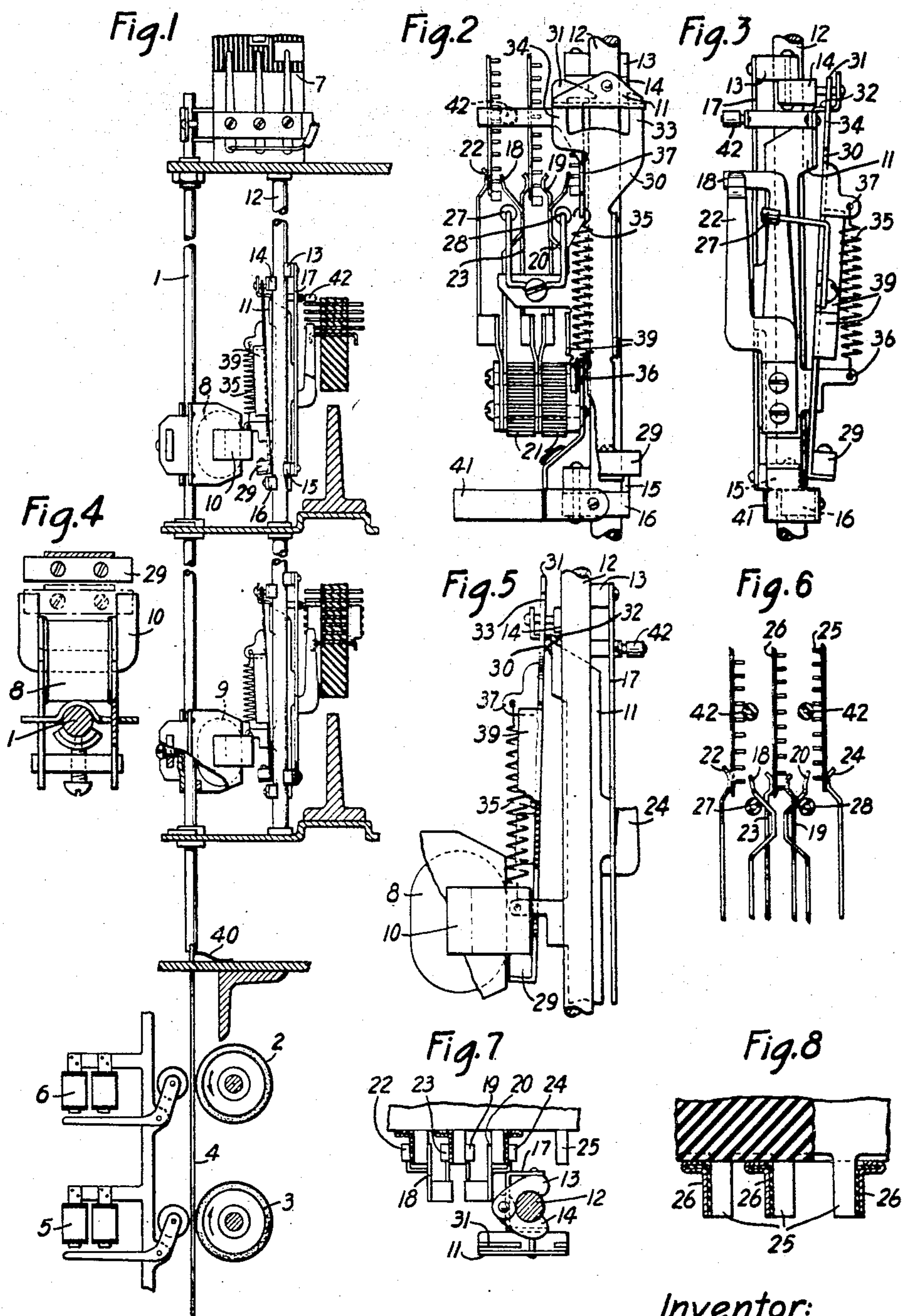
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SELECTOR SWITCH

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SELECTOR SWITCH.

