H. P. JANKE.

COMMUTATOR MANUFACTURE.

APPLICATION FILED AUG. 7, 1918.

1,325,325.

Patented Dec. 16, 1919.

2 SHEETS—SHEET 1.

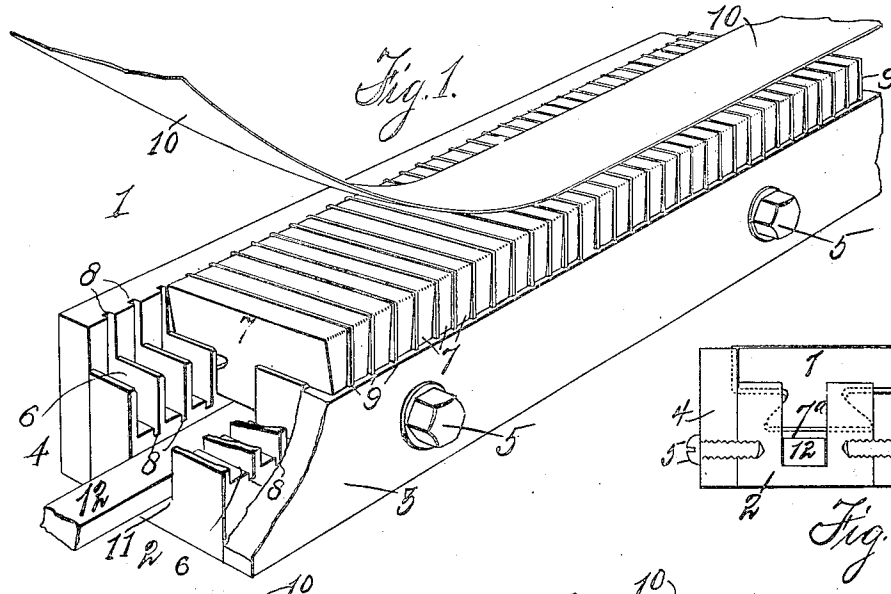


Fig. 1.

Fig. 4.

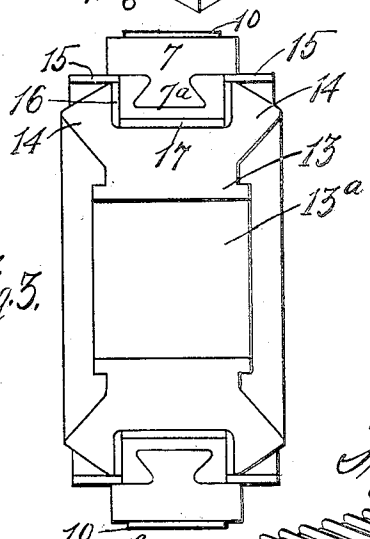


Fig. 3.

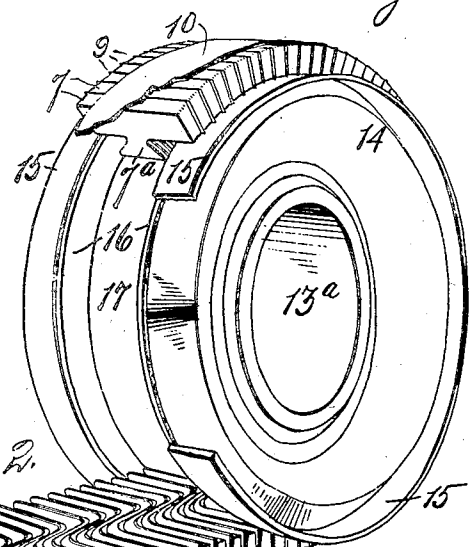


Fig. 2.

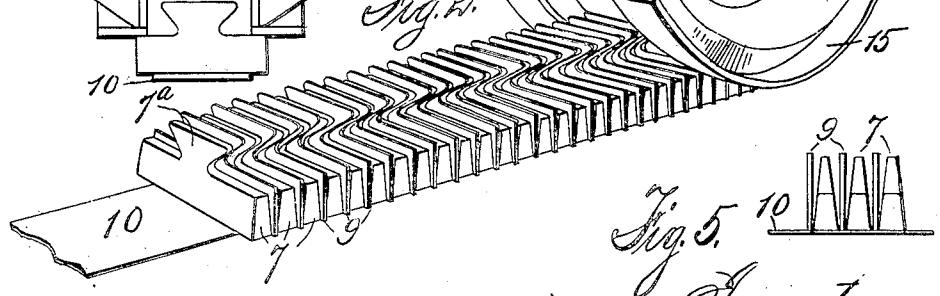


Fig. 5.

