

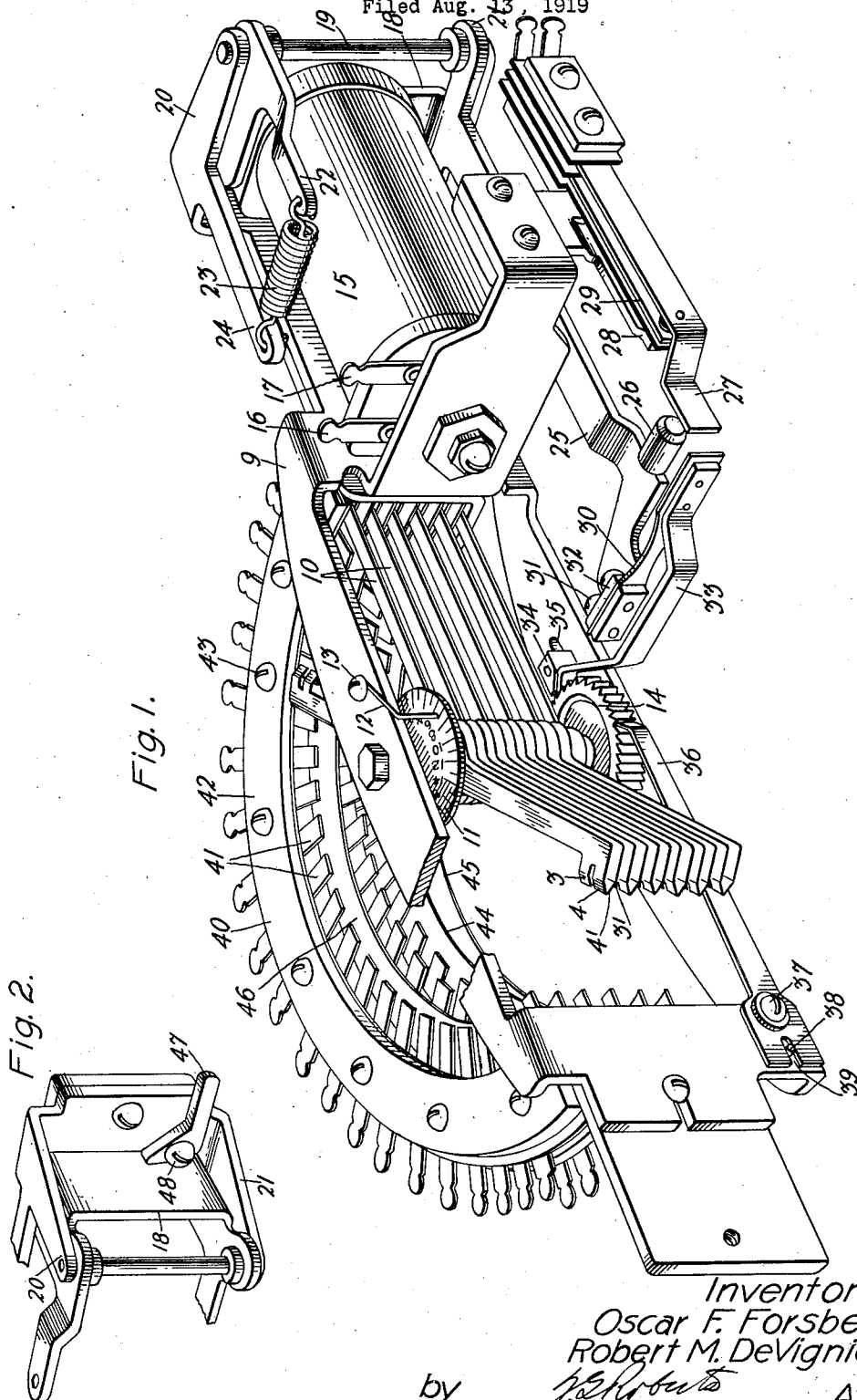
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O. F. FORSBERG ET AL

AUTOMATIC SWITCH

Filed Aug. 13, 1919



UNITED STATES PATENT OFFICE.

OSCAR F. FORSBERG, OF YONKERS, AND ROBERT M. DE VIGNIER, OF HOLLIS, NEW YORK, ASSIGNORS TO WESTERN ELECTRIC COMPANY INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

AUTOMATIC SWITCH.

Application filed August 13, 1919. Serial No. 317,126.

