

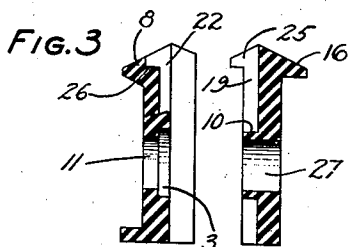
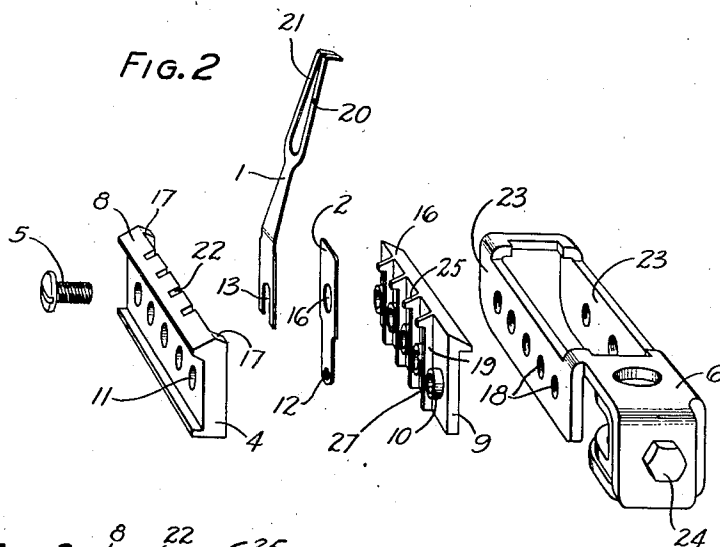
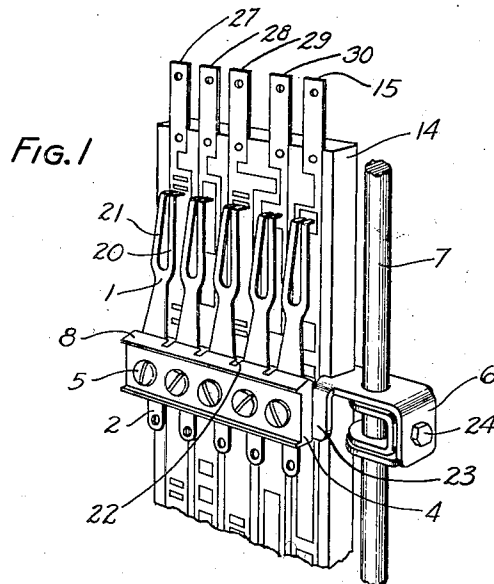
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ELECTRIC CONTACT DEVICE

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ELECTRIC CONTACT DEVICE

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This invention relates to a commutator brush and brush assembly block for selectors of the so-called panel type used in automatic and semi-automatic telephone systems. Brush assemblies used at the present time with such selectors consist of metal members two or more of which are fastened to a carrying block of some suitable insulating material and each ending as a bent prong for electrically contacting with the commutator surface over which the tip of the prong slides when the selector is in operation. This arrangement, while satisfactory from an operating standpoint when the commutator and brushes are new, causes some difficulty when metal filings, which are shaved off the commutator and commutator brushes during the repeated sliding operation of the brush assembly, begin to form. If the commutator stands upright in a vertically moving selector, as is the case in selectors of the panel type, experience shows that some of the filings, on dropping, lodge on the top edge of the carrying block. The separating distance between this top edge and the head of the screws which hold the respective brushes in place is so small that the gradual accumulation of filings at times connect any or all of the brushes on the carrying block to any or all of their respective holding screws. These screws are ordinarily separated by insulating bushings from any metallic contact with the brushes they hold but as they also serve to attach the carrying block to the metallic framework of the selector the commutator brushes which have become crossed to the screws by the metallic filings would consequently become grounded to the selector. Again, with the construction of brush and manner of connection to the block as above described, difficulty is experienced in removing a brush when the prong is worn down, or, for other reasons, has to be replaced. This necessitates unsoldering wires, and, due to the close proximity of adjacent selectors, a hot soldering iron might come in contact with the commutator and brushes of an adjacent selector and damage either one or both of them. Hot solder may also fall onto the apparatus below and cross-up contacts and wired terminals or, otherwise impair the functioning of the apparatus. Moreover, the assembly screw, clamp plate, insulator and bushing associated with each brush must be removed before the brush can be taken out. The reassembly of the spring pile-up is quite laborious because of the limited space in which the work must be done, and the parts to be reassembled, therefore, are frequently dropped and lost in the apparatus below. Because of these difficulties a workmanlike job cannot be done without spending considerable time and care at such an operation. The object of this invention is to make such improvements in the structure and arrangement of the brush and associated assembly block as to reduce the hazards of crossing and grounding the commutator brushes to the frame of the selector. A further object of the invention is to better facilitate the removal of worn parts while preserving intact the soldering terminal and such other parts as are now removed when a brush is to be replaced. In accordance with the invention, one embodiment of which is described herein by way of illustration, a pair of detachable assembly blocks, made of suitable insulating material, are provided with five compartments, each compartment to carry one commutator brush. The compartments are separated from each other in one of the pair of blocks by divisional partitions of appropriate depth, running transverse to the length of the block, while corresponding grooves are provided in the companion block into which the partitions are inserted when both blocks are fitted together. Each compartment in both blocks is drilled for the passage of a holding screw, the block containing the separating partitions being provided with a molded bushing around the periphery of the screw hole, of the same depth as that of the divisional partitions. A counterbore to fit the bushing surrounds the screw hole of the block which has the grooves but the depth of the counterbore is slightly less than the length of the bushing. The two blocks are thus made to fit one another and since bushings in one of the pair are longer than the depth of the

