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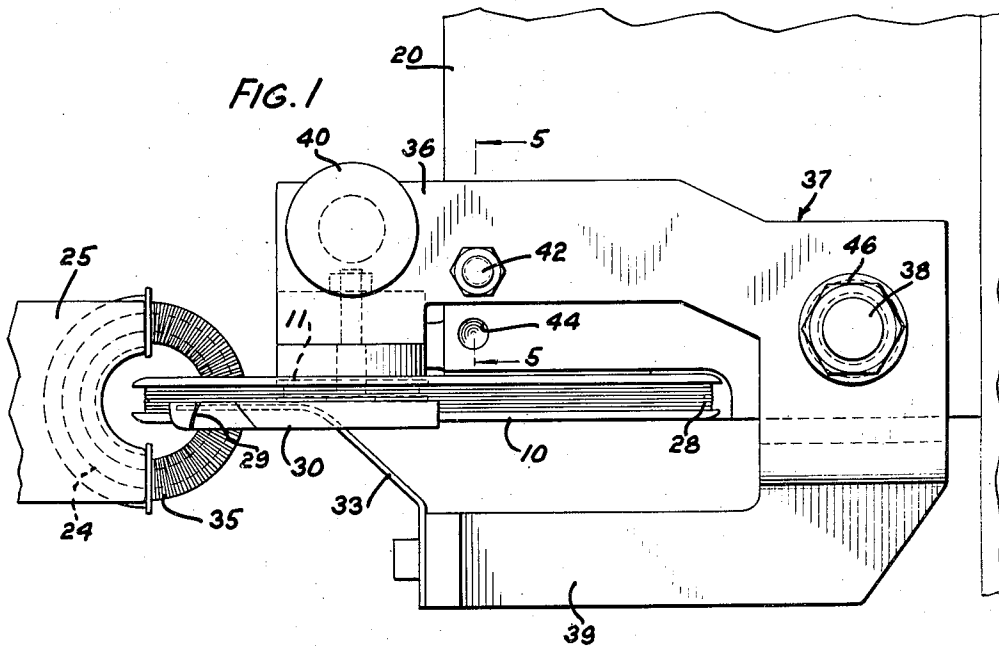
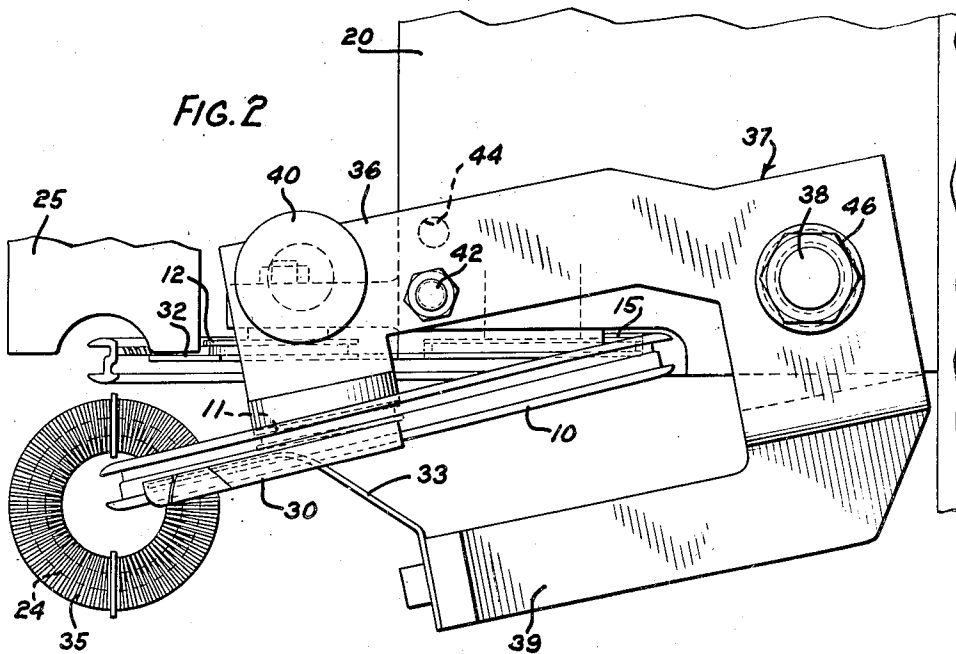
A. L. QUINLAN