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This invention relates to telephone exchange systems and more particularly to switching apparatus for use therein.

In telephone offices of the automatically operated type the interconnection of lines is accomplished by various types of switches and in large telephone offices it is of apparent advantage to use panel type banks for mounting the terminals which form a part of such switches. Brushes which are driven in a vertical plane to be associated with certain terminals of the bank form a second part of the switch for interconnecting lines. A well known method of elevating brushes to a desired terminal connection is shown in Patent No. 1,123,696 to E. B. Craft, et al, granted January 5, 1915. The brushes are permanently fastened to a drive shaft which is driven up or down by friction rolls when placed thereagainst by rolls on the armatures of magnets. The energization and de-energization of the magnets is controlled to position the brushes upon the desired terminals.

In the methods hereinbefore employed, a difficulty is encountered in centering the brushes upon the terminals, since there is a variation in the time of releasing the drive shaft. To care for this variation it has been customary to allow overthrow of the drive shaft and brushes after the release of the magnet. When the thrust of the overthrow has been expended, the drive shaft and brushes move downward by force of gravity and the brushes are centered upon the terminals by the use of a rack fastened to the drive shaft. Very rapidly operating apparatus is required to control the drive shaft magnets, and this apparatus must be maintained in careful adjustment in order that the brushes do not overthrow to a set of terminals above the ones to which they are directed. For this reason, it is desirable to eliminate the necessity for overthrow by the use of a brush driving combination which may be quickly released.

It is the principal object of the present invention to improve the brush driving mechanism for automatic switches.

The present invention contemplates use of a magnet permanently attached to a drive shaft, an armature attached to brushes by a flexible union, means operated on the energiza-

tion of the magnet to attract the armature for moving the brushes in either directive movement of the drive shaft, and means effective on the de-energization of the magnet to release the armature and arrest the movement of the brushes for associating them with the desired set of terminals independent of overthrow of said brushes or for returning said brushes to their normal position. To facilitate the movement of the brushes cams are attached to the armature pole piece for holding the brush springs away from the terminals as the brushes are moved upward.

A switch embodying the above enumerated features may be driven in essentially the same manner as that now used in panel type switches and which is disclosed in the above mentioned patent to E. B. Craft et al. The circuit arrangement for controlling the drive shaft and the magnet fastened thereto is disclosed in patent to W. G. Blauvelt, No. 1,634,734, granted July 5, 1927. For a clearer understanding of the above features reference may be made to the accompanying drawings, in which:

Fig. 1 is side view partially in section of a switch structure; Fig. 2 is a view of the brush carriage in position on a terminal rack, facing the bank; Fig. 3 is a view of the brush carriage from the side opposite that shown in Fig. 1; Fig. 4 shows the relative position of the magnet and armature with the magnet de-energized and energized; Fig. 5 shows a partial cut-away side view of the magnet and armature with the magnet operated; Fig. 6 shows a view of the brushes while being driven upward; Fig. 7 shows a view looking down on the brushes and terminal strips; and Fig. 8 shows a cross-section of the terminal bank.

As above indicated the drive rod 1 may be of the type commonly employed in panel type switches. The rod 1 is driven upward by means of roll 3 which is brought into frictional engagement with strip 4 by magnet 5. Similarly magnet 6 brings rack 4 into contact with roll 2 to restore the drive rod. No trip magnet and no latch are necessary since the brush set is selected directly and the drive rod remains stationary only in its normal position. A commutator 7 is provided for controlling selections as in other panel type switches, although the segments

would be arranged to cooperate with the appropriate control circuit. The brush rod is also adapted to close certain contacts (not shown) which form portions of the control circuit.

Magnets 8, 9, etc. are fixed to the drive rod and current is supplied thereto in any desired manner. Each magnet, such as magnet 8, is provided with a U-shaped pole-piece 10 which extends beyond the magnet winding and mounting. A magnet is provided for each panel making up the bank and a panel is selected by energizing the corresponding magnet.