Inventor:
Henry P. Janke,
By Alvin Hall, Atty.

H. P. JANKE.

COMMUTATOR MANUFACTURE.

APPLICATION FILED AUG. 7, 1918.

1,325,325.

Patented Dec. 16, 1919.

2 SHEETS—SHEET 2.

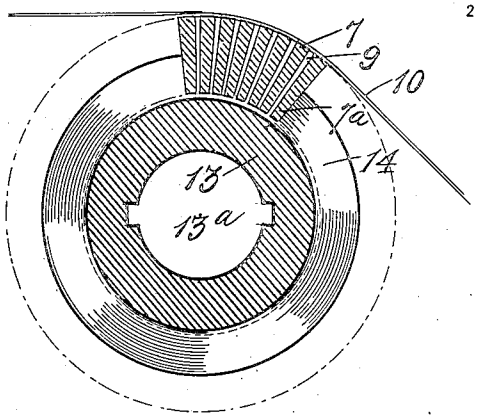


Fig. 6

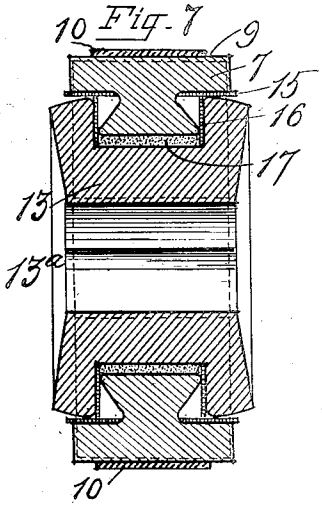


Fig. 7

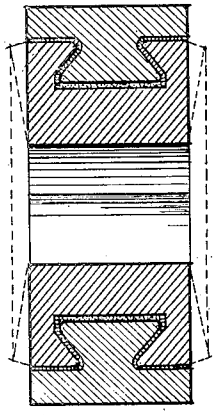


Fig. 8

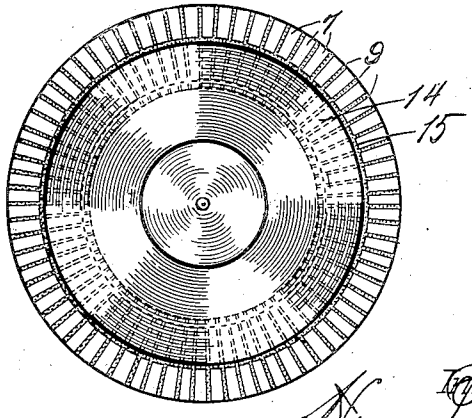


Fig. 9

Inventor:
Henry P. Janke,
By Munn Hall & Ally.

UNITED STATES PATENT OFFICE.

HENRY P. JANKE, OF TOLEDO, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE TOLEDO STANDARD COMMUTATOR COMPANY, A CORPORATION OF OHIO.

COMMUTATOR MANUFACTURE.

1,325,325. Specification of Letters Patent. Patented Dec. 16, 1919.

Application filed August 7, 1918. Serial No. 248,675.

To all whom it may concern:

Be it known that I, HENRY P. JANKE, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Commutator Manufacture; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

In the construction of commutators for electric generators and electric motors the assembling of the numerous parts which go to make up the device is a slow and tedious task. The difficulty of keeping the copper segments and the insulating pieces which separate the segments alined in proper parallel and transverse relation is well understood. Another difficulty, frequently encountered, is that in attempting to bring together the proper number of copper segments and their insulating pieces a miscount of one or the other of the kinds of pieces is made, with the result that if the error is not soon discovered there is caused a considerable loss of time, labor and materials.

My invention relates to devices and methods for assembling commutator parts which shall overcome the objections and difficulties here indicated, and, more particularly, to provide devices and methods for rapidly and accurately assembling commutator-segments and their insulating pieces in proper relation to each other and to their supports and retaining devices; which shall also render mistakes in the counting of the several parts next to impossible; which, during their assembling, insures the holding of the several segments and insulating pieces in correct parallel and transverse relation, and which permits the inspection, from all sides, of the segments and insulating pieces in their assembled relation before being permanently secured in their final operative position in relation to their supports and retaining devices.

Heretofore, the usual manner of assembling the copper segments of a commutator and their interposed insulating pieces in cylindrical form has been to gather these parts within an embracing ring or band, and to then insert through the axial opening from which the segments radiate, the supporting sleeve or spool to which the one or two requisite end-flanges are then secured. In a more recent and improved form of sleeve or spool, which has at each end, and integral therewith, a flange, the method of inserting the spool through the axial opening, just referred to, is impracticable. My invention is also designed to afford means by which the assembled segments and their insulating pieces may be quickly placed, by a single operation, around the outside of the improved spool referred to, so that the integral flanges of the spool may now be forced into engagement with the notches in the edges of the segments, which notches, collectively, form circumferential angular grooves for engagement with the spool-flanges when pressed or swaged into their final position.

