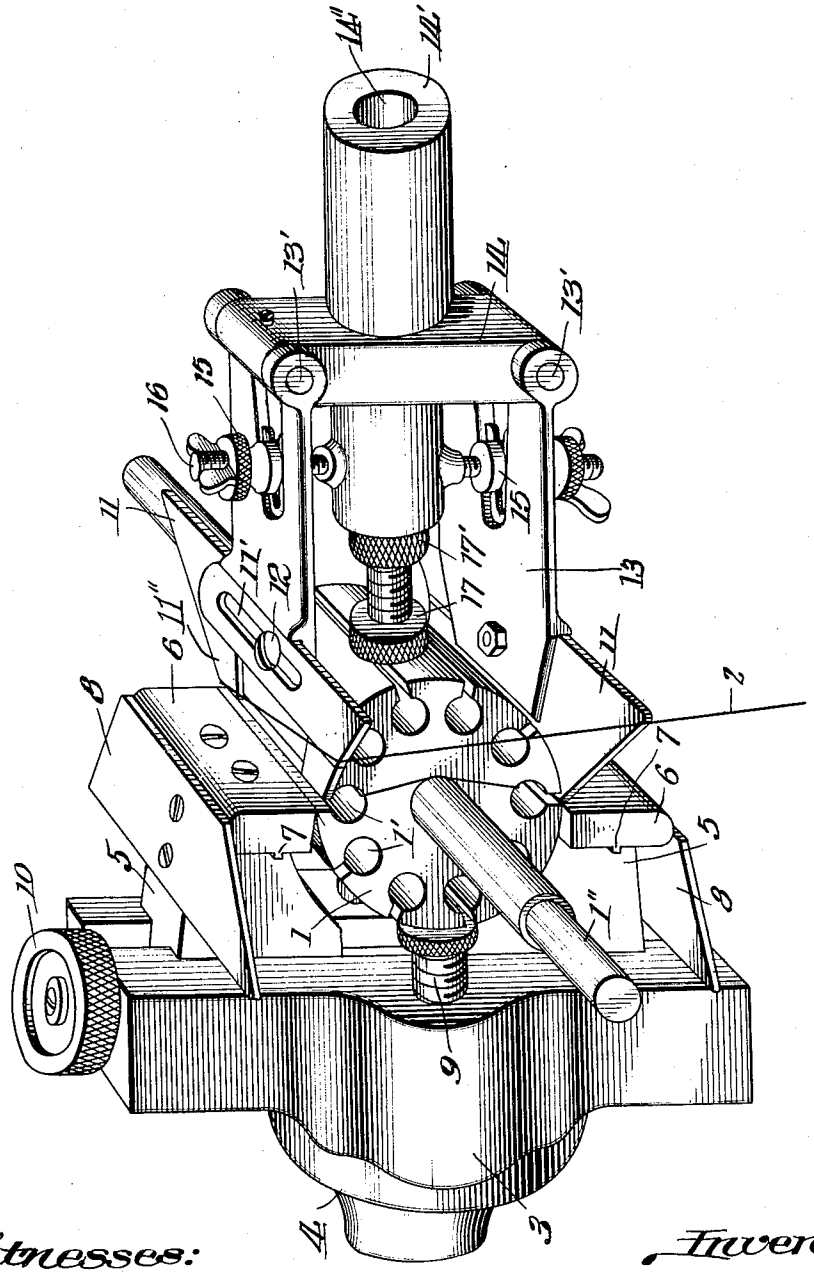
P. E. CHAPMAN.

DRUM ARMATURE WINDING MACHINE.

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1,121,798. Patented Dec. 22, 1914.



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PENROSE E. CHAPMAN, OF ST. LOUIS, MISSOURI.

DRUM-ARMATURE-WINDING MACHINE.

1,121,798. Specification of Letters Patent. **Patented Dec. 22, 1914.**

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To all whom it may concern:

Be it known that I, PENROSE E. CHAPMAN, a citizen of the United States of America, a resident of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Drum-Armature-Winding Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part hereof.

