F. R. McBERTY.

AUTOMATIC SWITCH.

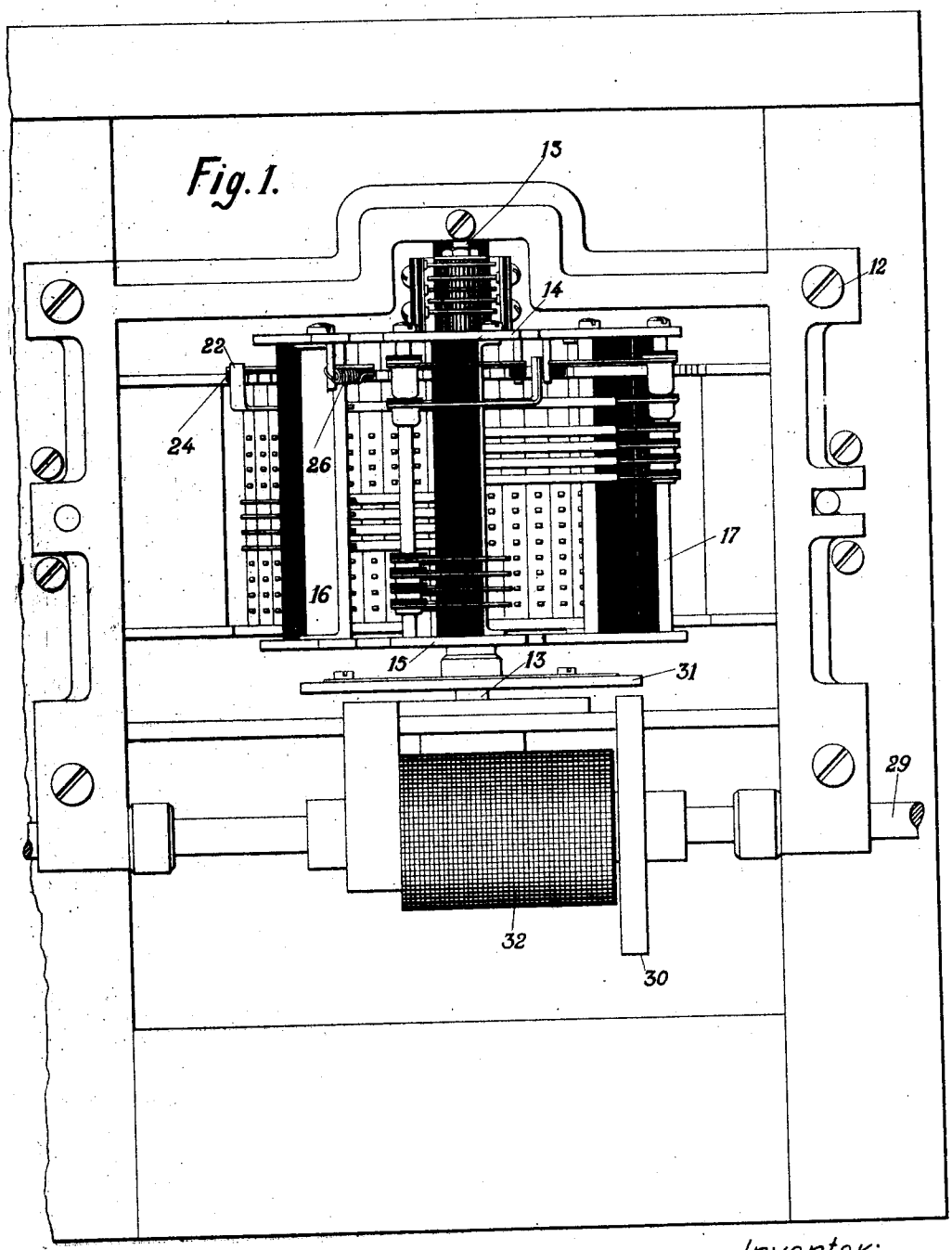
APPLICATION FILED DEC. 26, 1912.

1,085,454.

Patented Jan. 27, 1914.