2,326,969

WINDING MACHINE

Filed Dec. 9, 1941

2 Sheets-Sheet 1



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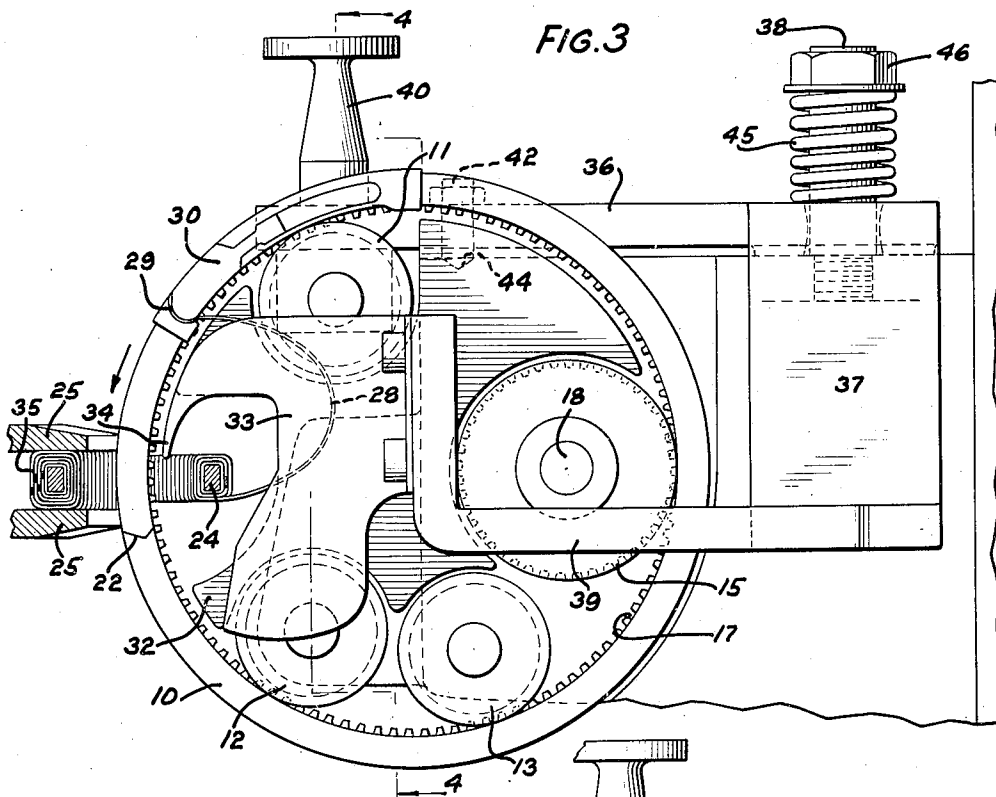
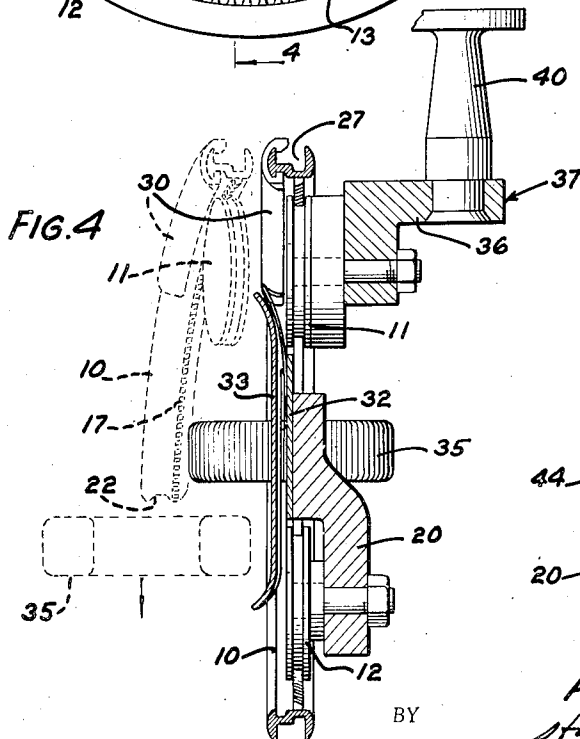
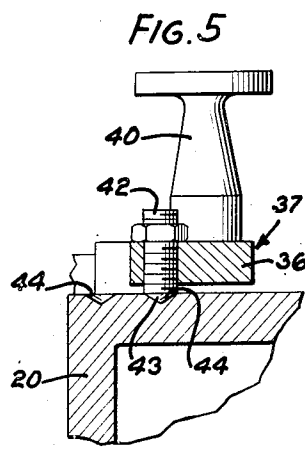
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WINDING MACHINE

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2 Sheets-Sheet 2



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2,326,969

WINDING MACHINE

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Application December 9, 1941, Serial No. 422,195

14 Claims. (Cl. 242-4)

This invention relates to winding machines, and more particularly to improvements in machines for winding toroidal coils of the type in which the wire is wound on a closed ring-shaped core.

