J. S. DOWNS.

MACHINE FOR APPLYING TAPE TO ARMATURE COILS.

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928,592. Patented July 20, 1909.

Fig. 3.

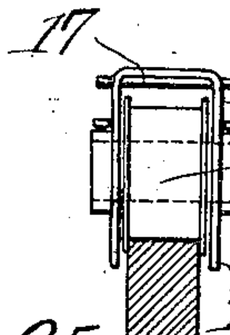

Fig. 4.

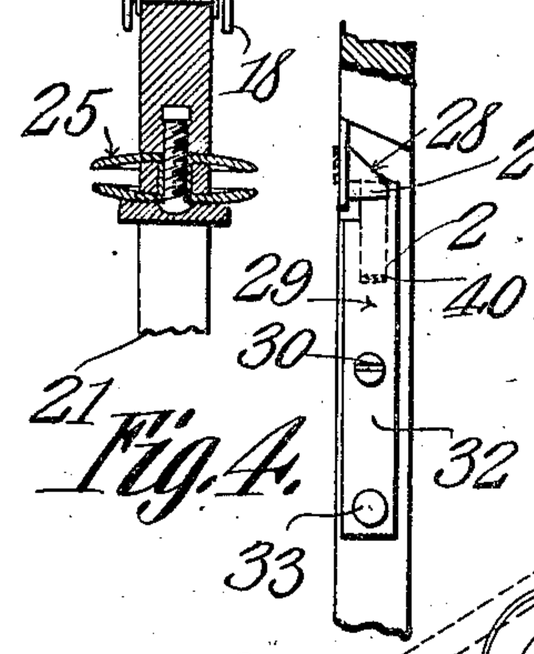

Fig. 1.

Fig. 5.

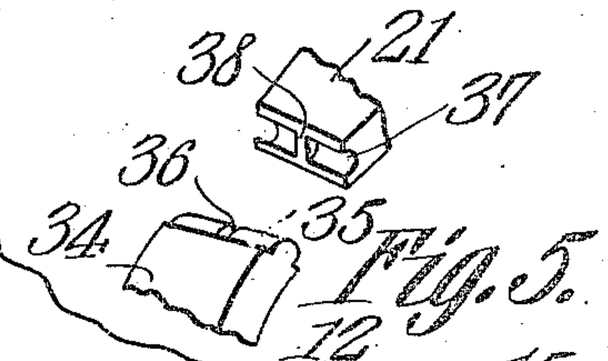

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

JAMES STANLEY DOWNS, OF EASTON, PENNSYLVANIA.

MACHINE FOR APPLYING TAPE TO ARMATURE-COILS.

No. 928,592. Specification of Letters Patent. Patented July 20, 1909.

Application filed August 26, 1908. Serial No. 450,378.

To all whom it may concern:

Be it known that I, JAMES STANLEY DOWNS, a citizen of the United States, residing at Easton, in the county of Northampton and State of Pennsylvania, have invented a new and useful Machine for Applying Tape to Armature-Coils, of which the following is a specification.

This invention has reference to improvements in machines for applying tape to armature coils, and its object is to facilitate the operation of applying tape to the coils preparatory to placing the coils in the grooves of the armature core or body.

The present invention relates more particularly to the winding of that type of armature coils which are first wound upon a suitable form and then the strands are bound together by a winding of tape and the coils thus completed are ultimately placed in the grooves formed in the armature core for the purpose of receiving the coil.

By the present invention any desired degree of tension of the tape upon the strands may be obtained, since the winding is entirely mechanical, and the operator has but to advance the coil slowly through the machine to insure the progressive covering of the strands.

Provision is made by the present invention for the ready insertion in and removal of the formed coils from the winding structure, and the operator may readily predetermine the degree of tension to be applied to the winding tape, so that the strands of the coil are bound together firmly and without danger of subsequent displacement in the operation of the armature.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings, forming a part of this specification, in which drawings—

Figure 1 is a side elevation of the winding machine. Fig. 2 is a plan view of the same with a portion broken away. Fig. 3 is a radial section through the ring for supporting a reel for binding tape, said section being taken through the reel in the plane of the axis of rotation of the ring. Fig. 4 is a view at right angles to that of Fig. 1, of the tension device for the tape. Fig. 5 is a detail view showing the meeting ends of the ring and gate therein in perspective.

