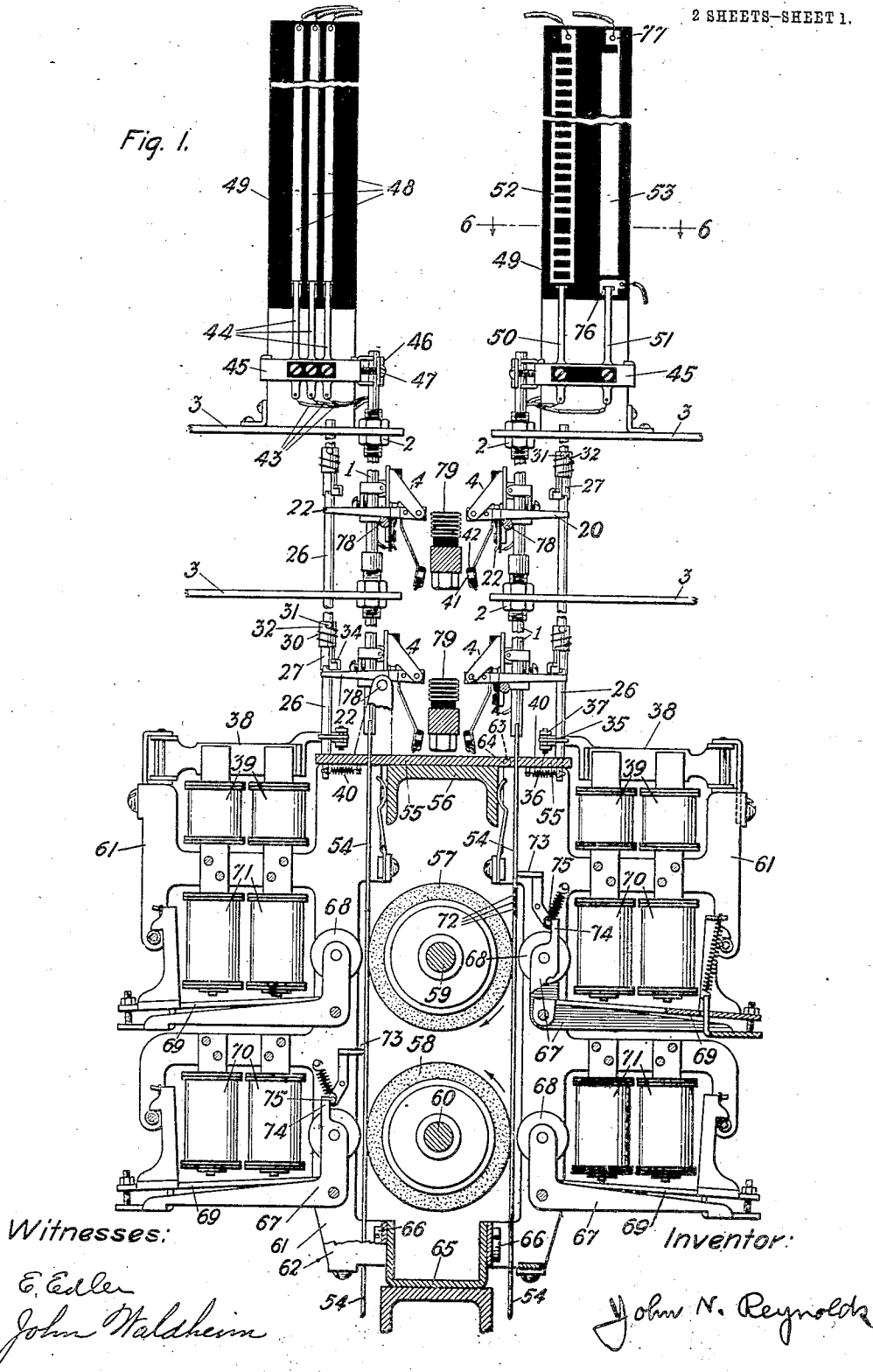


J. N. REYNOLDS.
 MULTIPLE BRUSH SELECTOR.
 APPLICATION FILED JULY 30, 1913.

1,122,642.

Patented Dec. 29, 1914.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 2.

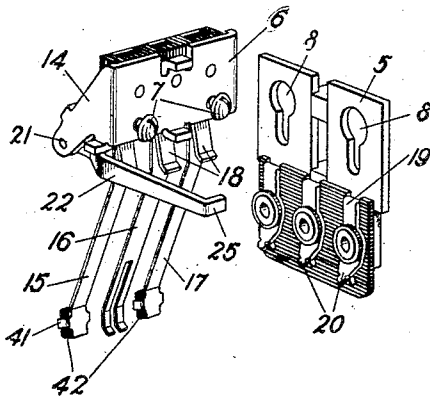


Fig. 3.