The brush carriage consists of a frame 11 on which the remaining apparatus is mounted. The frame 11 slides on guide rod 12 and is held in place by the frictional engagement of shoes 13, 14, 15 and 16 with the rod 12. Shoes 14 and 16 are fixed to frame 11 at one side of rod 12, and shoes 13 and 15 are fixed to a spring projection 17 on frame 11 which brings these shoes into resilient engagement with the opposite side of the guide rod. The shoes 13 and 14 are pivotally connected at one side as are shoes 15 and 16. These shoes have a cylindrical inner surface thus providing a relatively large contacting surface. The arrangement of the brushes, together with the shape and arrangement of these shoes provide for the ready attachment of brush sets to rod 12 and the easy substitution of a fresh set for one which becomes defective. The shoes are held in place by pins, and may also be renewed readily.

In order to reduce the pressure of the shoes 13 to 16 on the rod 12 and to facilitate the movement and centering of the brushes 18, 19 and 20, rollers 42 are resiliently mounted on the frame 11. These rollers are pressed outwardly by their spring mounting and are of such size and so arranged as to tend to lie in the space between adjacent terminals when the brushes are properly centered. When the brush set is driven upward or downward, the rollers move with ease over the terminals, but as soon as the power is removed they hold the brush set in place.

The brushes 18, 19 and 20 are mounted vertically and are insulated from the frame 11 by blocks of insulation 21. Side by side with each brush and in electrical connection therewith are feed brushes 22, 23 and 24. The terminal lugs 25 of the panel bank are arranged in vertical rows, and along one side of each row is a conducting strip 26 insulated from the rows of terminals. These strips afford convenient means for connecting the control circuit with the brush set. The feed brushes are constantly in engagement with the feed strips, but in order to prevent interference with busy outgoing lines or injury to the brushes themselves, the

tip and ring brushes are lifted from their terminals during hunting. This is accomplished by the use of a pair of camming rolls 27 and 28. These rolls are carried by the same lever arm 30 as is the armature 29 and when this arm is raised by the upward pull of the drive magnet the camming rolls 27 and 28 lift the brushes 18 and 20 from their terminals, as shown in Fig. 6. When the switch is being restored the brushes 18 and 20 are permitted to ride down over the terminals. The sleeve brush 19 has a camming surface for both upward and downward motion since it must engage its terminals during hunting.

The armature 29 is mounted on the arm 30 of magnetic material. This arm is supported on frame 11 by a slidable hinge arrangement. Projection 31 normally rests on horizontal portion 32 of frame 11 forming a knife edge fulcrum for the arm 30 to swing on. The vertical strips 34 and 33 engage slots in portion 32 and permit vertical motion of the arm 30. Spring 35 connects a projection 36 on frame 11 with a projection 37 on arm 30, in such a way as to tend to hold the arm 30 in the position shown in Fig. 3. Extensions 39 on the arm 30 are bent at right angles to the arm forming a secondary armature. The arm 41 serves to control certain normal contacts (not shown).

Magnet 8 and the brush set normally occupy the relative positions shown in Fig. 1. When magnet 8 is energized, the armature 29 is drawn toward the magnet and under the polepiece 10 as shown in Figs. 4 and 5. When, now, the updrive magnet 5 is energized and magnet 8 is moved upward, the arm 30 is first moved upward to withdraw brushes 18 and 20 from their terminals and then the brush set is moved with the magnet. When the desired outgoing line has been found, the magnet 8 is de-energized. The spring 35 quickly withdraws the armature and the brush set is held in position by the engagement of the cams 42 with the terminal strips. The restoration of the armature permits brushes 18 to 20 to make contact with terminals and complete the connection. As set forth in the above identified Blauvelt patent, the brush rod continues to move upward until a top contact closed by the drive rod opens the circuit of the updrive magnet 5 and closes that of downdrive magnet 6. Magnet 8 being de-energized during the downward movement, the brush set is unaffected.