An object of the invention is to provide a simple, inexpensive and efficient machine for winding toroidal coils.

In accordance with the above object, one embodiment of the invention contemplates the provision of a toroidal coil winding machine in which a laterally split one-piece winding ring is rotatably supported upon a series of grooved rollers, one of which is mounted for lateral movement to laterally deflect one of the split ends of the winding ring, whereby the ring is sprung open to permit the insertion of the core and the removal of the coil. The movable guide roller is mounted on a pivoted support, which also carries a wire guide which extends into the central opening of the core for guiding the wire on the core.

Other features and advantages of the invention will become apparent from the following detail description when read in conjunction with the accompanying drawings, in which

Fig. 1 is a fragmentary plan view of a toroidal coil winding machine embodying the features of the invention;

Fig. 2 is a fragmentary plan view, similar to Fig. 1, but with the winding ring shown in the open position;

Fig. 3 is a fragmentary side elevational view of the machine;

Fig. 4 is a vertical sectional view taken on line 4-4 of Fig. 3; and

Fig. 5 is a fragmentary sectional view taken on line 5-5 of Fig. 1.

The winding machine illustrated in the drawings comprises a one-piece winding ring 10, which is rotatably supported upon three grooved guide rollers 11, 12 and 13 and is driven by a driving gear 15 connected to a suitable source of power (none shown). The inner surface of the winding ring is formed with gear teeth 17, 17 for engagement with the driving gear, which is mounted on a horizontal shaft 18. This shaft and the stub shafts which support the two lower guide rollers 12 and 13 are rotatably journaled in suitable bearings provided in a supporting frame 20, only portions of which are shown in the drawings.

The winding ring is formed of spring steel and has a separable transverse joint 22, whereby it may be sprung open by laterally shifting one of the joined ends out of alignment with the other end, as shown in Fig. 2. This permits the winding ring to be interlinked with a closed ring-shaped core 24, upon which the wire is to be wound to form a toroidal coil. After being

interlinked with the core, the winding ring is closed and the core is clamped between a pair of clamp members 25-25, only portions of which are illustrated in the drawings. These clamp members are adapted to be oscillated either manually or by suitable mechanical means (not shown), whereby the core may be oscillated about its axis to distribute the wire thereon.

The winding ring is provided on its outer surface with a circumferential with storage groove 27 that is capable of accommodating a predetermined amount of wire 28, which is wound on the winding ring after the latter has been interlinked with the core, as described above. Before starting the winding of the coil, the outer end of the wire on the winding ring is attached to the core after being threaded through a wire guiding slot 29 of a slider 30 which is slidably mounted on one side of the winding ring. The winding ring is then rotated in the direction indicated by the arrow in Fig. 3, whereby the wire is withdrawn from the winding ring and applied to the core while the latter is oscillated to distribute the wire evenly thereon. As the wire is withdrawn from the winding ring, the slider 30 is caused by the wire to slide around the winding ring in a manner well known in the art.

For the purpose of guiding the wire and holding it taut as the slider approaches the core, the loop of wire between the slider and the core is yieldably pressed between a stationary vertical plate 32 and a spring plate 33. The latter plate is formed with a wire guiding finger 34, which extends into the central opening of the core and serves to guide the wire on the core.

In order to facilitate the opening of the winding ring to insert a core 24 and/or remove a finished coil 35, the upper winding ring supporting roller 11 is mounted on a forwardly projecting horizontal arm 36 of an angular bracket 37, which is loosely mounted for pivotal movement on a vertical post 38 secured to the frame 20. The bracket has a second forwardly projecting horizontal arm 39 to which the spring plate 33 is attached. Thus, this spring plate and the upper winding ring supporting roller 11 are movable with the bracket when the latter is swung about the vertical post 38. A handle 40 is provided on the forward end of the bracket arm 36 for convenience in manually shifting the bracket between the two positions shown in Figs. 1 and 2. The bracket is yieldably held in either of these positions by a set screw 42 which is secured to the bracket arm 36 and has a conical point 43 which is receivable in either of two conical depressions 44-44 in the frame 20 to hold the bracket in either of the two positions. A compression spring 45 is interposed between the upper surface of the bracket and

a nut 46 secured to the upper end of post 38. This spring presses downwardly on the bracket, thus holding the set screw 42 in one or the other of the conical depressions 44.