To these ends, my invention consists of the devices and operations described in the following specification, and while, in their broader aspect, the steps of my method admit of various modifications, and while the mechanisms are capable of embodiment in numerous forms, their preferred illustrative embodiments are shown in the accompanying drawings, in which—

Figure 1 is a perspective view of my assembling device with commutator-segments and interposed insulating pieces assembled therein, and with portions broken away to disclose the construction and arrangement of parts; Fig. 2, a perspective view of a commutator-sleeve or spool with a flexible band, carrying commutator-segments and interposed insulating pieces, partly encircling the spool; Fig. 3, an axial sectional elevation of a spool, having the commutator segments, together with the several insulating parts, in place thereon, and before the integral flanges of the spool are upset into their final shape; Fig. 4, an end-elevation of my assembling device; Fig. 5, an edge view, showing commutator segments and insulating pieces resting upon and removably secured to the adhesive flexible strip hereinafter referred to; Fig. 6, a transverse sectional elevation of a commutator-sleeve with

commutator-segments and insulating pieces thereon, further illustrating the method of applying the segments and insulating pieces to the sleeve; Fig. 7, a central vertical sectional elevation taken at a right angle to the view in Fig. 6, and showing a modified form of spool-flanges before the flanges are set up into engagement with the tangs of the segments; Fig. 8, the same after the spool-flanges have been set up into their final position in engagement with the tangs of the commutator-segments, and Fig. 9, an end-view of a completed commutator.

Like numerals of reference indicate like parts throughout the drawings.

In the drawings, 1 is a trough-like jig or holder, consisting, preferably, of three pieces, viz., a bottom 2 and two sides 3—4, composed of any suitable material,—preferably steel,—and rigidly secured in the relation indicated in Figs. 1 and 4 by cross-bolts 5. The bottom piece 6 is transversely slotted or recessed, as at 6, for the reception of the copper segments 7, and the opposed inner sides of the pieces 3—4 as well as the bottom piece 2 are also correspondingly slotted or recessed, as at 8, for the reception of mica or other insulating strips 9, the slots 8 alternating with the slots 6 and being vertically and horizontally a trifle deeper than the slots for the copper segments. As will be seen from Fig. 1, the arrangement of these slots 6—8 is such that there is barely space in the successive slots for the reception alternately of copper segments and intervening pieces of mica or other suitable insulating material. The slightly greater depth vertically and horizontally of the slots 8 permits the edges of the mica pieces to project slightly beyond the bottom and side edges of the copper segments. In some commutators such protruding edges are not required, in which case the slots 8 are omitted, the slots 6 being made just wide enough to receive both the segment and the mica piece. It will be seen that the copper segments and mica pieces,—proceeding from one end of the holder to the opposite end,—may be readily slipped into their respective slots, and that since these slots 6—8 correspond in number with the number of segments and insulating pieces required for the completed commutator there can be no miscount. It will also be seen that now the several segments and insulating pieces are thus held parallel with each other and in practically perfect alinement. In the assembling of the parts of certain commutators it may be preferable to form the recesses 6 wide enough for the reception of a plurality of copper segments, as, for instance, two copper segments with an interposed mica piece.

10 is a flexible strip, preferably of stout paper, having on one side gum, paste or other suitable adhesive, and which is caused to closely adhere to the edges of the pieces 7—9 which ultimately form the brush-surface of the commutator.

The bottom piece 2 on its upper side is centrally channeled, as at 11, throughout its length. In this channel rests loosely a bar 12 which runs under the assembled pieces 7—9. A strip of board or a flat elongated plate being laid and held upon the top of the pieces 7—9 and the strip 10, the holder may be inverted and the several segments and insulating pieces may, by means of the bar 12, be forced from their slots, so that now they rest upon such board or plate and still cling to their strip of paper, as illustrated in Fig. 2.

The commutator-sleeve or spool 13, having therethrough a shaft-opening 13ª, and designed for the reception and support of the segments and insulating pieces 7—9, may be of the usual or any preferred type, but in the present instance, for illustration, is of the sort having the integral flanges 14. The spool being provided with insulating bands 15, insulating rings 16, and insulating material 17 in the bottom of the circumferential channel of the spool,—preferably of bakelite,—is ready for the reception of the copper segments and the mica separating pieces. As indicated in Fig. 2, these are applied by wrapping the strip of paper with the adhering pieces 7—9 around the commutator-spool, with the angular portion 7ª projecting into the circumferential channel of the spool. The arrangement of the several parts upon the strip 10 is such that when the end-pieces upon this strip are brought together, side by side, the parts, in exactly the proper number, relation and alinement, encircle the spool and are now ready to be clamped in their final and permanent place upon the spool. This is accomplished by upsetting or swaging the flanges 14 into the position indicated in Fig. 8 by means of a powerful press. The paper may now be removed and the commutator is ready for such machining or other treatment, if any, as may be required.

