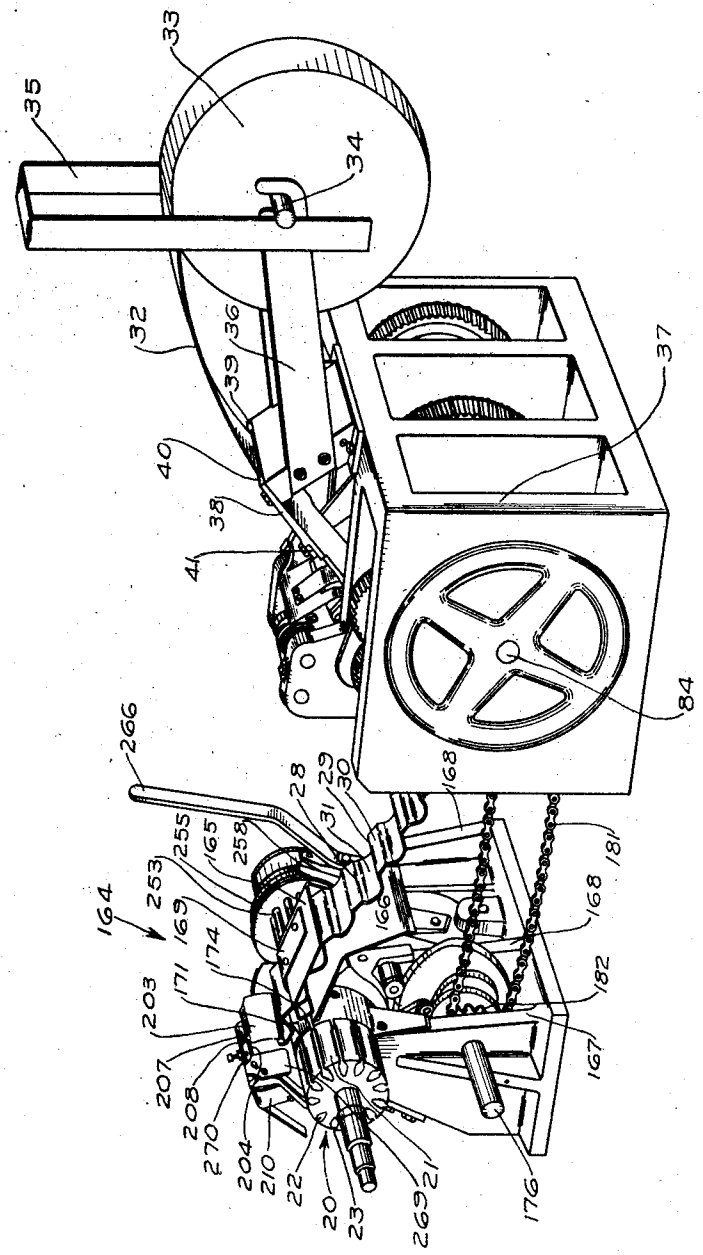
Dec. 22, 1931. H. H. EATON 1,838,017

ARMATURE INSULATION PROCESS AND MACHINE

Original Filed Jan. 2, 1926 2 Sheets-Sheet 1



FIG—1

Inventor

HARRISON H. EATON

By Braselton, Whitcomb & Davies

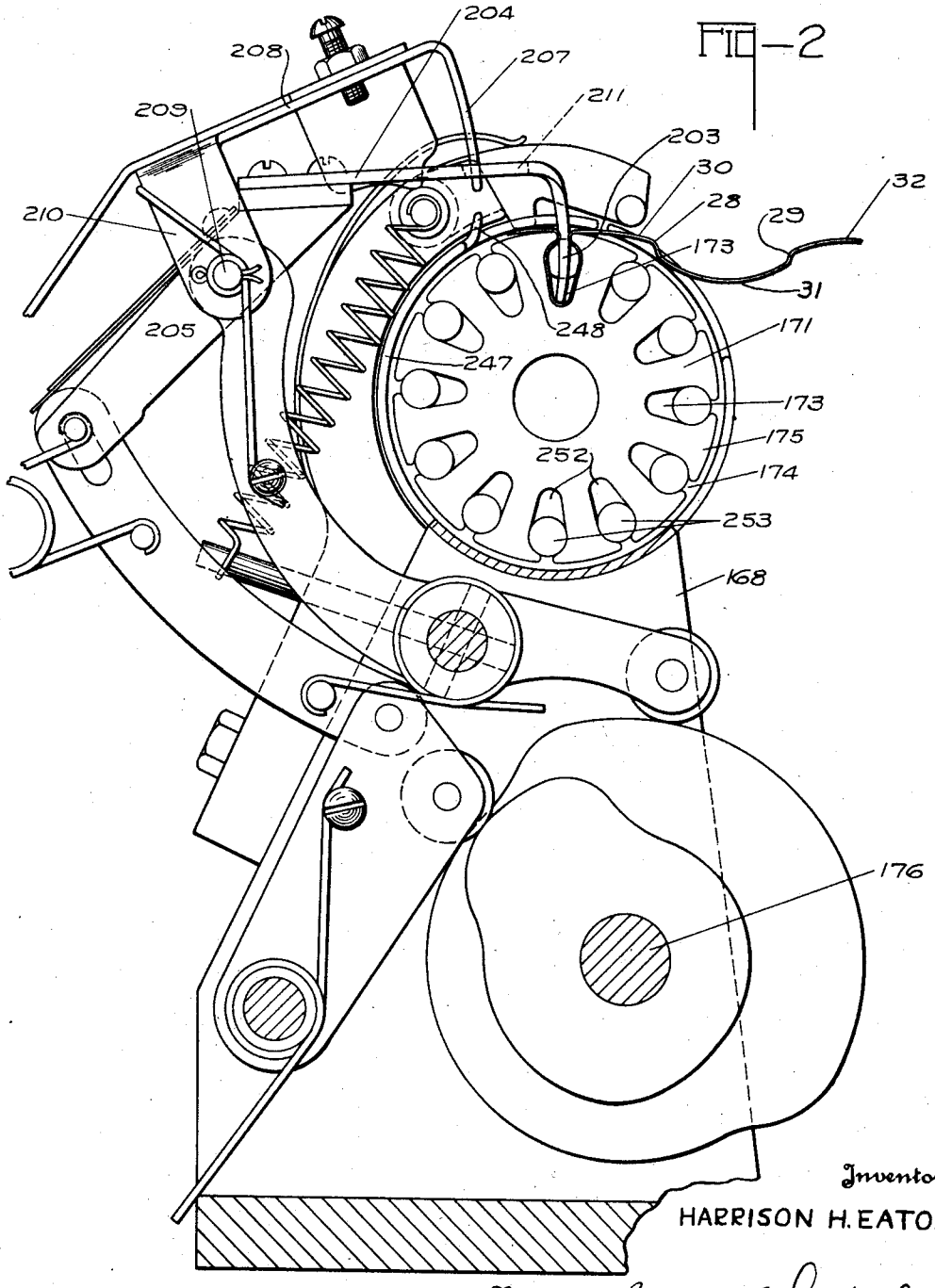
Attorneys

Dec. 22, 1931. H. H. EATON 1,838,017

ARMATURE INSULATION PROCESS AND MACHINE

Original Filed Jan. 2, 1926 2 Sheets-Sheet 2

FIG-2



Inventor

HARRISON H. EATON

By Bracelton, Whitcomb & Davis

Attorneys.

Patented Dec. 22, 1931 1,838,017

UNITED STATES PATENT OFFICE

HARRISON H. EATON, OF TOLEDO, OHIO

ARMATURE INSULATION PROCESS AND MACHINE

Original application filed January 2, 1926, Serial No. 79,053. Divided and this application filed October 16, 1930. Serial No. 489,131.

This invention relates to armature insulations and to an apparatus and method for forming and mounting an insulating strip in the slots of an armature core in which the armature winding wires are received and held, and is a division of my co-pending application Serial No. 79,053, filed January 2, 1926.