Referring to the drawings, there is shown a suitable base 1, near one end of which is formed a pair of parallel guides 2. These guides are undercut to receive a block 3, on which is erected two pedestals 4, 4, receiving the journal 5 of a flanged roller 6. The block 3 is adjustable in the guides 2 to different positions by means of a thumb or set screw 7, arranged to engage in any one of a number of sockets 8 in the base 1, between the guides 2. By this means the block 3 may be held in any one of several adjusted positions for a purpose which will presently appear. On each side of the guides 2 the base 1 is provided with a series of sockets or perforations 9, into any one of which may fit the bottom end of a post 10, and each post, there being one on each side of the guides 2, is provided at its upper or free end with a notch or recess 11, the purpose of which will presently appear. At the end of the base 1, remote from the guides 2 there are other pedestals 12, formed with journal bearings for a shaft 13, carrying near one end a pulley 14 and near the other end a grooved roller 15. The pulley 14 receives power from any suitable source as by means of a belt 16.

Mounted on the base 1 below the grooved or flanged roller 15 is the lower end of a spring arm 17 rising from the base 1 and overhanging the flanged roller 15 and extending a distance toward the guides 2. The upper free end of the arm 17 carries journal bearings 18 for the journal 19 of a flanged roller 20. The several parts are so arranged that the flanged roller 6, the flanged roller 15, and the flanged roller 20 are all in the same vertical plane cutting the axes of the several rollers at right angles.

Mounted upon and supported by the several flanged rollers 6, 15 and 20, is a ring 21, rotatably supported by the several rollers and receiving rotative movement by its engagement with the roller 15, which latter is driven by the shaft 13, receiving motion from the power pulley 14 fastened thereon.

The several parts so far described may all be made of metal with the exception of the flanged roller 15, which may be made in whole or in part of fiber or other suitable material, or its bearing face may be formed of fiber, so as to readily grip the periphery of the ring 21 and impart rotative movement thereto, even when the rotative movement of the ring 21 is subjected to more or less resistance.

Projecting radially inward from the inner face of the ring 21 is a lug 22, the extent of projection of the said lug in an inward di-

rection being considerably less than the radius of the said ring 21. The inner end of the lug 22 is tapped to receive the threaded end of a thumb-screw 23, carrying a sleeve 24 between two dished washers or plates 25, the said sleeve 24 and plates or washers 25 constituting a spool or reel for a purpose which will presently appear.

Fast to the inside of the ring 21 and projecting inwardly therefrom is a bracket 26, terminating in a lip 27, one edge 28 of which is inclined as indicated best at Fig. 4. The bracket 26 also carries an angle finger 28′, the purpose of which will presently appear. Engaging under the lip 27 is the free end of an arm 29, made fast by a screw 30 or otherwise to a lug 31, formed at an appropriate point on the inner edge of the ring 21. The spring 29 is extended beyond the screw 30 and bent away from the lug 31 as shown at 32, and there is engaged by the head of an adjusting screw 33, entering a suitably tapped hole in the lug 31. The thumb or adjusting screw 33 serves to rock the spring 29 about its securing screw 30, to bring the free end of the arm 29 with greater or less force against the lip 27.

The ring 21 is provided with a hinged section 34, the free end of which is formed with a tongue 35 having at about its central point a notch 36. The matching end of the ring 21 where the free end of the hinged section 34 engages it, is formed with a corresponding recess 37, having a central pin or web 38, which enters the notch 36 when the tongue 35 is seated in the recess 37. The ring 21 is slightly elastic so that it may be expanded sufficiently to permit the introduction in or removal of the tongue 35 from the recess 37. This is found in practice to be an ample latch mechanism for the hinged section 34, but it is within the scope of the invention to use any other suitable latch mechanism for holding the hinged section 34 into coincidence with the ring 21, or for permitting the removal of the free end of the said section 34 from engagement with the main body of the ring 21, so that the section 34 may be moved about its hinge.