My invention relates to drum armature winding machines, and more particularly to those intended for winding iron-clad drum armatures of the types now universally wound by or with the aid of some form of armature winding machine, of which armatures there are a great variety of sizes and styles in commerce, the vast number of desk fan, ceiling fan, and small power motors being conspicuous examples. In all of the present armature winding machines it is necessary to have a separate and distinct winding machine or device for each size or style of armature wound, rendering a great variety of sizes and styles necessary, and for a repair shop a very large number.

The object of my invention is to provide means whereby any size or style of drum armature may be wound with one single machine within the limits of its capacity, thus making one winding device or machine answer for a great variety if not all of such armatures built, making it possible for the average repair shop to wind armatures by machine where it was almost impossible to do so previously, due to the great variety and number of winding machines required, and reducing the number required by manufacturers.

In all the present types of winding machines the wire directing guides are fixed with reference to each other and the work to be performed, with the exception of the winding machine disclosed in my Patent #874,163 dated December 17, 1907, wherein it will be noted that some of the wire directing guides are mounted in a manner to permit of their movement, in this case to accommodate themselves to irregularities of the winding only, there being no arrangement for operating on more than one sized armature per machine. In the invention herein disclosed this result is accomplished, and it is to be considered in connection with said patent, a number of features in said patent being utilized.

In the drawing is shown a preferred form of my device in perspective, wherein—

1 is an iron-clad drum armature intended for winding, 2 is the coil-forming wire being wound thereon, shown with a couple of turns deposited in the slots 1′, 3 is a two-jawed lathe chuck, of the usual construction having the usual screw arrangement for operating the jaws, and adapted for mounting in a winding lathe by means of the face plate 4 or any other suitable method. The jaws of said chuck are modified for the purpose in view as shown at 5 and carry the removable jaw faces or liners 6 fastened thereto by means of the screws shown therein, the key 7 compelling alinement, thus providing means whereby the liners may be readily changed if desired. These liners have the double purpose of gripping the armature in the manner shown, and of assisting in directing the coil-forming wire within the slots. Removable wings or wire-directing guides 8 are provided for use when the coil is wound partly on both sides of the armature shaft as in diametrical windings.

At 9 are shown depth stops formed of screws threaded into the body of the chuck and having large knurled heads for their ready adjustment, and whose function is to limit the depth to which an armature may be set in the jaws of the chuck 3 thereby facilitating the registry of the slots in the armature with the jaws 6.

10 is a handle or wrench actuating the chuck screw, and made small enough to limit the possible pressure upon the armature core, it being quite possible to damage said core with the usual forms of chuck wrench, and being permanently attached it has the additional advantage that it is never lost.

At 11 are shown wire-directing guides partaking of the funnel characteristic described in the patent hereinbefore referred to.

At 11″ will be noted small horns projecting from the wire directing guides for preventing the coil forming wire catching on the corner of the armature slot, these horns are also noted projecting from the "saddle" in the hereinbefore mentioned patent.

Slots 11′ are provided in the wire-directing guides 11 through which large and thin headed screws 12 are passed to secure said guides in place. The wire-directing guides are made in separate pieces, one for each corner of the armature, and by means of the

slots 11′ therein and the retaining-screws 12 may be adjusted for any length of armature up to their extreme capacity. Each guide or wing 11 carries one of the little horns 11″. These wings are fastened to the flaps 13, which in turn are hinged to the yoke 14 which is made integral with the sleeve 14′ and which is adapted to rotate freely upon a stud or center inserted therein and secured to a tail-stock of a lathe in any suitable manner.

The flaps 13 being hinged at 13′ are arranged to move in a fixed plane, and are restrained and adjusted in place by the grooved nuts 15 traveling on the studs 16 secured to the sleeve 14′ as shown. Into the grooved nuts 15 a portion of the flaps 13 are fitted giving said nuts control of the position of said flaps in the manner shown. The sleeve or tail piece 14′ carries also the screw stop 17 with its lock nut 17′ arranged to limit the longitudinal motion of the entire tail mechanism, and set the depth of the wings with reference to the armature operated upon. It is not intended that said stop shall hold the armature in position, as the jaws of the chuck 3 are for this purpose, and this arrangement reduces the friction load on the lathe considerably. The inner edge of the chuck jaw liners 6 are beveled a little as shown, that they may grip an armature beyond the center without leaving a crack where the edge of the liner adjoins the armature, giving the coil forming wire no chance to catch as it slips over the jaw into the armature slots.