counterbores in the other, a narrow space remains in each compartment when the blocks are fitted together. The screw, in passing through a compartment in the pair of fitted blocks, is entirely housed by the bushing, so that no contact is possible with anything on the outer surface thereof.

The top of each block is shaped in the form of a sloping shed, running its entire length and overhanging beyond the outer surface of the block by a depth a little greater than the thickness of the screwhead of the holding screw. This novel construction protects the screw from coming into contact with falling metal filings and the sloping shed provides a sliding platform from which such filings may drop to the floor without contacting with the screw.

The commutator brush is made in two parts, a lower segment and an upper segment and of a thickness such that, when the upper segment is superimposed upon the lower, both will fit into the slotted compartment space of the pair of assembly blocks. The lower segment carries the soldering terminal at one end while a hole is drilled through its center large enough to permit its being fitted over the outer surface of the compartment bushing and rest on it. The upper segment is formed at one end with a forked prong the tips of which are bent at right angles with respect to the body of the segment, while its other end is circularly slotted for passing over and resting against the bushing. Since the lower segment is also supported on the same bushing the two brush segments will thus come into electrical contact with each other. The blocks are fitted together with the assembled segments of the brush in this position and all are held securely in place by the holding screws. Each of these screws passes through a compartment bushing, holds the blocks and brush in proper position and threads into a bracket on the selector switch shaft thereby fastening the assembly blocks with their associated brushes to it.

When it become necessary to replace a worn brush all that is necessary is to pull it out. During this operation the lower segment, of course, remains in the blocks and is otherwise undisturbed. A new upper segment may then be inserted in the place of the one thus removed, and the contacting springs properly adjusted. The commutator brush is then again ready for service. As the brush slides back and forth over the commutator and metal filings are produced, the sloping shed along the top of both blocks will cause these filings to drop to the floor, thereby preventing their accumulation on top of the block, and so reduce the hazards of metallically connecting the holding screws to the brushes.

Should it become necessary for any reason to remove a lower segment, the entire block may be detached from the selector by remov-

ing the screws. The block containing the grooves and counterbores is then removed, the upper segment or brush proper is lifted from the bushing and the base segment to be removed is taken out of the bushing and another segment put in its place. The reassembly consists in replacing the block, screwing the assembly block once more to the selector and slipping into place again the upper segment of the brushes. After proper adjustments are made, the selector is again ready for service.

A clearer conception of the scope and purpose of the invention will be obtained from a consideration of the following description taken in connection with the attached drawings, in which:

Fig. 1 shows a perspective assembly of five commutator brushes, brush carrier, selector elevator rod, and commutator with which the brushes cooperate.

Fig. 2 is a detailed perspective drawing illustrating the component parts of the brush assembly and carrier.