There is indicated at 39, in dotted lines, an armature winding. This indication is to be taken simply as illustrative, and not in any manner as showing the size or shape of the armature windings, as these windings vary greatly both in shape and size. Let it be assumed, for purposes of illustration, that the armature winding 39 consists of a number of turns of a single strand of wire suitably insulated and suitably shaped, and that it is desired to wind tape upon this winding, in order that the strands may be firmly bound together and also the winding as a whole be insulated from the walls of the grooves of the armature core provided for the reception of the armature winding.

Preparatory to winding the armature coils with tape a suitable roll of tape shown in dotted lines at 40 is applied to the spool formed of the sleeve 24 and the plates or washers 25, this being accomplished by the removal of the thumb-screw 23, which allows the disassembling of the spool for the purpose of applying the tape. The end of the tape is now carried around the finger 28′ and under the lip 27 so as to be engaged by the free end of the spring arm 29. The armature winding 39 is now introduced into the ring 21 through the hinged section 34, and is permitted to rest in the recesses 11 in the upper ends of the posts 10. The free end of the tape 40 is now wound around the armature coil by hand for a turn or two until firmly united thereto, such tape being usually of a more or less adhesive nature, so as to readily unite with the strands of the coil. Power is now applied to the pulley 14 by means of the belt 16, or directly by any source of power, the belt and pulley being simply used as an illustration of any suitable source of power for imparting rotative movement to the flanged roller 15. Suppose that the movement of the pulley 14 be clockwise then the movement of the ring 21 will be counter clockwise. Now the tape will be slowly wound upon the coil 39 by the continued rotation of the ring and the tape will be slowly withdrawn from the roll of tape upon the spool carried by the thumb screw 23, the tension of the tape about the coil 39 being determined by the pressure of the spring arm 29 upon the tape against the lip 27, and the said tape being guided from the spool about the finger thence over the inclined edge and finally between the lip and the spring arm 29, before passing to the coil 39. As the winding progresses the coil 39 is slowly moved in the seat formed by the recesses 11 at the upper ends of the posts 10, so as to cause the tape to be helically wound upon the strands of the coil 39. The movement of the coil 39 to cause the progressive winding of the tape thereon is performed by an operator and requires practically no skill. The winding of the tape upon the coil may progress until the entire coil is covered with tape, when the machine may be stopped and the tape cut, and then by opening the gate 34, the completed coil may be readily removed from the interior of the ring 21. The unwinding of the tape from the reel supporting the same may be determined by the tension of the thumb screw 23 and the dished plates or washers 25 brought by the thumb screw into engagement with the sides of the reel of tape.

In practice it is found that for different sizes of armature coils and for different widths of tape, it is advantageous to have different sized rings 21. In order to accommodate rings of different size is the purpose

of making the block 3 adjustable along the guides 2 to different positions. In the drawings the block 3 is shown as adjustable to three different positions, but, of course, it is to be understood that a greater or less number of adjustments may be provided. By this means the structure is made to accommodate at least three rings 21 of different sizes. The spring arm 17 provides means for the ready removal or insertion of the rings 21 in the several flanged rollers, since it is only necessary to lift the roller 20 away from the ring 21 when the latter may be readily removed from engagement with the other two rollers.

It is to be observed that the machine is adapted for winding tape upon armature coils already formed, whether of the open or closed type. With the closed type of coils, the gate 34 is necessary, but with the open type of coil, if used exclusively, the gate need not be provided. In order that the winding of the tape upon the coils may be best performed the portion of the coils being wound should be substantially in the axis of rotation of the ring 21, and for this reason the posts 10 are made adjustable in the sockets 9 when rings 21 of different sizes are used. Furthermore, the interior of the ring 21 should be quite free and unobstructed, so that ample space is provided for winding the corners of the coils which usually are of rectangular shape, and for accommodating the sides and ends of the coils when they are of the distorted rectangular shape.

It is to be observed that the axis of the tape carrying spool is radial to the axis of the annulus or ring 21. This permits the spool to be brought into quite close relation with the inner periphery of the annulus and still brings the tape into proper relation to the tension means.