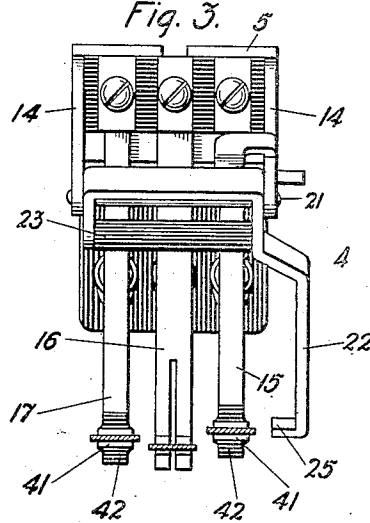


Fig. 4.

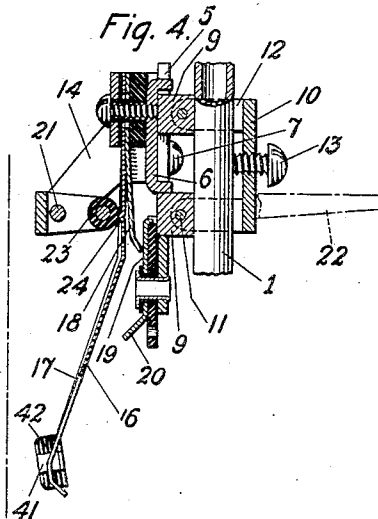


Fig. 5.

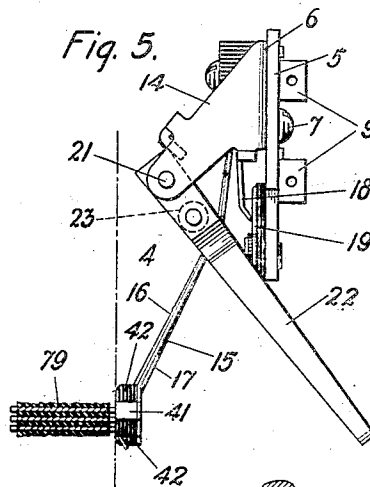


Fig. 6.

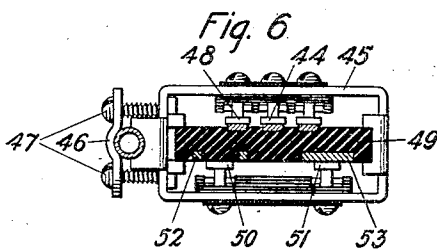


Fig. 8.

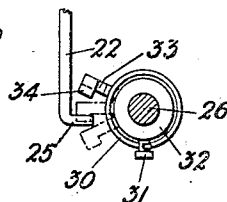
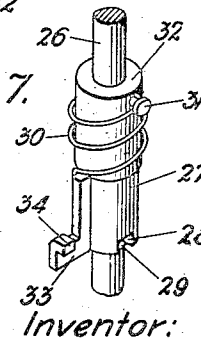


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MULTIPLE-BRUSH SELECTOR.

1,122,642.

Specification of Letters Patent.

Patented Dec. 29, 1914.

Application filed July 30, 1913. Serial No. 782,149.

To all whom it may concern:

Be it known that I, JOHN N. REYNOLDS, a citizen of the United States, residing at Greenwich, in the county of Fairfield and State of Connecticut, have invented a certain new and useful Improvement in Multiple-Brush Selectors, of which the following is a full, clear, concise, and exact description.

This invention relates to switching devices for use in automatic and semi-automatic telephone systems and is adapted for use either as a selector or as a connector.

One of the features of this invention resides in the improved arrangement of the driving means whereby a more compact and economical structure is provided.

Another feature resides in the improved construction of the panel bank and the brushes and of the brush controlling means.

Another feature resides in the improved manner of mounting the brushes on the shaft.

By means of this invention the unnecessary duplication of power drum is avoided, a single set of said drums being made to operate two groups of brush carriages. Also means are provided whereby a brush set may be readily changed without interfering with the soldered terminal connections. In the terminal bank of the structure herein disclosed, the terminal contacts are arranged with projecting edges, substantially parallel to the face of the bank, over which the brushes are arranged to wipe in the movement of the carriage, and a cam-like brush controlling lever is provided, whereby all the brushes of a set are moved laterally from the face of the bank when the brushes are in retracted or inoperative position.