To all whom it may concern:

Be it known that we, OSCAR F. FORSBERG and ROBERT M. DE VIGNIER, citizens of the United States, residing at Yonkers, in the county of Westchester and State of New York, and at Hollis, in the county of Queens and State of New York, respectively, have invented certain new and useful Improvements in Automatic Switches, of which the following is a full, clear, concise, and exact description.

This invention relates to improvements in automatic switching devices and more particularly to improvements in the mechanical structure of an automatic switch suitable for use in telephone exchange systems.

It has been found that step-by-step switches of small capacity are adapted to a variety of uses in automatic telephone exchange systems, wherein they may be used as line switches, as controlling, auxiliary, or side switches, as registers, or as cord or trunk finders. These and other uses are well understood by those skilled in the art.

It is the object of this invention to provide a switch which shall be low of cost and simple in construction and at the same time rapid and efficient in operation.

A feature of the invention is the utilization of a contact bank which is in the form of a half cylinder and which is served by two brush sets 180° apart. This allows ample space between contacts and also provides the advantages of a cylindrical bank with none of the difficulties of mounting which are present in a contact bank which form a complete cylinder.

An additional feature of the invention is the mounting of the stepping pawl, which has a simple, compact structure capable of a high speed of operation and without small pivots which would normally tend to loosen and rattle in a high speed switch.

Further features of the invention will be found in structural details which allow of ease of assembly, and adjusting devices by means of which the switch can be kept in a high state of efficiency.

It is thought that the invention will best be understood from the following detailed description, reference being had to the accompanying drawings.

In the drawings, Fig. 1 shows a perspective view of the switch; Fig. 2 is a perspec-

tive view showing an adjustable stop which limits the movement of the armature proper of the stepping magnet.

Two brush sets are provided and are arranged 180° apart. The contact bank extends through an arc of 180°, with the result that when one brush set steps off the last contact set in the bank, the other set of brushes will engage the first contact set in the bank.

Each brush is composed of two wiping members, as 3 and 3', and a multiple brush, which is 180° beyond it in revolution, is integrally made up from the members of 3 and 3' so that two multiple brushes are made up from one pair of punchings. The edges 4 and 4' are suitably offset so as to wipe over the contacts in the bank and to be forced apart when in engagement with a contact, so that the portion 4 will be above the contact and in engagement therewith and the contact 4' will be underneath the contact and in engagement therewith. Any desired number of brushes may be provided. In the embodiment shown in Fig. 1, six brush sets are shown with a corresponding set of six brush sets in multiple with them.

The various sets of brushes are mounted on a rotatable shaft and suitably insulated from one another. Current is led into the brushes by means of conducting strips, such as 10, which are mounted in the bank in the same manner as the contact sets. The inner portions of the conducting strips 10 are arranged to bear constantly on circular portions of the punchings 3, so that as the brushes rotate the members 10 will be constantly in engagement with them. On the same shaft with the brushes 3, and in fixed relation thereto is a circular indicating plate 11 which cooperates with an adjustable pointer 12 secured to the frame 9 and adjustable by means of screw 13 to indicate with which particular contact set the brushes are in engagement. This indicator may be used to inform an attendant in what position the switch is resting in case of trouble. Secured to the lower portion of the shaft is a ratchet wheel 14. The shaft, with the indicator 11, the various brush sets, and the ratchet wheel 14 is suitably mounted for rotation.

A magnet 15 is provided to impart motion to the switch. Connection terminals 16 and 17 are provided for introducing the con-

ductors to the magnet. An armature 18 is secured to a rotatably mounted shaft 19 which is mounted in bent over portions 20 and 21 of the main frame punching 9. The
 5 punching from which the armature is made is bent into a U shape with one of the branches of the U longer than the other. The shorter branch 22 of the U, is connected by means of a spring 23 to an arm 24 which
 10 is part of the main frame punching. The longer arm 25 of the U, is brought forward a sufficient distance to carry the stepping pawl. An insulated lug 26 is arranged to co-operate with a spring member 27, to op-
 15 erate the contact set included by the members 28 and 29. This contact may be utilized to make the stepping magnet self-interrupting. Also secured to arm 25 is a resilient connecting portion, or reed 30 which is
 20 fixedly secured to the arm 25 by means of screws 31 and 32. To the free end of the reed 30 is securely fastened a stepping pawl 33 which may be riveted to the reed or rigidly secured thereto in any desired manner.
 25 The pawl 33 is made to co-operate with the ratchet wheel 14 by means of an adjustable block 34 which throws the end of the pawl into engagement with the teeth of the ratchet wheel 14. The block 34 is made adjustable
 30 in slot 35 of the frame to insure proper registration between the pawl and the teeth of the ratchet.