It is possible to mount the machine upon a table of suitable height and apply power through a pedal actuated by the operator. Also, for different sized rings, other spring arms 17 may be used so as to always bring the roller 20 over the axis of the ring 21 or the arm may be mounted in guides like the guides 2. Furthermore, instead of driving the ring 21 frictionally by the roller 15, any suitable form of positive drive may be used. For instance the roller and ring may be provided with gear teeth, especially when rings without the gates are used, although it is possible to use gear or other like driving means even with rings provided with gates.

What is claimed is—

1. In a machine for winding tape upon armature coils, an annular tape carrier having a peripheral support and drive, said carrier being provided with a tape-supporting reel participating in the rotative movement of the carrier and also movable about an axis radial to the axis of the carrier, and a tension device on the periphery of the carrier spaced from the tape reel and provided with tape-engaging means in the plane of rotation of the tape reel.

2. In a machine for winding tape upon armature coils, an annular tape-carrier having a peripheral support and drive, said carrier having a tape supporting reel with its axis radial to the axis of rotation of the annulus, and also provided with tension means, both the tape reel and tension means projecting from the inner periphery of the annulus.

3. In a machine for winding tape upon armature coils, a tape supporting reel having axial and orbital movement, the axial movement being about an axis radial to the axis of the orbital movement.

4. In a machine for winding tape upon armature coils, a carrier comprising an annulus, and a number of recessed roller supports therefor, one of which supports constitutes the drive for rotating the annulus, and an elastic arm in which another of said supports is journaled, said arm constituting a means for permitting the movement of the roller journaled thereon away from said annulus to release the latter.

5. In a machine for winding tape upon armature coils, an annular tape carrier, peripheral supporting and driving means therefor, a tape-supporting reel on and interior to the annulus, tension means carried by the annulus, and supports for a formed armature coil having seats for the reception of said coils in the axis of rotation of the annulus.

6. In a machine for winding tape upon armature coils, an annular tape carrier, a supporting drive pulley engaging the exterior of said annulus, another supporting pulley for said annulus engaging the exterior thereof, and elastically mounted for movement away from the annulus to release the same, and a third supporting means for the annulus, spaced from the first named pulley and adjustable with relation thereto, for adapting the machine to annular tape carriers of different diameters.

7. In a machine for winding tape upon armature coils, an annular tape carrier, a roller support therefor constituting the drive for the annulus and engaging the outer periphery thereof, a roller spaced from the first named roller and also engaging and overriding said annulus, and a third roller engaging and under-riding the annulus and adjustable with relation to the other two rollers.

8. In a machine for winding tape upon armature coils, an annular tape carrier, a drive supporting roller therefor, another roller spaced from the drive roller and elastically engaging the periphery of the annulus, another roller spaced from the drive roller and second named roller and also engaging the outer periphery of the annulus, and sup-

ports for the armature coils arranged at each side of the annulus and having means for engaging the armature coils in the axis of rotation of the said annulus.

9. In a machine for winding tape upon armature coils, an annular tape carrier, a tape reel on the inner periphery of said carrier, a tension means also upon the inner periphery of said carrier, a roller engaging the outer periphery of said carrier and constituting a drive and supporting roller therefor, another roller in adjustable relation to the first-named roller and also supporting said carrier to accommodate the machine to carriers of different diameters, and a support for armature coils on each side of the carrier and also adjustable to accommodate them to carriers of different sizes.

10. In a machine for winding tape upon armature coils, an annular tape carrier, said annular carrier having a gate therein for permitting access to the interior of said carrier through the body thereof, a tape reel interior to said annulus and having an axis of rotation radial to the axis of rotation of said carrier, a tension means also on the inner periphery of said carrier, a flanged drive roller engaging the outer periphery of said carrier, another flanged roller engaging the outer periphery of said carrier and adjustable to and from the drive roller, a third roller engaging the outer periphery of the said carrier and elastically supported with relation thereto for movement to and from said carrier, and adjustable supports for armature coils on each side of said carrier and provided with means for holding said coils while being wound with tape from the tape reel on the carrier.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JAMES STANLEY DOWNS.

Witnesses:

H. T. BECKLEY,

JOHN S. NOBLE.