In Fig. 1 of the drawings, the winding ring is closed and the pivotal bracket 37 is in the position it assumes when the winding ring is closed. In order to open the winding ring to permit the insertion of a toroidal core and/or the removal of a toroidal coil, it is necessary to first remove all wire from the winding ring. The winding ring is then rotated to the position in which the joint 22 is disposed on the front side of the ring and just below the clamp members 25, as shown in Fig. 3. Then, by means of the handle 40, the bracket arm 36 is lifted sufficiently to disengage the holding screw 42 from the conical depression 44 and separate the winding ring at the joint 22. The bracket is then swung counter-clockwise (Fig. 1) to the position in which it is shown in Fig. 2, wherein it is held by the engagement of the holding screw 42 with the other conical depression 44. The upper winding ring supporting roller 11 moves with the bracket arm 36, whereby the upper end portion of the winding ring, which is constrained to move with the roller, is deflected laterally or sprung open with respect to the lower portion of the ring, as shown in full lines in Fig. 2, and in broken lines in Fig. 4. The spring plate 33, being attached to the bracket arm 39, moves laterally outwardly with the deflected portion of the winding ring, so that the previously wound coil is freely removable from the wire guiding finger 34 as well as from the deflected end portion of the winding ring. Before closing the winding ring, another core 24 is slipped upon the wire guiding finger 34 and upon the deflected end portion of the winding ring, and after closing the winding ring by shifting the pivotal bracket 37 to the position shown in Fig. 1, the newly inserted core is clamped between the clamp members 25 and is thus properly positioned for the winding operation.

It will be obvious from the above description that a simple and convenient means is provided for opening the winding ring and for simultaneously shifting the wire guiding finger 34 with the deflected end portion of the winding ring to permit the insertion of the core and the removal of the coil. It should be understood, of course, that the invention is not limited to the specific embodiment thereof herein illustrated and described, but is capable of other applications within the scope of the appended claims.

What is claimed is:

1. In a machine for winding toroidal coils, a one-piece winding ring having a normally closed transverse joint, a grooved roller for rotatably supporting said winding ring, and means for moving said roller to laterally deflect a portion of said winding ring to open said ring at said joint.

2. In a machine for winding strand material on a toroidal core, a winding ring having a normally closed transverse joint, a grooved roller for rotatably supporting said winding ring, and a support for said roller mounted for movement to move said roller laterally of said winding ring and thereby laterally deflect a portion of said winding ring to open said ring at said joint.

3. In a machine for winding strand material

on a toroidal core, a one-piece winding ring having a normally closed transverse joint, a supporting frame for said winding ring, and a member pivotally mounted on said frame for opening said winding ring at said joint.

4. In a machine for winding toroidal coils, a one-piece winding ring having a normally closed transverse joint, and means for opening said winding ring at said joint, said means comprising a grooved roller engaging the inner surface of said ring, and a support for said roller mounted for movement about an axis substantially perpendicular to the axis of said winding ring.

5. In a machine for winding toroidal coils, a winding ring having a normally closed transverse joint, a plurality of grooved rollers for rotatably supporting said winding ring, and means for moving one of said rollers laterally with respect to the other rollers to laterally deflect a portion of said winding ring and thereby open said ring at said joint.

6. In a machine for winding toroidal coils, a winding ring having a normally closed transverse joint, a grooved roller engaging the inner surface of said ring, a support for said roller mounted for lateral movement with respect to said ring, and a wire guide movable with said support.

7. In a machine for winding toroidal coils, a one-piece winding ring having a normally closed transverse joint, a series of grooved rollers engaging the inner surface of said ring, a pivotal support for one of said rollers, and a stationary support for the remaining rollers.

8. In a machine for winding toroidal coils, a one-piece winding ring having a normally closed transverse joint, a series of grooved rollers engaging the inner surfaces of said ring, a movable support for one of said rollers, and a wire guide movable with said support.

9. In a machine for winding toroidal coils, a winding ring having a normally closed transverse joint, and a guide member for said winding ring mounted for movement laterally of said ring for opening said ring at said joint.

10. In a machine for winding toroidal coils, a winding ring having a normally closed transverse joint, and a guide member for said winding ring mounted for movement radially of said ring for opening said ring at said joint.

11. In a machine for winding toroidal coils, a winding ring having a normally closed transverse joint, and a guide member for said winding ring mounted for movements radially and laterally of said ring for opening said ring at said joint.

12. In a machine for winding toroidal coils, a winding ring composed of resilient material and having a normally closed transverse joint, a guide member for said winding ring mounted for movements first radially and then laterally of said ring for opening said ring at said joint, and a wire guide movable with said guide member.

13. In a machine for winding strand material on a toroidal core, a winding ring having a normally closed transverse joint, a supporting frame for said winding ring, and a member movably mounted on said frame for opening said winding ring at said joint.

14. In a machine for winding strand material on a toroidal core, a winding ring having a normally closed transverse joint, a supporting frame for said winding ring, a member movably mounted on said frame for opening said winding ring at said joint, and a wire guide movable with said member.

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