3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

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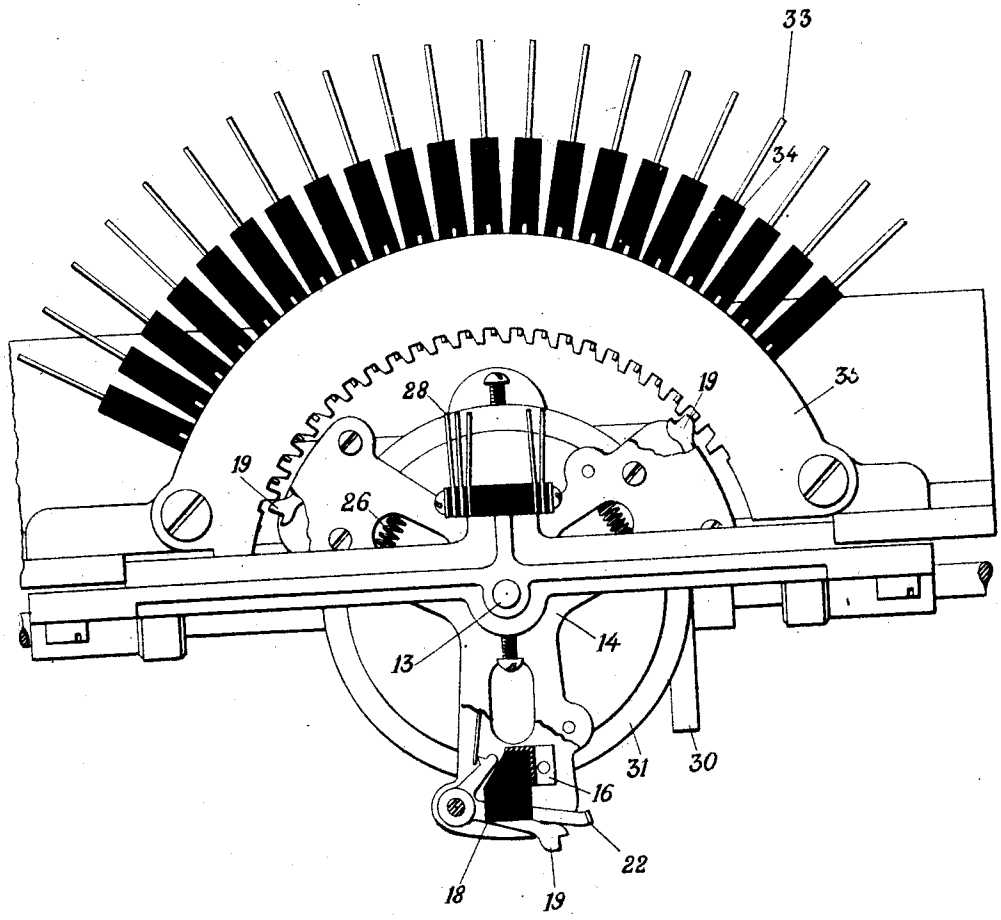
Fig. 2.



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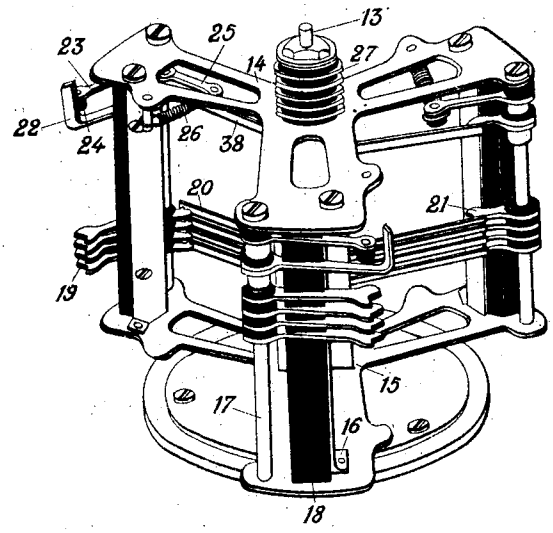

Fig. 3.