In the type of armature to which the present invention relates, the armature core of laminated or other suitable structure, is provided with longitudinal grooves or slots in which the armature windings are wound or inserted. Before winding these winding wires into the slots, an insulating layer or lining is required in each slot to separate the windings from the iron armature core. These insulating linings have heretofore been made of pieces of paper cut to form an individual lining for each slot and pressed or creased to permit them to be inserted into the slots of the core the edges of the paper linings projecting radially from the edges of the slots. These projecting portions or edges of the paper strips were then clamped to the surface of the armature and the winding wires inserted, the clamps acting as guides for the winding wires to be inserted. The strips or pieces of paper cut and formed in this manner did not closely fit the inner surfaces of the slots and, to bring them snugly against the surfaces of the slots, it was necessary to tamp the wires in the slots as they were inserted. The insertion of these separate pieces of insulating paper and the tamping in of the armature winding wires involved considerable labor, thus slowing down the output and adding to the cost of the armature. Moreover, in case any of the pieces of paper happened to slip longitudinally, the stopping of the winding apparatus and replacement of the paper were necessary. Moreover, as the tamping of the winding wires tended to break the insulating paper strips, a strong or "fish" paper was required to minimize the troubles from this source. As the pieces of paper were usually stored after creasing or crimping to be ready for use, the edges of the papers were liable to become frayed or worn from handling before mounting in the armature.

These difficulties and disadvantages are obviated by my present invention, some of the objects of which are: to provide an apparatus in which a strip of paper is creased or crimped to closely fit into the grooves of the armature core and is then slid into position therein; to provide a method and apparatus by which a unitary strip of paper is formed to fit into all or several of the armature core slots and is slipped as a unit into the slots; to provide a method and apparatus in which the insulating paper strip is crimped immediately prior to its insertion into the armature core slots; to provide an apparatus in which in a unitary sequence a strip is formed into the shape required to fit the slots of an armature core and is inserted into the slots; to provide a continuous strip of insulating paper fitting into several slots of an armature; to provide a method of folding and inserting the insulating lining paper that permits a close and accurate fitting of the paper to the inner surfaces of the slots to avoid the necessity of tamping in the winding wires and to permit weaker and cheaper paper to be used and to provide an apparatus in which the folding and fitting in of the insulating paper strips is done substantially automatically and with a minimum of labor.

With these and other objects in view, which will become apparent from the following description, my invention comprises the method and apparatus described and set forth in the following specification and claims.

The various features of the invention are illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of the apparatus and the formed core insulating strip of my invention;

Figure 2 is a sectional view of the core supporting mechanism showing the formation of the insulating strip and its insertion in the armature core.

In my present invention, a strip of paper is crimped or creased in such a manner that, when it is formed or folded to conform to the contour of the armature core and slid

into its proper position in the armature core grooves, the creases in the paper fit the projections or ledges and hollows of the grooves and the paper fits the walls of the grooves so closely as to resist any tendency to fall or work radially outwardly from the grooves. The strip of paper thus crimped or creased, is then brought and held into a shape or form conforming to the contour of the armature core and slots and immediately at the side of the armature to be mounted or lined, the strip making a complete circuit of the armature in alignment with the outer surface of the armature and the inner surfaces of the slots. The strip is then cut at a line to complete the circumference of the armature and is then slipped through suitable guides sidewise onto the armature. When released on the armature core, the folds or creases in the strip fit tightly against retaining ledges in the slots and are firmly held in place in the grooves.

Referring more particularly to the accompanying drawings, the invention is illustrated as applied to an armature core 20, shown in perspective in Fig. 1, having a cylindrical outer surface divided into segments 21 by a series of radial slots 22. The slots 22 are of a general V or oval shape having their outer open ends slightly contracted to a narrow passage 23 by opposing ledges or edges giving the separated armature segments 21 a flaring, approximate bell or T shape. In creasing or crimping the strip of insulating paper 32, the strip is given a series of alternately reversed creases 28 and 29, spaced alternately at a length 30, equal to the width of the segments 21, and a length 31 equal to the peripheral length of the slots 22, so that when the strip is folded into the proper shape with the lengths 30 covering the segments 21 and the lengths 31 depressed inwardly to conform to the surfaces of the slots 22, the creases 28 and 29 will abut the inner faces of the ledges and hold the lengths 31 tightly against the inner faces of the slots.