Referring now to the drawings—Figure 1 is a side elevation of a pair of switch carriages and the driving means therefor, with parts broken away; Fig. 2 is a detailed perspective view of portions of a brush carrier; Fig. 3 is a front elevation of a brush carrier with the brushes in released or operative position; Fig. 4 is a side view of the same in section with the brushes in retracted position; Fig. 5 is a side view of the structure shown in Fig. 3; Fig. 6 is a section on the line 6—6 of Fig. 1; Fig. 7 is a per-

spective view of the portion of a trip rod showing the manner of mounting the trip finger thereon; Fig. 8 is a plan view of the device illustrated in Fig. 7 showing the relation of the trip finger to the brush controlling lever.

The switch here disclosed is adapted to serve five hundred lines, the terminals of which are divided into sections of one hundred each and are duplicated on opposite sides of the panel board so as to be accessible to the brushes of the carriages on either side thereof, as shown in Fig. 1. It is obvious, however, that the capacity of this switch may be increased or decreased at will. In order to avoid needless duplication of the parts of the apparatus and to more clearly illustrate the parts of the apparatus herein claimed, only two switching devices with two sets of brushes each and a portion of corresponding sections of the terminal bank are shown on the drawing. It is to be understood, however, that the stationary terminals are arranged in sets of three each and that in the approved embodiment of the device there will be one hundred of such sets in a section, and five sections to a row. These rows of terminals will be multiplied horizontally across the panel to be accessible to as many individual switching mechanisms as are necessary to handle the greatest number of simultaneous calls.

Each switching device comprises a brush shaft 1 slidably mounted in the guide members 2 secured in the frame members 3. Upon each shaft is secured a number of brush carriers 4, one for each section of the terminal bank 79. Each of these brush carriers consists of a plate 5 to which is secured a yoke shaped member 6 by means of the screws 7 inserted through the keyhole slots 8. On the opposite face of the plate 5 is a pair of perforated lugs 9 to which is secured the member 10 by means of the pins 11. The member 10 has an opening 12 through which the shaft 1 is inserted, said member being secured to the shaft by means of the set screw 13. Insulatively secured to the member 6, between the arms 14 thereof, is a plurality of flexible brush arms 15, 16 and 17 and a corresponding plurality of contact plates 18. These plates 18 are in electrical engagement with the respective

brush arms and at the lower ends thereof are bent to contact with the strips 19, insulatively secured to the plate 5 and terminating at the lower ends thereof in the soldering clips 20. By means of this structure, the brush set may be readily removed from the shaft without touching the soldered connections. Pivotaly secured between the outer ends of the arms 14 by means of a pin 21, is a U-shaped device formed integrally with the brush controlling or trip lever 22. Secured between the sides of the U-shaped member, adjacent to the spring arms 15, 16 and 17, is an insulating roller 23 so arranged that when the lever 22 occupies a substantially horizontal position, as shown in Fig. 4, it will engage said brush arms and force them away from the face of the terminal bank. In the brush arm 16 is formed a slight projection 24 over which the roller 23 rides and which assists in retaining said roller in operative position. The lever 22 is provided at the outer end thereof with a right angular extension or lug 25 for a purpose which will be hereinafter described.

Rotatably secured in the frame members 3, parallel to the shaft 1, is a brush selecting or trip rod 26. Secured to this rod is a plurality of sleeves 27, one for each set of brushes. A notch 28 is formed in the lower edge of each of these sleeves to receive a pin 29 on the rod, whereby the rotation of the sleeve on the rod is limited. This pin also serves to prevent downward movement of the sleeve on the rod. Springs 30 are provided, each having one end secured to a pin 31 on a collar 32 fixed to the rod immediately above the sleeve 27, and the other end to its respective sleeve, as shown in Fig. 7, in such a manner as to normally tend to rotate the sleeves in an anti-clockwise direction as viewed from above. Extending outwardly from the sleeve 27 is a trip finger 33 having a right-angular projection 34 at the upper and outer edge thereof. These fingers are positioned in alinement with the ends slightly back of the line of travel of the projections 25 of the trip levers, as shown in solid lines in Fig. 8, and are arranged at progressively increasing distances above the normal positions of the projections 25 on their respective trip levers 22. It will thus be seen that if the shaft is moved upwardly until the projection 25 of the trip lever of any desired brush set occupies a position opposite its respective trip finger 33, and the rod 26 is then rotated, the trip finger individual to the selected set will engage the projection 25 and the right-angular projection 34 will pass above said lug, and remains in the line of travel thereof, the rod rotating in the sleeve 27. The other trip fingers will not engage their respective levers at this time, being posi-

tioned either above or below the same respectively, and will pass through the line of travel of said projections 25 to the other side thereof as shown in dotted lines in Fig. 8. Upon the continued upward movement of the brush shaft, the brush controlling lever will be rotated and the brushes will be forced to their operative position by their resilient supporting arms, and the trip rod passing from contact with the trip finger through clockwise rotation of the sleeve 27, will allow the trip finger to be rotated by its spring to a position in alinement with the other trip fingers. As soon as the brush shaft has passed beyond this brush selecting stage, the rod 26 may be allowed to return to its normal position.