Fig. 3 is a cross-sectional view of the two insulating assembly blocks, the cross-section of the left-hand block being taken through the axis of one of the screw holes with a further partial cross-section at the top of the block passing through the center line of one of the grooves. The cross-section of the right-hand block is taken through the axis of one of the screw holes and surrounding bushing and in a plane parallel to the end face of the block.

Referring more particularly to Fig. 1, the elevator rod of a selector switch of the well-known panel type is shown at 7 to which a brush carrier 6 is attached by a set screw 24. The brush carrier 6 is provided with two parallel members 23, one disposed on each face of the commutator 14, only a part of the front member being visible in Fig. 1, and arranged to be out of contact with the front and rear faces of the commutator as the carrier is advanced by the rod 7. Mounted upon the front member 23 of the carrier 6, between the blocks of insulating material 4 and 9, only block 4 appearing in Fig. 1, are five upper segments 1 of the commutator brushes, for cooperation with commutator strips 27, 28, 29, 30, and 15 embedded in the front face of the commutator 14 and five corresponding lower segments or soldering terminals 2.

The brush assembly and carrier 6 are shown in detail in Fig. 2. The front block 4 comprises a channel shaped member of insulating material provided upon its inner face with four transverse grooves 22 and end shoulders 17 thereby dividing the inner face of the block into five sections. Extending through the block and centrally spaced with respect to each section is a hole 11 of sufficient diameter to receive an assembly screw 5, said hole being enlarged by counterbore 3 as

shown in detail in Fig. 3 for a purpose to be hereinafter described. The top face of the block 4 is sloped as shown at 8, and the upper faces of the end shoulders 17 are similarly, but reversely sloped.

The rear block 9 comprises an I shaped member of insulating material of a sufficient length to fit between the end shoulders 17 of block 4 when assembled in juxtaposition therewith and having transverse partitions 19 extending from one face thereof and dividing the face of the block likewise into five sections. Extending through the block centrally spaced with respect to each section and coaxial with hole 11 of block 4, is a hole 27 of sufficient diameter to receive an assembly screw 5, each hole being surrounded by a bushing 10 which extends from the face of the block, that is, the face having the separating portions. The top face of the block 9 is also sloped as shown at 16 to the same angularity as the shoulders 17, block 4. When the two blocks 4 and 9 are assembled as shown in Fig. 1, the partitions 19 and bushings 10 of block 9 register with corresponding grooves 22 and counterbores 3 of block 4, the enlarged portion 25 of each partition 19 engaging the deepened portion 26 of the corresponding groove 22. Since the bushings 10 are longer than the depth of the counterbores 3, when the two blocks are united and the front face of the bushings abut the base of the corresponding counterbores, five slotted compartments are formed for the reception of contact brushes as described hereinafter.

The upper and lower segments of a typical brush of the five brushes carried by the assembly blocks 4 and 9 are illustrated by 1 and 2, respectively. The lower segment 2 has a soldering terminal 12 at the tip end while a hole 16 is drilled through the center of the segment of sufficient diameter to allow the segment to pass over the bushing 10 and mount thereon. The upper segment 1 is a strip of the same width as lower segment 2 and has a semi-circular slot 13 at its base whose width is the same as the diameter of hole 16 so that segment 1 may also be mounted on the bushing 10. The upper portion of the segment 1 terminates in bifurcated prong tips 20 and 21 which, in operation, contact with the commutator strip exposed to the brush. The upper segment 1 is electrically joined to lower segment 2 by superimposing it on segment 2 and mounting it on the same bushing by means of semi-circular slot 13. Segment 1 thus sits astraddle on the bushing and in metallic contact with segment 2. That portion of the brush segment 1 which is exposed beyond the retaining compartment of the blocks is bent at a slight angle to secure means for regulating the spring tension of the pronged tips 20 and 21 when contacting with the surface of the commutator.