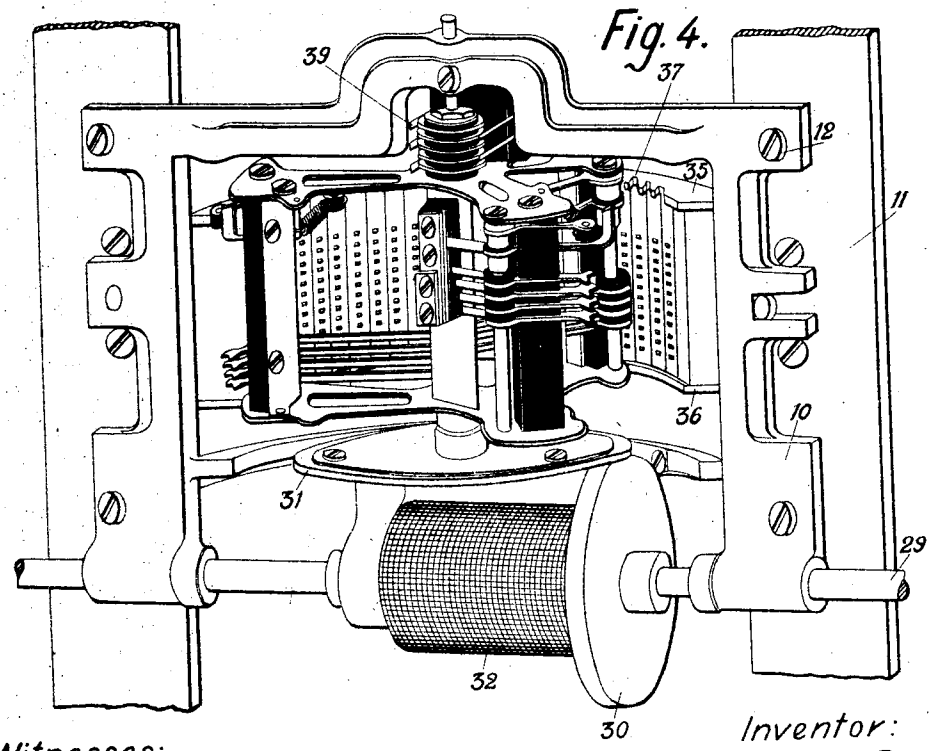

Fig. 4.

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UNITED STATES PATENT OFFICE.

FRANK ROBERT McBERTY, OF ANTWERP, BELGIUM, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF ILLINOIS.

AUTOMATIC SWITCH.

1,085,454. Specification of Letters Patent. Patented Jan. 27, 1914.

Application filed December 26, 1912. Serial No. 738,660.

To all whom it may concern:

Be it known that I, FRANK ROBERT McBERTY, a citizen of the United States, residing at Antwerp, in the Province of Antwerp and Kingdom of Belgium, have invented certain new and useful Improvements in Automatic Switches, of which the following is a specification.

This invention relates to a switch or selecting device capable of making connection with a comparatively large number of contacts during one revolution of its shaft without it being necessary to distribute the contacts over a large area or displacing the axial direction of the shaft. This is attained in the invention by so arranging a plurality of contact arms or brushes or a plurality of sets of contact arms or brushes on the shaft that each contact arm or set of contact arms is displaced with respect to the other contact arms or sets of contact arms radially and axially and by providing a row of contacts to coöperate with each contact arm. The contact bank consists of several rows of superimposed contacts, the angular displacement of the contact arms being such that when one contact arm leaves a row of contacts another contact arm comes into operation with a different row of contacts. An advantage of a switch of this kind compared to the well-known form of Strowger selector consists in there being no need of a magnet for lifting the contact arms into the range of the various rows of contacts. As compared to the known selectors with circular contact banks the new arrangement has other advantages consisting in the contacts of the contact banks being more accessible and easier to inspect. An additional advantage is that the contact banks of selectors with contact banks having the form of an arc instead of a cylindrical form are more easily wired.

Referring to the drawings, Figure 1 is a front elevation of the switch, Fig. 2 shows the switch viewed from the top, certain parts being broken away; Fig. 3 is a perspective view of the brush carriage removed from its bearings in the switch; and Fig. 4 is a perspective view of the entire switch structure.

The frame 10 of the selector is shown fixed to a rack 11 by screws 12. In the upper and lower parts of the selector frame there are two bearings in which a shaft 13, which supports a brush carriage having two three armed carriers 14, 15, is journaled. The outer ends of each pair of carriers 14, 15, are linked together by an angular bar 16 and by a rod 17, upon which latter the brushes 19 are pivoted. Fixed to each angular bar 16 is a lath 18 of insulating material. Each lath 18 has a number of deep furrows in which the brushes 19 are adapted to lie and which act as guides for the same. Insulatively fixed to the shaft 13 are a number of springs 20 the free ends of which press against the inner levers 21 of the brushes 19 so that these brushes have a tendency to remain pressed outwardly. In addition to the brushes 19 there is pivoted on each rod 17 near the upper end thereof, a contact arm 22 and a lever 23 carrying an insulated roller 24 attached to the free outer end thereof. The end of the lever 23 carrying the roller 24 has a tendency to move outward because of the pull exerted on its other end 25 by a spiral spring 26, and the contact arm 22 also is pressed outwardly by a spring 38. Slip rings 27, embedded in insulating material are secured to the upper end of the shaft 13. Contacting with each slip ring is a brush 39 the free end of which is so shaped as to form a soldering lug 28. Four of the slip rings 27 are connected with the sets of springs 20, which are connected in multiple, and one to the spring 38 of the arm 22. The soldering lugs 28 therefore form leads to the springs 20 and to the brushes 19 as well as to the contact arm 22.

All the parts hereinbefore described, with the exception of the soldering lugs 28 and the brushes of which they form parts, rotate with the shaft 13 and the brush carriage. The brush carriage is rotated by a constantly revolving shaft 29 by means of two disks 30 and 31. On the energization of the power magnet 32 the disk 30 is magnetized and attracts the iron disk 31, which is attached to the shaft 13 by a flexible diaphragm. A magnetic coupling is thus brought about between the disks 30 and 31, and the revolving

disk 30 causes the disk 31 and the switch shaft 13 with its brush carriage to rotate.