Copper segments punched or blanked in a die from a sheet or bar are not exactly alike on both sides, for which reason it is desirable that the corresponding sides of these pieces shall be faced in the same direction around the commutator in order to secure uniformity. It is manifest that the device and method here shown and described facilitate this arrangement of the segments, and provide as well for the inspection of the parts on all sides before they are finally clamped in place.

In the assembling of certain forms of commutator-segments, as, for instance, when the arms of the segment-bars are of unequal length, as illustrated in Fig. 4, it will be found convenient to have one of the side-

pieces,—for illustration the part 4, Fig. 1,—higher than the opposed piece 3, to form a convenient abutment for one end of the commutator-bars.

In the operation thus far described a strip carrying a sufficient number of segments and insulating pieces to completely encircle the commutator-sleeve has been implied. It is obvious, however, that in some cases, as in the manufacture of large commutators, the strips 10 with their adhering pieces may be made in two or more separate sections to avoid undue weight or other complications.

Having described my invention, what I claim and desire to secure by Letters Patent is—

1. An apparatus of the described character, comprising a holder adapted for the reception, side by side and in alinement, of a predetermined number of alternate commutator segments and insulating pieces, and means for detachably engaging and holding in such assembled relation such segments and insulating pieces during their removal from said holder.

2. An apparatus of the described character, which includes in its construction a holder adapted for the reception,—side by side and in proper alinement,—of alternate commutator-segments and insulating pieces, and devices for detachably engaging and removing from the holder, in such assembled relation, such segments and insulating pieces.

3. In an apparatus of the described character, a holder adapted for the reception of a series of a predetermined number of alined alternate commutator segments and insulating pieces, and a flexible strip adapted for adhesive connection to the members of such series.

4. In a device of the described character, a holder having a series of spaced recesses adapted for the reception, side by side and in alinement, of a predetermined number of commutator segments and interposed insulating pieces, and a flexible strip adapted for adhesive connection with such series of segments and insulating pieces.

5. In a device of the described character, a holder having a series of spaced recesses adapted for the reception, side by side and in alinement, of a predetermined number of commutator-segments and interposed insulating pieces, the recesses for the reception of said insulating pieces being of greater depth than the segment recesses.

6. In a device of the described character, a trough-like holder having its inner sides recessed for the reception of alternate commutator-segments and insulating pieces, and a removable bar disposed longitudinally of the bottom of such holder and adapted to lift such segments and insulating pieces from their said recesses.

7. In a device of the described character, a trough-like holder having its inner sides recessed for the reception of alternate commutator-segments and insulating pieces, and a removable bar disposed longitudinally of the bottom of such holder and adapted to lift such segments and insulating pieces from their said recesses, and a flexible strip adapted for adhesive connection to the top of such commutator-segments and insulating pieces.

8. In a device of the described character, a trough-like holder having transversely thereof recesses adapted for the reception, side by side and in alinement, of commutator-segments and interposed insulating pieces, one of the sides of such trough-like holder being higher than the opposite side to form an abutment for the segment ends.

9. As a means for the assembling of commutator-segments and interposed insulating pieces, a trough-like member having transversely of its interior, recesses adapted for the reception, in alternation, of commutator-segments and insulating pieces, and having lengthwise of its bottom a channel, a bar disposed in such channel, and a flexible strip adapted for adhesive connection to the edges of a series of segments and insulating pieces disposed in such recesses.

10. An apparatus of the described character which includes a holder adapted for the reception of a series of alternating commutator-segments and insulating pieces adapted for arrangement as a hollow cylinder, means for detachably engaging and removing from the holder said series, whereby said series may be transferred from the holder to a commutator-spool having at each end an integral outstanding flange 14.

11. A device of the described character, comprising a series of commutator-segments and interposed insulating pieces, adapted for arrangement as a hollow cylinder, in combination with a commutator-spool having at each end and integral therewith an outstanding flange of greater diameter than the internal diameter of such cylinder, and means for disposing said series of commutator segments and interposed insulating pieces in operative relation to and between the flanges of said spool.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY P. JANKE.

Witnesses:
S. N. SLOAN,
M. KRAMER.