When the brush set is to be restored, the magnet is carried to the top of the panel and is there energized. As the energized magnet comes opposite the brush set, it exerts a force on the extensions 39 or secondary armature drawing the armature 29 forward and into position to be more readily engaged by the magnet. Since the polepieces of the

magnet exert a strong physical pressure on the armature 29 on the downward movement and might therefore prevent the retraction of the armature when the magnet 8 is de-energized or its complete attraction when the magnet is re-energized, a spring 40 is provided to give the drive rod a slight upward displacement at the end of its down stroke to free the armature and to permit its complete attraction when the magnet is subsequently energized.

What is claimed is:

1. In an automatic switch, a terminal bank, a movable brush set, a movable shaft and a magnet secured thereto, and means under the control of said magnet to move said brush set into position with respect to said terminal bank and to restore it to its normal position.

2. In an automatic switch, a terminal bank, a movable brush set, a movable driving shaft, an electro-magnet secured to said driving shaft, and means effective on the operation of said magnet for moving said brushes with the directive movement of said driving shaft comprising an armature for said magnet flexibly attached to said brush set.

3. In an automatic switch, a terminal bank, a movable brush set, a movable driving shaft, an electro-magnet secured to said driving shaft, means effective on the operation of said magnet for moving said brushes with the directive movement of said driving shaft comprising an armature for said magnet flexibly attached to said brush set, and means effective upon the release of said magnet to arrest the movement of said brush set.

4. In an automatic switch, a terminal bank, a movable brush set, a movable shaft and an electro-magnet secured thereto, means under the control of said magnet to move said brush set into position with respect to said terminal bank and to restore it to its normal position, and resiliently mounted means on said brush set to hold said brush set in position with respect to said terminal bank.

5. In an automatic switch, a terminal bank, a movable brush set, a movable driving shaft, an electro-magnet secured to said driving shaft, means effective on the operation of said magnet for moving said brushes with either directive movement of said driving shaft, comprising an armature for said magnet flexibly attached to said brush set, and resiliently mounted means on said brush set to hold said brush set in position with respect to said terminal bank.

6. In an automatic switch, a terminal bank, a movable brush set, a movable driving shaft, an electro-magnet secured to said driving

shaft, means effective on the operation of said magnet for moving said brushes with either directive movement of said driving shaft comprising an armature for said magnet flexibly attached to said brush set, and resiliently mounted means on said brush set effective upon the release of said magnet to hold said brush set in position with respect to said terminal bank.

7. In an automatic switch, a terminal bank, a movable brush set, a movable driving shaft, an electro-magnet secured to said driving shaft, means effective on the operation of said magnet for moving said brushes with either directive movement of said driving shaft comprising an armature for said magnet flexibly attached to said brush set, and resiliently mounted rollers on said brush set effective upon the release of said magnet to hold said brush set in position with respect to said terminal bank.

8. In an automatic switch, a terminal bank, a movable brush set, a movable driving shaft, an electro-magnet secured to said driving shaft, means effective on the operation of said magnet for moving said brushes with the directive movement of said driving shaft comprising an armature for said magnet flexibly attached to said brush set, and means for holding the talking circuit brushes away from their terminals as the brush set is moved upward.

9. In an automatic switch, a terminal bank, a movable brush set, a movable driving shaft, a magnet secured to said driving shaft, means effective on the operation of said magnet for moving said brushes with the movement of said driving shaft comprising an armature for said magnet flexibly attached to said brush set, and means operated by said armature for holding the talking circuit brushes away from their terminals as the brush set is moved upward.

10. In an automatic switch, a terminal bank, a movable brush set, a movable driving shaft, an electro-magnet secured to said driving shaft, means effective on the operation of said magnet for moving said brushes with either directive movement of said driving shaft comprising an armature for said magnet flexibly attached to said brush set, and cams controlled by said armature for holding the talking circuit brushes away from their terminals as the brush set is moved upward.

In witness whereof, I hereunto subscribe my name this 29th day of April, A. D., 1926.

HAROLD W. GOFF.