A paper strip 32 to be subjected to the required creasing operations may be supplied from a roll 33 rotatably mounted on a rod 34 supported between arms 35 projecting rearwardly from a supporting bracket 36 on the upper face of a frame 37 of the creasing or crimping mechanism. The strip of paper 32 drawn from the roll 33 passes forwardly and downwardly over a guide plate 38, mounted on the bracket 36, and is held in position by a pair of side guide strips 39 and 40 and passes beneath an upper guide plate 41 mounted on and spanning the strips 39 and 40. The crimping and creasing mechanism is completely shown and described in my co-pending application and will not be herein described in further detail.

The strip of paper 32, creased in the manner and by the mechanism described in the application referred to above, is delivered to a mechanism 164 for folding the strip to a form to correspond with the armature core to be lined and for then mounting the strip on the armature. The strip 32 is received between a pair of vertically spaced horizontal guide plates 165 and 166 mounted on and between a pair of standards 167 and 168 of the mounting mechanism 164 and is directed by a plate 169 extending downwardly and forwardly of the upper plate 165 towards a mounting drum 171, rotatably mounted on a shaft journalled in the standards 167 and 168.

The mounting drum 171 is of the same diameter and approximately the same shape as the armature core 20 to be lined, being provided with the same number of grooves 173, twelve in the present instance, but the openings 174 in these grooves being somewhat narrower than the passages 23 of the grooves 22 of the armature 20 to permit the paper strip to be more easily inserted therethrough. The cylindrical surface 170 of the drum is divided by the openings 174 into sections 175 of the same width as sections 21 of the armature core and as the lengths 30 of the strip 32.

In mounting the paper strip 32, it is conveyed into such a position that a length 30 of the strip rests on and co-incides with a section 175 of the drum 171, and with a crease 28 at the edge of the opening 174 to the rear of the supporting section 175. The supported length 30 is then held on the section 175 and the following length 31 is pushed downwardly through the opening 174 into the groove 173. The drum 171 is then given one-twelfth of a rotation, while a succeeding length 30 is brought into position on a succeeding section 175 of the drum and is then brought to rest to permit the succeeding sections 30 and 31 to be respectively held and depressed. When each of the grooves 173 of the forming drum 171 has been lined with a length 31 of the paper strip 32, the further feeding of the strip stops and the mounted length of strip is severed and pushed sidewise through suitable guides onto an armature aligned with the drum 171.

The various elements of the forming and mounting mechanism 164 are driven from a common or main drive shaft 176 journalled in and extending between the standards 167 and 168. As the shaft 176 and its associated mechanisms are driven in synchronism with the creasing mechanism, it is preferably driven from the drive shaft 84 of the creasing mechanism by means of a sprocket chain 181 driving a sprocket wheel 182 keyed to shaft 176. As the various elements of the forming and mounting mechanism 164 are rotated once for each pair of

creases 28 and 29, the shaft 176 must be rotated twice as fast as the drive shaft 84. This is accomplished in the present instance by making the gear train actuating the sprocket chain 181 of a suitable ratio.

The portion 31 of the paper strip 32 is tucked into its proper groove 173 by means of a finger 203 depending from a plate 204 secured to a lever 205 fulcrumed on a floating or reciprocating pivot 209. As soon as the finger 203 has withdrawn from the groove 173, a second finger 207 depending from a plate 208, also pivoted on the floating or reciprocating pivot pin 209 by means of a pair of depending ears or lugs 210, is moved downwardly and rearwardly over the following length 30, spreading this length over the following drum section 175, and slightly entering the succeeding opening 174 to press the succeeding crease 28 in its place therein to be ready for a following tucking operation. The finger 207 is withdrawn just before the lowering of the finger 203 and remains withdrawn until the drum 171 is again rotated one-twelfth of a revolution. The plate 204 is provided with an opening or slot 211 through which the finger 207 projects, and which is large enough to permit the movements of the finger 207 to take place without hindrance.