It will be noted that the tail mechanism in this application, composed of the parts 12—13—14—15—16—17, &c., and their appurtenances, is a modification of the "saddle" which carries the movable wire directing guides in the hereinbefore mentioned patent. Among the many types of armatures successfully wound with my device are, iron clad drum armatures of any diameter up to the limits of the winding machine, likewise any length even beyond the capacity, by substituting longer chuck jaws and winding wings, these may be wound with either diametrical bipolar windings, chord windings, and multipolar windings for four or more poles, and these may also be chord wound if desired, and armatures with twisted slots may be wound.

The operation of the device is as follows: The chuck 3 is fitted to the head stock of a winding lathe in any of the usual ways, and the entire tail mechanism is adapted to revolve on a stud fitted to the tail stock and into the hole or opening 14″ in the sleeve 14′. The armature to be wound is gripped between the chuck jaws or liners 6 with the edges of the slots selected for winding registering therewith as shown; and the stops 9 (of which there are two) are adjusted to come in contact with the rim of the armature as shown, that the armature may be held at the correct depth for placing subsequent slots, thereby greatly facilitating the operation. After this the tail mechanism is advanced, and the winding wings 11 are adjusted for the length of the armature by loosening the screws 12 and moving the wings 11 out or in as the occasion may require, the slots 11′ permitting this adjustment, when the wings are again locked in place with the screws 12. These screws are purposely made with a very large thin head that the wire may not be caught thereon, and their slots are made short for the same reason. After the wings are adjusted for length, they are set for the diameter of the work by means of the grooved nuts 15, which control the movement of the flaps 13 and their appurtenances, and which carry the winding wings as above. The wings 11 should be made to bear lightly on the armature and their edges made to register with the edges of the slots 1′ by means of the adjusting stop or screw 17 being locked in position by its lock nut 17′.

In the drawing the armature shown is arranged with the machine set for diametrical winding, that is with the opposite sides of the coils in slots diametrically opposed. If it is desired that the coil be divided with part on either side of the shaft 1″, the wings 8 secured to the chuck jaws are allowed to remain in place, but as the majority of armatures of these types are chord wound—that is have the opposite sides of the coils disposed in slots that are not diametrically opposite,—the wings 8 are frequently removed, as in this event they are unnecessary and in the way, and for the same reason the chuck jaws 6 are not encumbered with a full set of wire-directing guides or surfaces, said surfaces being formed on the removable piece 8, the device thereby being rendered capable of winding both diametrical and chord-wound armatures, the simplification of the chuck jaws just described facilitating the forming of chord windings. When the device is set the winding is commenced by securing the coil forming wire 2 in any suitable manner as to the shaft, and the said wire is held a little to one side or the other of the shaft 1″ and the device rotated by the lathe headstock away from the operator, the chuck 3 doing the driving and the tail mechanism following. The drawing shows the wire being wound on the tail side of the armature shaft 1″. As the device is rotated the coil forming wires strike the beveled edges of the wire directing guides 11 or wings as I have termed them, and slide down to their places in the slots, being prevented from catching on the corners of the slots by the little horns 11″. As the mechanism is ro-

tated the wire being held in position to pass the shaft drops to place along side of it, is then caught by the opposing wing, and slips down it into a slot. The operation is repeated on the reverse end till the proper number of turns are wound. If it is desired that part of the coil be deposited on the opposing side of the armature shaft 1″, with the device set as shown it is only necessary to hold the wire sufficiently far toward the chuck; and this change of position may be made while the device is at full speed, the action being practically the same as on the other side. The horns 11″ may be put on the jaws if desired but are usually omitted. The action of the wire is exactly the same as if it were slipping down a funnel, as it is wound on and slips down the wire directing guides, as is more fully described in the hereinbefore mentioned patent on armature winding machines. When the coil is completed, the usual loop in the coil forming wire made, the armature is rotated to the next position by withdrawing the tail mechanism enough to clear, releasing the chuck jaws with the handle 10 and turning the armature to the next slot and repeating the operations as above till the armature is completely wound. The operation as described is practically the same for winding all other types of windings, varying only in minor details. Armatures with twisted slots are wound by gripping them with the chuck jaws alined with a corner only of the slots allowing the other corner of a slot to project out beyond the jaws, alining each of the wings 11 with the slot corner coming in position with it, by twisting or setting the wings at an appropriate angle. For multipolar windings, the armature is gripped at any convenient place by the chuck jaws, preferably in alinement with a slot, the tail mechanism backed off till the wings can be brought to aline with the slots selected for winding. The coil forming wire is fed to the device exactly the same as for other windings. Setting the jaws or one of them in alinement with a slot facilitates resetting of the armature, giving a tangible guide to work to.