When any or all of the required number of brushes are thus assembled on the bushings of block 9, block 4 is positioned against it so that the partitions 19 fit the retaining grooves 22, the enlarged portion 25 rests on deepened portion 26 and the bushings 10 are inserted in the corresponding counterbores 3. Block 9 is shorter than block 4 by the thickness of the enclosing shoulders 17 so that, when the two blocks are thus secured together, the end surfaces of 9 are completely enclosed by shoulders 17. Block 4 is constructed with end shoulders in order to prevent exposure of the outer edges of the two end brushes. By enclosing them within the insulating medium of the end shoulder 17, metal filings which might become suspended along the outer end surfaces of the blocks will thus be prevented from crossing the outer edge of the brush either with the screw head of a screw 5 in the two end holes of block 4 or the metal frame of carrier 6. With the blocks thus fitted together the screws 5 are passed through the respective compartments through hole 11 and bushing 10 and tightened into the threaded apertures 18 of brush carrier 6.

A similar assembly of brushes can also be attached to the opposite face 23 of the brush carrier; the number of threaded apertures provided on that face of the carrier being equal, of course, to the number of brushes to be carried on that side to cooperate with the number of commutator strips embedded in that face of the commutator.

The entire assembly is then attached to rod 7 and adjusted to cooperate with commutator 14 as already described in connection with Fig. 1.

As will be evident from an inspection of Fig. 1, the sliding movement of the prong tips 20 and 21 along the commutator surface may produce metallic filings which, on falling down, will either come to rest on the sloping shed 8 or drop to the ground. In either case there is very little possibility that these filings will cross the brushes with any metallic parts, such as screw 5 or brush carrier 6.

Should it become necessary to remove one of the upper brushes, it can be readily pulled out since that part of the brush which is resting on the bushing is semi-circularly slotted on the base as already described. A substitute brush can then be inserted in place and pushed down until the semi-circularly slotted base rests upon the bushing, which fact is made known to the installer by his inability to push the brush down any further. The tension adjustments are then made on the prongs 20 and 21 of the brush and the entire commutator assembly is ready for operation again.

What is claimed is:

1. A brush assembly comprising a pair of complementary carrying blocks of insulating material, one of said blocks having a plurality of transverse partitions on one face

thereof and the other of said blocks having a plurality of grooves in one face thereof registering with the partitions of said first block, whereby a plurality of compartments is formed between the adjacent faces of said blocks, said blocks having aligned openings extending therethrough, a contact brush mounted in each compartment, and screws extending through said aligned openings for clamping said brushes between said blocks.

2. A brush assembly comprising a pair of complementary carrying blocks of insulating material, one of said blocks having a shoulder at each end thereof and a plurality of transverse partitions on one face thereof, the other of said blocks being of a length to fit between the shoulders of said first block and having a plurality of grooves in one face thereof registering with the partitions of said first block, whereby a plurality of compartments is formed between the adjacent faces of said blocks, said shoulders and partitions, said blocks having aligned openings extending therethrough, a contact brush mounted in each compartment, and screws extending through said aligned openings for clamping said brushes between said blocks.

3. A brush assembly comprising a pair of complementary carrying blocks of insulating material, one of said blocks having a plurality of transverse partitions on one face thereof dividing said face into a plurality of equal sections and having in each of said sections an opening extending through said block, and the other of said blocks having a plurality of grooves in one face thereof and counterbored openings extending through said block aligned with the openings of said first block, bushings surrounding the openings of said first block, said partitions and bushings of the first block registering with the grooves and counterbores of said second block when the blocks are assembled together, the adjacent faces and partitions of said blocks thus forming a plurality of compartments, a contact brush mounted in each compartment and having an opening for positioning said brush over the bushing of that compartment, and screws extending through said aligned openings for clamping said brushes between said blocks.

4. A brush assembly comprising a pair of complementary carrying blocks of insulating material, one of said blocks having a plurality of transverse partitions on one face thereof dividing said face into a plurality of equal sections and having in each of said sections an opening extending through said block, and the other of said blocks having a plurality of grooves in one face thereof registering with the partitions of said first block, and having counterbored openings extending through said block aligned with the openings of said first block, bushings surrounding the openings of said first block and of sufficient

depth and diameter to fit within the counterbores of the second block and to hold the blocks slightly spaced apart when assembled together, the adjacent faces and partitions of said blocks thus forming a plurality of compartments, a contact brush mounted in each compartment and having an opening for positioning said brush over the bushing of that compartment, and screws extending through said aligned openings for clamping said brushes between said blocks.