As the drum 171 carries the mounted strip of paper through its movement of rotation, the outer surface of the paper covering the sections 175 is held in place by means of a cylindrical guiding mantel 247 mounted on the standards 167 and 168, and extending in a position slightly spaced from the surface of the drum to enable the paper strip 32 to lie therebetween. To insure an insertion of the forward edge of the strip beneath the mantel 247, the upper or entering edge of the mantel is turned outwardly at 248.

When a length of the strip 32, sufficient to line the outer surface and grooves or slots 22 of the armature 20 has been advanced and creased by the creasing mechanism and mounted on the drum 171, the mechanism is automatically stopped by means (not shown). The creased and mounted portion of the strip is then severed from the following portion and slid into position on the armature 20.

For this purpose, an armature 20 is mounted on the shaft 172 to one side of the drum 171, and with its slots 22 aligned with the grooves 173 of the drum so that when the mounted strip of paper is pushed sidewise towards the armature, the lengths 31 in the grooves 173 will slip into place in the slots 22, and the lengths 30 will cover the peripheral segments 21. To guide the strip into its proper position on the armature, the grooves 173 are narrowed as at 252 at the side of the drum adjacent the armature to be lined.

The strip mounted on the drum 171 is pushed onto the armature 20 by means of a series of pusher rods 253, one for each of the grooves 173, positioned to slide through and to fill the outer portions of the grooves, the diameters of the rods being such as to prevent the paper from remaining between the edges of the rods and the inner surfaces of the grooves 173, and the narrowed portions 252 of the grooves 173 having those portions in the paths of the rods 253 of sufficient diameters that the rods may be pushed to the farther side of the drum 171 and completely displace the mounted strip of paper.

To slide the mounted strip of paper 32 onto the armature 20, the collar 255, and with it the rods 253, are pushed towards the drum by means of a manually operable forked lever 258 provided with a suitable operating handle 266.

The mounted portion of the strip is severed from the following portion as it is pushed from the drum 171 onto the armature 20. For this purpose a knife blade 269 is mounted on a bracket 270 extending upwardly from the standard 168 to a position above the drum 171 at which the strip is to be severed, and at the edge of the drum which the armature abuts. A hump (not shown) is provided on the section 175 of the surface of the drum in alignment with the knife blade 269 to lift the strip against the knife blade as it is pushed off the drum.

When the mounted strip of paper is thus pushed onto the armature, the apparatus may be returned to its initial position to crease and mount a following strip of paper.

Through the above apparatus, therefore, an armature core 20 is wrapped in a continuous strip of paper and the paper is pressed into the grooves 22 of the core to line the inner surfaces of these grooves. When thus mounted on the core, the creases 28 and 29 engage the inner edges of the ledges 24 and 25 and prevent the inserted portions of the paper strip from being drawn out of the grooves.

As changes of construction could be made within the scope of my invention, it is desired that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

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

1. A method of covering the grooves of armature cores with insulation which comprises creasing and forming a continuous strip of paper into sections lying in a cylindrical curvature and forming looped sections extending radially of said cylindrically curved sections and pushing said strip of paper sidewise onto a grooved armature core with the looped sections in the grooves of the armature.

2. A method of lining armature cores with

insulating paper, which comprises forming a series of spaced pairs of spaced opposing creases in a strip of paper; forming the lengths of said strip between the creases of each pair into sections lying in a cylindrical surface; forming the lengths of paper between the creases of successive pairs into loops extending radially inwardly of said cylindrical surface; and sliding said strip sidewise onto a grooved armature core with the looped sections in the grooves and the cylindrical surface sections on the cylindrical surface of the core.

3. A method of lining armature cores with insulating paper, which comprises forming a series of spaced pairs of spaced opposing creases in a strip of paper; forming the lengths of said strip between the creases of each pair into sections lying in a cylindrical surface of the same curvature as that of the surface of the core; forming the lengths of paper between the creases of successive pairs into loops extending radially inwardly of said cylindrical surface and aligned with the grooves of said armature; sliding said creased and looped section of the strip onto said core; and severing said mounted strip from the main body of the strip.

In testimony whereof, I affix my signature:

HARRISON H. EATON.