Secured to the rod 26, near the lower end thereof, is a projection 35 to which is loosely secured, by means of a pin 36, an angular projection 37 on the end of the armature lever 38 of the electromagnet 39. Thus, it will be seen that upon the energization of the electromagnet 39, the rod 26 will be caused to turn a fraction of a revolution. For the purpose of returning the rod to its normal position, the spring 40 is provided.

By considering the relation of the trip fingers to their respective trip levers at the moment the rod 26 is rotated, it may be seen that due to the arrangement of the fingers at successively increasing distances above the normal position of their respective levers, only the finger provided for releasing the desired brush set will engage its cooperating projection 25 and that the other trip fingers immediately pass to the other side of the line of travel of their respective levers.

The brush arms 15 and 17 are each provided near the lower end thereof with a band 41 of conducting material adapted to receive and retain an insulating shoe or rider 42, as shown most clearly in Figs. 2 and 4. The arm 16, however, is bifurcated and turned outwardly at its lower end.

The brush shaft 1 is hollow and has the circuit wires 43 therein. Branches from each of these wires are extended to the soldering terminals 20 of the corresponding brushes of the several sets, thus connecting the corresponding brushes of the several sets on the shaft in multiple. Another branch from each of these conductors is secured to one of the wipers 44 insulatively secured to the rectangular member 45. The frame 45 may be secured to the shaft 1 in any desired manner, the means shown being a clamping plate 46 and screws 47. The wipers 44 are arranged to slidably engage one of the conducting plates 48 respectively, mounted in the block of insulation 49, thus providing means whereby the circuit may be readily extended to the brushes and the correspond-

ing brushes connected in multiple. Insulatively secured to the other side of the member 45 is a pair of wipers 50 and 51, adapted in the movement of the carriage to traverse the contacting segments of the interrupters 52 and 53 for a purpose to be hereinafter described.

Secured to the lower end of each brush shaft 1 is an elevating bar 54 which passes loosely through the plate 55 secured to a frame member 56. Located between the elevating bars of the groups of switches on opposite sides of the terminal bank is a pair of power drums 57 and 58 fixed to the shafts 59 and 60. These shafts may be constantly rotated or may be driven only when necessity requires, but at any event, they are so arranged that they will rotate in opposite directions. These power drums are common to the switches on both sides of the panel bank, the drum which elevates the brush shafts on one side of the bank being used to restore the shafts on the other side of the bank to normal and vice versa.

Secured adjacent to each of the bars 54 on the side opposite to the power drums 57 and 58, is a clutch pulley and an operating magnet therefor individual to each drum. These mechanisms are supported between the pair of plates 61 and 62, secured in position by means of the lugs 63 at the upper end thereof entering the depressions 64 in the plate 55 and by being secured at the lower end to the fixed frame member 65 by means of a screw 66. Pivoted between the plates 61 and 62 is a pair of bell crank levers 67, each carrying at one end thereof and opposite the axis of its respective drive drum, a clutch pulley 68. The other arm of each of these bell cranks carries an armature 69 of the clutch magnets 70 and 71 respectively. The magnets 70 and 71 as well as the magnet 39 are secured in position by having their pole pieces clamped between the plates 61 and 62.

The bars 54 are formed with perforations 72 adapted to be engaged by the spring pressed pawl 73, whereby the brush shaft may be retained in elevated position. Projecting from the vertical arm of one of the bell cranks 67 is a finger 74 which, upon energization of the electromagnet 70, will be caused to engage the pin 75 carried by the lower end of the pawl, whereby said pawl will be retracted.

From an inspection of the drawings, it will now be seen that upon the energization of the magnet 71, the elevating bar 54 will be clamped between the power drum 58 and the clutch pulley 68, and will be driven upwardly and will be retained in its elevated position by the pawl 73 engaging the notches or openings 72 in the elevating bar. Upon energization of the magnet 70, however, the pawl 73 will be retracted and the bar will

be clamped between the oppositely rotating power drum 57 and its respective clutch pulley 68, and the shaft will be driven downwardly.