5. A brush assembly comprising a pair of complementary carrying blocks of insulating material, one of said blocks having a plurality of transverse partitions on one face thereof each partition having at its upper end a shoulder of greater depth than the remaining portion of such partition, and the other of said blocks having a plurality of grooves in one face thereof registering with the partitions of said first block each groove being deepened at its upper end to form a seat to receive the shoulder of the registering partition, the adjacent faces of said blocks and partitions forming a plurality of compartments therebetween when said blocks are assembled together with the shoulders of the partitions of said first block seated on the seats of the grooves of the second block, said blocks having aligned openings extending therethrough, a contact brush mounted in each compartment, and screws extending through said aligned openings out of electrical contact with said brushes for clamping said brushes between said blocks.

6. A brush assembly comprising a pair of complementary carrying blocks of insulating material, one of said blocks having a plurality of transverse partitions on one face thereof dividing said face into a plurality of equal sections and having in each section an opening extending through said block, each partition having at its upper end, a shoulder of greater depth than the remaining portion of such partition, and the other of said blocks having a plurality of grooves in one face thereof registering with the partitions of said first block each groove being deepened at its upper end to form a seat to receive the shoulder of the registering partition said second block also having counterbored openings aligned with the openings in said first block, bushings surrounding the openings of said first block and of sufficient depth and diameter to fit within the counterbores of the second block and holding the blocks slightly spaced apart when assembled together, the adjacent faces and partitions of said blocks thus forming a plurality of compartments, a contact brush mounted in each compartment and having an opening for positioning said brush over the bushing of that compartment, and screws extending through said aligned openings for clamping said brushes between said blocks.

7. A brush assembly comprising a pair of complementary carrying blocks of insulating material having compartments for the reception of contact brushes and aligned openings, each of said blocks having a sloping top surface extending beyond the outer face thereof, a contact brush mounted in each compartment and screws extending through the opening of said blocks out of electrical contact with said brushes for clamping said brushes between said blocks. 70

8. A brush assembly comprising a pair of complementary carrying blocks of insulating material, one of said blocks having a plurality of transverse partitions on one face thereof dividing said face into a plurality of equal sections and having in each of said sections an opening extending through said block, and the other of said blocks having a plurality of grooves in one face thereof and counterbored openings extending through said block aligned with the openings of said first block, bushings surrounding the openings of the first block, said partitions and bushings of the first block registering with the grooves and counterbores of said second block when the blocks are assembled together, the adjacent faces and partitions of said blocks thus forming a plurality of compartments, a contact brush mounted in each compartment each comprising a contact segment and a terminal segment each segment having an opening therethrough for positioning said segments over the bushing of that compartment, and screws extending through said aligned openings for clamping said brushes between said blocks. 80

9. A brush assembly comprising a pair of complementary carrying blocks of insulating material, one of said blocks having a counterbored opening therein and the other of said blocks having an aligned opening surrounded by a bushing, said bushing engaging in said counterbore when the blocks are assembled together, a contact brush having two segments, one segment formed at one end with a slotted portion for embracing said bushing and the other segment having an opening through which said bushing extends, and a screw extending through said aligned openings for clamping said segments in electrical contact with each other between said blocks, the slotted end of said one segment permitting such segment to be withdrawn without removing said other segment. 85

10. A brush assembly comprising a pair of complementary carrying blocks of insulating material having aligned openings, a contact brush having two segments, one segment formed at one end with a slotted portion and the other segment having an opening there-through and a screw extending through the aligned openings of said blocks and through the slotted portion of said one segment and the opening in the other segment and out of 90

electrical contact with both segments for clamping said segments in electrical contact with each other between said blocks, the slotted end of said one segment permitting such segment to be withdrawn without removing said other segment. 95

11. A brush comprising two segments, one segment constituting a contact member and having a slotted end and the other segment constituting a soldering terminal and having an opening through one end thereof, a support for said brush and a screw passing through the slotted end of said one segment and the hole in the other segment for clamping said segments in electrical contact with each other to said support, the slotted end of said one segment permitting such segment to be withdrawn without removing said other segment. 100

In witness whereof, we hereunto subscribe our names this 1st and 3rd days of April, 1930. 105

CHARLES C. SEASONGOOD.
CHARLES W. McWILLIAMS. 110

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