A resilient holding pawl 36 is provided to hold the brushes in their proper position and
 35 to prevent backward movement of the ratchet wheel. The holding pawl 36 may be adjusted longitudinally by means of a screw 37 which secures it to frame 9 through a slot in the pawl 36. A pin 38, secured to
 40 the frame and movable in the slot 39 of the pawl, allows longitudinal adjustment of the pawl and at the same time prevents lateral movement thereof.

The contact bank indicated at 40 is made
 45 up from a number of rows of terminals 41 arranged in an arc and clamped together by means of the arc-shaped binding members 42 and screws 43. The lower binding arc cor-
 50 responding to 42 is not shown, but since this type of construction is well-known, it is thought that it will be readily understood without further description.

The contacts 41 are suitably insulated from one another in any desired manner.
 55 Similarly, the various rows of contacts are suitably insulated from one another in the make-up of the contact bank.

At 44, 45 and 46, are shown solid strips of an arc shape and so mounted as to be en-
 60 gaged by corresponding brushes. It is obvious that these would operate as off-normal contacts of the switch since the brush would remain in engagement with a contact strip of this nature throughout the entire move-
 65 ment of the switch. It has been found that

it is as cheap to supply any necessary off-normal contacts in this manner since the small mechanisms incident to the provision of the usual type of off-normal contact are thus eliminated.

Referring now to Fig. 2, an adjusting member 47 is shown, to limit the movement of armature 18. In accordance with the setting of this stop, the movement of the armature may be made to correspond to a
 70 stop advance of the ratchet wheel. After it has been properly set, it may be locked in adjusted position by tightening screw 48.

Briefly, the operation of the switch is as follows. When the armature 18 is attracted,
 80 the arm 25 is moved back to register with another tooth of the ratchet wheel 14. The resiliency of reed 30 allows sufficient lateral movement of pawl 33 to enable it to ride over the tooth; at the same time spring 23
 85 is tensioned. When magnet 15 is deenergized the tension in spring 23 restores the armature 18 to its normal position and throws pawl 33 forward and advances the ratchet wheel one step. During this for-
 90 ward stroke the reed 30 and the pawl 33 are moving in parallel relation. There is no tendency for the reed 30 to bend and ample power may be transmitted through it.

The advantage of this type of mounting
 95 for a pawl is obvious. If a pivoted pawl is provided the wear on the pivot is sure to cause looseness and rattling which cannot be eliminated by adjusting. If a reed pawl
 100 is provided, that is a pawl in which the reed itself operates as a stepping pawl, it is difficult to provide the proper weight and material and still have the pawl sufficiently resilient. If sufficient resiliency is obtained, it
 105 is very likely that the pawl will not be strong enough to function properly. In the present invention there can be no wear which would cause looseness or rattling except perhaps in the point of the pawl itself and if this occurred it could readily be eliminated by ad-
 110 justing the stop 34.

What is claimed is:

1. In an automatic switch for use in tele-
 115 phone exchange systems, power means comprising a ratchet wheel, a pawl in operative relation thereto, a stepping magnet, an armature for said stepping magnet, and a resilient driving member, having one end rigidly secured to said armature, and the other end rigidly secured to said pawl.
2. In an automatic switch for use in tele-
 120 phone exchange systems, a frame for said switch, ratchet and pawl mechanism for controlling the movement of said switch, a stepping magnet, an armature for said magnet,
 125 controlling arms integral with said armature, a resilient driving member between one of said arms and said stepping pawl, said connecting member being rigidly connected at one end to the last named arm and at the
 130

other end to said stepping pawl, a spring connection between the other controlling arm and said frame, means to actuate said stepping pawl in response to operation of
5 said magnet, and means to advance said ratchet wheel upon deenergization of said magnet due to the retractile power of said spring connection.

3. In an automatic switch for use in tele-
10 phone exchange systems, a ratchet and pawl mechanism for causing movement of said switch, a stepping magnet, an armature therefor, a resilient driving member having one end rigidly secured to said armature and
15 the other end rigidly secured to said step-

ping pawl, and means to adjust the extent of movement of said pawl.

4. In a progressively operable mechanism, power means comprising a ratchet wheel, a
pawl in operative relation thereto, a step- 20 ping magnet, an armature for said stepping magnet, a resilient connecting member having one end secured to said armature and the other end secured to said pawl, and means for applying power to said pawl by
25 applying tension to said connecting member.

In witness whereof, we hereunto subscribe our names this 31st day of July A. D., 1919.

OSCAR F. FORSBERG.

ROBERT M. DE VIGNIER.