Jan. 2, 1940. F. C. BERGER 2,185,883

STRAND WINDING MACHINE

Filed Jan. 19, 1939

FIG. 1

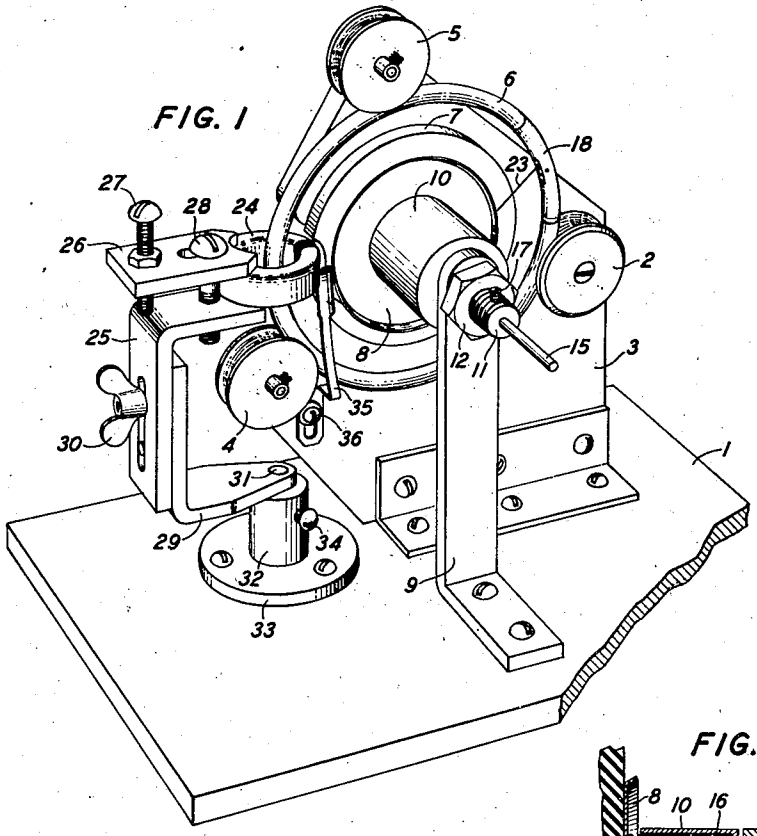


FIG. 3

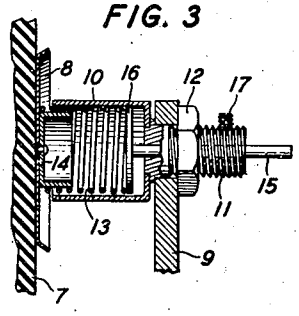
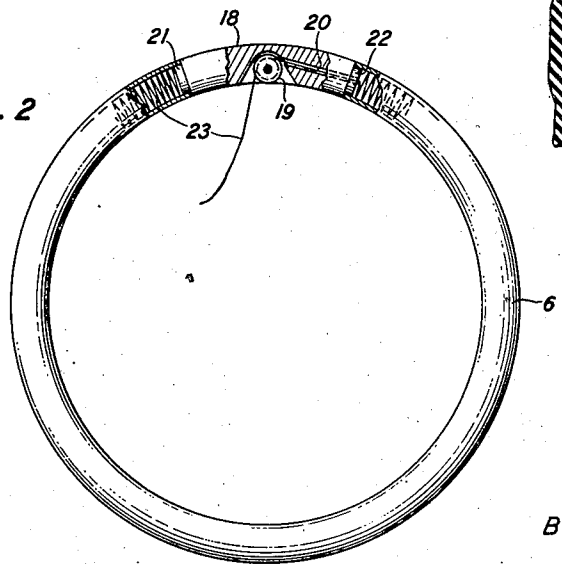


FIG. 2



INVENTOR
F. C. BERGER
BY
R. M. Jackson
ATTORNEY

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STRAND WINDING MACHINE

Frederick C. Berger, Brooklyn, N. Y., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

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1 Claim. (Cl. 242—4)

This invention relates to a machine for winding strand material on an annular ring and more particularly for winding wire on a toroidal core to produce an electric coil.

In machines of this type it is necessary that the strand material or wire to be wound on the core be stored on a device which may pass through the space enclosed by the ring in order that the strand may be properly wound. For rings of small diameter which are commonly used in telephone practice the storage device must be small and at the same time have a fairly large wire storage capacity. It is also necessary that some means be provided to maintain tension at all times between the strand applied to the ring and that being fed from the storage device. Heretofore, many machines have been proposed for this purpose which have had varying degrees of success.

This invention has as an object a winding machine for annular rings, which is of simple construction and inexpensive to manufacture.

Another object of this invention is a winding machine in which the strand material is maintained under substantially uniform tension during the winding process.

A further object of the invention is a machine in which the strand storing device is sufficiently small to pass through the enclosed space of small annular rings and still have a reasonably large strand storage capacity.

To accomplish these objects the winding mechanism of this invention comprises a single hollow ring having a removable section with one or more pulleys or rollers and a hole in the inner peripheral part. The strand material is stored in the hollow portion of the ring in the form of a helix and is fed out over a pulley and through the hole in the removable section. A spring actuated plate forms a part of the means for maintaining the proper tension on the strand.

The invention with its objects and features will be understood from the following detailed description and the attached drawing forming a part thereof.