The fixed contacts 33 of the selector are embedded in insulating strips 34, fixed between two arc-shaped plates 35, 36. These fixed contacts 33 extend through the strips 34 and are adapted to be engaged at their inner ends by the brushes 19. Each strip may have twelve contacts 33 grouped in three sets of four contacts each. The sets of contacts of all the strips 34 form three rows of sets of contacts. Each of these rows of sets of contacts therefore consists of four single contact rows. The sets of brushes 19 of the three rods 17 are displaced with respect to each other in the direction of the axis of the shaft 13 and each individual set of brushes is so located that during its rotary travel it brushes over a row of sets of contacts different from the rows of sets of contacts that lie in the paths of the other two sets of brushes.

The radial displacement of the sets of brushes 19 with respect to each other is such that when one set of brushes leaves the last set of bank contacts at the right hand end of the contact bank, one of the other sets of brushes will come into engagement with another set of bank contacts at the left hand end of the contact bank in a different row of sets of contacts.

In order to prevent the stopping of the carriage of the selector—on the deënergization of the power magnet 32—until a set of brushes 19 has reached the set of contacts 33 desired, a device is provided for each set of brushes consisting of the teeth 37 of the arc shaped plate 35, the rubbing contact 22 and the lever 23 with its roller 24. As long as a set of brushes is traveling from one set of contacts 33 to the next, the rubbing contact 22 rides upon a tooth 37 and closes a circuit which will not allow the power magnet 32 to be deënergized until the rubbing contact has reached the right hand end of the tooth 37 in question. While the brushes 19 are traversing the distance from one set of contacts 33 to the next the roller on the lever 23 belonging to the rubbing contact 22 that is in action will be rolling over a tooth 37. As hereinbefore mentioned this roller is forced outward by a spiral spring 26; it will therefore jump into every gap between the teeth.

The rubbing contact 22 and the roller lever 23 pertaining thereto are so arranged that as soon as the contact between the rubbing contact 22 and the particular tooth 37 of the arc shaped part 35 ceases, the roller 24 of the roller lever 23 is driven by the spiral spring 26 into a space between two teeth 37, this forcing the brush carriage to assume a position in which the set of brushes in question, that is, the set of brushes that is pivoted on the same rod 17 as the rubbing contact 22 that was in action, is accurately centered on a set of contacts 33. Instead of connecting all the sets of brushes 19 in parallel a separate set of slip rings 27 may be provided for each set of brushes.

I claim:

1. In a selector, the combination with a plurality of rows of fixed terminals, of a shaft, a frame supported thereby, a plurality of rods carried by said frame and extending parallel to said shaft, contact arms pivotally supported on said rods, the said contact arms being so arranged with respect to each other and the rows of fixed terminals, that in any given position of the shaft one only of said contact arms engages its terminal row.

2. In a selector, the combination with a plurality of rows of fixed terminals, of a shaft, a frame piece at each end of said shaft, each said frame piece having a plurality of radially extending arms, rods extending between the ends of said arms and lying parallel with said shaft, contact arms pivotally mounted on said rods, said arms being displaced with respect to each other angularly and in the direction of the shaft whereby in any given position of the shaft only one of said contact arms engages its terminal row.

3. In a selector, the combination with a plurality of rows of fixed terminals, of a carriage, means for imparting uniform and continuous motion thereto, contact arms for said rows respectively, pivotally mounted on said carriage and displaced with respect to each other angularly and in the direction of the shaft.

4. In a selector, a rotary carriage, a plurality of contact arms pivotally mounted thereon, and a corresponding plurality of groups of terminals arranged to be successively traversed by said contact arms, respectively, in the movement of said carriage.

5. In a selector, a brush carriage, a plurality of contact arms pivotally mounted thereon, each of said contact arms being fixed in angular displacement to the others, and groups of fixed terminals, respectively, individual to such contact arms, arranged to be successively traversed by said contact arms in the continuous movement of said carriage.

6. In a selector, a carriage, a plurality of rods thereon, a contact arm carried by each of said rods, a group of fixed terminals for each contact arm, said contact arms and terminals being so arranged that a single contact arm will be in a position to engage its group of terminals at a time.

7. In a selector, a carriage, a plurality of parallel rods thereon, contact arms pivotally supported by said rods, respectively, a group

of fixed terminals for each of said contact arms, said contact arms and terminals being so arranged that the groups of terminals will be successively traversed by said contact arms in the movement of said carriage.

In witness whereof I hereunto subscribe my name this 20th day of December A. D., 1912.

FRANK ROBERT McBERTY.

Witnesses:

WALTER F. HOFFMAN,

JOHN G. ROBERTS.