It is obvious that many forms of wire directing guides will operate in connection with this device, as well as the one of my invention portrayed herein. Whether the device is rotated, and the coil forming wire fed to it, or it remains stationary and the wire rotated around the work is immaterial.

I do not limit my device to the exact form herein portrayed as there are many modifications that may be made without departing from the spirit of my invention, but the form shown herewith is a preferred form.

I claim—

1. In an armature winding machine, the combination of wire directing guides with means for adjusting said guides diametrically with reference to the armature to be wound.

2. In an armature winding machine, the combination of wire-directing guides, with adjustable stops, for setting the position of said guides at right angles to the plane of the coils being wound, registering said guides with slots in armature being wound.

3. In an armature winding machine the combination of a chuck, having transversely adjustable jaws, with wire directing guides attached to said chuck.

4. In an armature winding machine, the combination of adjustable means for holding an armature in position for winding, with wire directing guides, and means for adjusting diametrically said guides with reference to the diameter of said armature.

5. In an armature winding machine, the combination of adjustable means for holding an armature in position, with wire directing guides, means for adjusting said guides diametrically, and means for adjusting said guides longitudinally with reference to the armature to be wound.

6. In an armature winding machine, the combination of adjustable means for holding an armature, diametrically and longitudinally adjustable wire directing guides, with means for adjusting said guides at right angles to the plane of said armature shaft, for registering said guides with slots in said armature, substantially as described.

7. In an armature winding machine the combination of an adjustable chuck having movable jaws, with wire directing guides attached to said movable jaws, substantially as described.

8. In an armature winding machine, the combination of an adjustable chuck having movable jaws for holding an armature, wire directing guides, and adjustable stops for setting the position of said armature within said holding device, for registering the slots in said armature with wire directing guides carried by said armature holding device.

9. In an armature winding machine the combination of an adjustable chuck having movable jaws, with wire directing guides fitted to a tail piece or mechanism independently of said chuck.

10. In an armature winding machine, the combination of an adjustable chuck having movable jaws for holding an armature with adjustable wire directing guides mounted upon a tail piece, and stops for adjusting their position with reference to the slots in said armature, substantially as described.

11. In an armature winding machine, the combination of an adjustable chuck having movable jaws for holding an armature, adjustable wire directing guides mounted upon a tail piece, stops for adjusting said guides,

with adjustable carriers or flaps supporting said guides, substantially as described.

12. In an armature winding machine, the combination of an adjustable chuck having movable jaws for holding an armature, adjustable wire directing guides mounted upon a tail piece, stops for adjusting said guides, adjustably mounted guide carriers, with means for adjusting said carriers.

13. In an armature winding machine, the combination of an adjustable means for holding an armature, adjustable wire directing guides mounted upon a tail piece, stops for adjusting said carriers, and a supporting frame or yoke having provisions for allowing the free rotation of the entire tail mechanism upon a stud or shaft, substantially as described.

14. In an armature winding machine, the combination of an armature holding chuck, wire directing guides mounted upon said chuck, depth stops mounted upon said chuck, and a tail piece carrying adjustable wire directing guides said guides being adjustable by means of the mechanism of said tail piece diametrically and longitudinally, and transversely with reference to the armature to be wound, said adjusting means consisting of independent guides retained in place on a carrier by screws passing through slots in said guides, said guide carriers being hinged to a frame, and retained in position by adjusting screws, depth stops being attached to said frame, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PENROSE E. CHAPMAN.

Witnesses:

CHAS. HUNDEMER,

E. F. SIEDLER.