In the drawing:

Fig. 1 is a side perspective of the machine;

Fig. 2 is a side elevation of the storage and winding ring with a part of the ring cut away to show the details thereof; and

Fig. 3 shows in partial section the spring-pressed plate for maintaining tension in the strand.

For the purposes of description and illustration a machine has been chosen which is adapted for winding wire about a toroidal core which may be of magnetic material to produce a transformer, an inductance coil or other similar electric coil. The machine is mounted on a base 1 which may be of metal, wood or other suitable material. An electric motor (not shown) drives grooved pulley 2 through a gear train or other mechanism enclosed in housing 3. Housing 3 also supports two grooved idler pulleys 4 and 5 which, together with pulley 2, support hollow ring 6. Pulley 2 is faced in its groove with a friction material to aid it in driving ring 6. Also attached to housing 3 substantially centrally of ring 6 is a disc 7 of somewhat less thickness and of smaller diameter than rings 6.

Spring-pressed against disc 7 is a thin metal plate 8 having its peripheral edge bent slightly away from disc 7. Plate 8 is adjustably pressed against disc 7 by means of the structure shown in detail in Fig. 3. Near the top of standard 9 is a hollow cylinder 10 held by means of screw-threaded portion 11 and nut 12. Enclosed in the hollow cylinder 10 is a helical spring 13 which fits over a cup-shaped piece 14 riveted to plate 8. A smooth rod 15 passes through an axial hole in threaded portion 11 and has on its inner end a thin piston 16 of the same diameter as the outside diameter of the helix of spring 13. The pressure of spring 13 is adjusted by moving rod 15 and attached piston 16 as will be readily understood. Rod 15 is held in place after adjustment is made by means of set screw 17 or other suitable means.

Hollow ring 6 as shown in Fig. 2 has a removable solid section 18 near the central portion of which is a pulley 19. A hole 20 is provided in section 18 from one end thereof to the recess containing pulley 19. On the ends of section 18 are reduced portions 21 and 22 which fit snugly into the hollow portion of the ring. The ring 6 has sufficient spring to permit section 18 to be snapped into place and held.

The wire 23 is stored in the hollow ring in the form of a helix. Placing the wire in the ring may be conveniently done by winding it on a thin mandrel, entering the mandrel in the hollow portion and pushing the wire into the ring while withdrawing the mandrel.

The toroidal core 24 to be wound is held in position by means of angle plate 25, flat plate 26, and bolts 27 and 28 as shown. Angle plate 25 is adjustably attached to another angle plate 29 by means of bolt and wing nut 30. Angle piece 29 is provided with a rod 31 which extends

into a bearing 32 on plate 33. The supporting structure may be moved about rod 31 as a pivot to position core 24 during the winding process or it may be held fixed by means of set screw 34.

A flexible strip 35 is adjustably held by screw 36, as shown, against disc 7 to aid in maintaining the tension of the wire after it passes from under plate 8.

To operate the machine, ring 6 is taken therefrom by removing section 18 which permits the ring to be withdrawn from the pulleys. The wire is then placed in the ring as explained above and the core clamped between plates 25 and 26. After passing the ring through the core it is positioned on the pulleys. One end of the wire is then drawn out and threaded through hole 20 in ring section 18 and over pulley 19 contained therein. Section 18 is then snapped into position in ring 6 and the ring moved until section 18 is near core 24. Sufficient wire should be drawn out to make one or two turns around the core and then the machine is started, moving the ring in a counterclockwise direction as viewed in Fig. 1.

As the ring section 18 moves in the lower half of the revolution more wire is drawn from the ring than is required until it reaches a position diametrically opposite the core when the maximum amount of wire for the revolution will have been withdrawn. During the remainder of the revolution no more wire is withdrawn but that which has already been withdrawn becomes slack. On the next revolution only a small amount of wire will need be withdrawn and this will occur just before the pulley of section 18 reaches its most distant point from the core. At this point there will be a sudden withdrawal with danger of wire breakage. To avoid this, plate 8 and flexible strip 35 are provided.

It is readily seen from Fig. 1 that as the wire 23 is drawn around the core and section 18 moves away the wire will be drawn between plate 8 and disc 7. This will maintain the tension in the wire and take up the slack as section 18 moves through the upper part of the revolution. After section 18 passes through the core the wire is drawn over the core and out from between plate 8 and disc 7.

Since plate 8 is somewhat smaller in diameter than disc 7 there is a space between plate 8 and the cut-out or reentrant portion of disc 7 where the wire would be free. To bridge this space and maintain some tension on the wire, flexible strip 35 is provided. This strip presses against disc 7 and the wire is drawn between it and disc 7 just before it is applied to the core. The wire is, therefore, maintained under substantially constant tension for the complete turn about the core and no shock occurs to cause a sudden snap and resultant breakage of the wire.

It is to be understood that whereas this specific description has been directed to one form which the invention may take, many variations thereof may be made and the invention is, therefore, to be limited only by the scope of the appended claim.

What is claimed is:

A winding machine for winding strand material around closed cores comprising a hollow ring, strand material stored in said hollow ring, said ring having a hole through which said strand material may be withdrawn, means to rotate said ring and means to maintain tension in said strand as it is being wound on said core, said tension means comprising a fixed plate in the area enclosed by the ring and a second plate resiliently pressed against said fixed plate between which plates said strand is drawn.

FREDERICK C. BERGER.