In practice, the operation of the device will preferably be as follows: Assuming that the switching device shown at the right in Fig. 1 is to be operated, the up-drive clutch magnet 71 will be energized to cause the elevation of the shaft during brush selection, the amount of travel prior to the actuation of the tripping means being measured by the lower portion of the interrupter 52 in a manner which is well understood in the art. After the required number of impulses has been sent, the rod 26 will be rotated to release the desired set of brushes and the released set of brushes will be caused to traverse the stationary terminals in its respective section of the terminal bank, the amount of travel being measured by the upper portion of the interrupter 52 in a well known manner. When the desired terminals are reached, the upward travel of the shaft will be arrested by the deenergization of the clutch magnet, the shaft being held in its elevated position by the pawl 73. When release is desired, the down drive clutch magnet 70 will be energized, thus retracting the pawl and causing the shaft to be carried downwardly by the drum 57. Upon the approach to normal of the brush shaft, the brush 51 will engage the contact 76, thus completing a circuit for a sequence switch or other device, whereby the circuit for the down drive clutch magnet may be interrupted. A contact 77 is provided whereby the power may be similarly cut off at the other extreme of the travel of the brush shaft. The application of current to the clutch magnets may be controlled through the medium of sequence switches, relays or in any desired manner. When the brush shaft returns to its home position, the actuated brush set is returned to normal or inoperative position by the engagement of the lever 22 with the stop 78. This causes the insulating roller 23, carried by the arm 22, to engage the brush arms and force the brushes to their retracted position, as shown in Fig. 4.

It is obvious that the mechanism above described would operate equally well in any position and that changes may be made therein without departing from the spirit of the invention. It is therefore to be understood that the invention is not to be restricted to the specific arrangement shown herein and described, which is merely illustrative, but is to be limited merely by the scope of the annexed claims.

What I claim is:

1. In a telephone exchange, a pair of rotatable power drums, brush carriages on opposite sides of said drums, and means for

causing said carriages to engage either of said drums whereby they may be driven in one direction or the other.

2. In a telephone exchange, a pair of rotatable power drums, longitudinally movable brush shafts on opposite sides of said drums, and means for forcing said shafts into engagement with either of said drums, whereby said shafts may be driven in one direction or the other.

3. In a telephone exchange, a pair of brush carriages, a pair of rotatable drums therebetween, and means for causing engagement of either of said carriages with said drums to drive them in one direction or the other.

4. In a telephone exchange, a pair of longitudinally movable brush shafts, a pair of oppositely rotatable power drums therebetween, and means for forcing either of said shafts into engagement with either of said drums, whereby they may be driven in one direction or the other.

5. In a telephone exchange, two groups of brush carriages, a pair of rotatable drums located between said groups of carriages, and means for operatively associating any of said carriages with either of said drums, whereby they may be selectively driven in one direction or the other.

6. In a telephone exchange, two groups of brushes, longitudinally movable supporting shafts for said brushes, the shafts of each group being located in substantially the same plane, a pair of oppositely rotatable power members between said groups of shafts, and means for causing operative engagement of any of said shafts with either of said power members.

7. In a switch, a brush support, a plate secured thereto, a second plate, a set of brushes carried thereby, means secured to said second named plate and a slot in said

first named plate receiving said means, whereby said set of brushes may be removed from said support as a unit.

8. In a switch, a brush support, a plate secured thereto, terminal soldering clips carried by said plate, a second plate, a set of brushes carried thereby, means electrically connecting said brushes to said clips respectively, and means securing said plates together whereby said set of brushes may be removed from said support as a unit.

9. In a switch, a brush support, a plate secured thereto, terminal soldering clips carried by said support, a U-shaped member, a set of brushes and a controlling lever carried thereby, contact springs electrically connecting said brushes to said clips respectively, means secured to said U-shaped member and a slot in said plate receiving said means, whereby said set of brushes may be removed from said support as a unit.

10. In a switch, a shaft, a support secured thereto, terminal soldering clips carried by said support, a set of brushes secured to said support, and electrically connected to said clips respectively, and means whereby said set of brushes may be attached to or removed from said support as a unit.

11. In a switch, a shaft, a support secured thereto, terminal soldering clips carried by said support, a set of brushes secured to said support, contact springs electrically uniting said brushes and said terminal clips respectively, and means whereby said set of brushes may be attached to or removed from said support as a unit.

In witness whereof, I hereunto subscribe my name this 28th day of July A. D., 1913.

JOHN N. REYNOLDS.

Witnesses:

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MURRAY V. CONATY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."