

Dec. 15, 1953

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2,662,693

COUNTER FOR COIL WINDING MACHINES

Filed May 19, 1951

FIG. 1

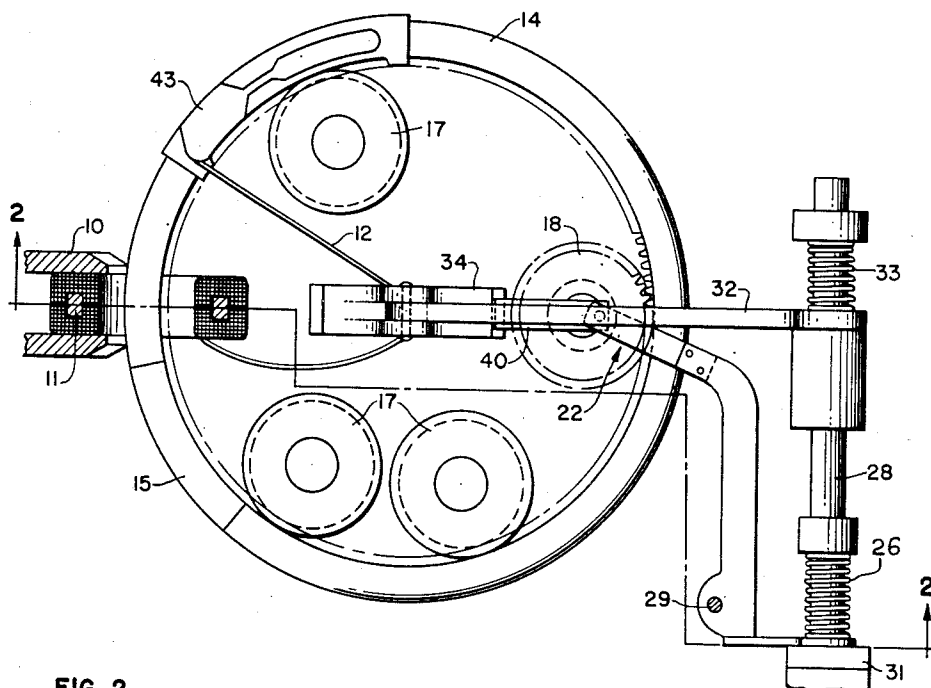
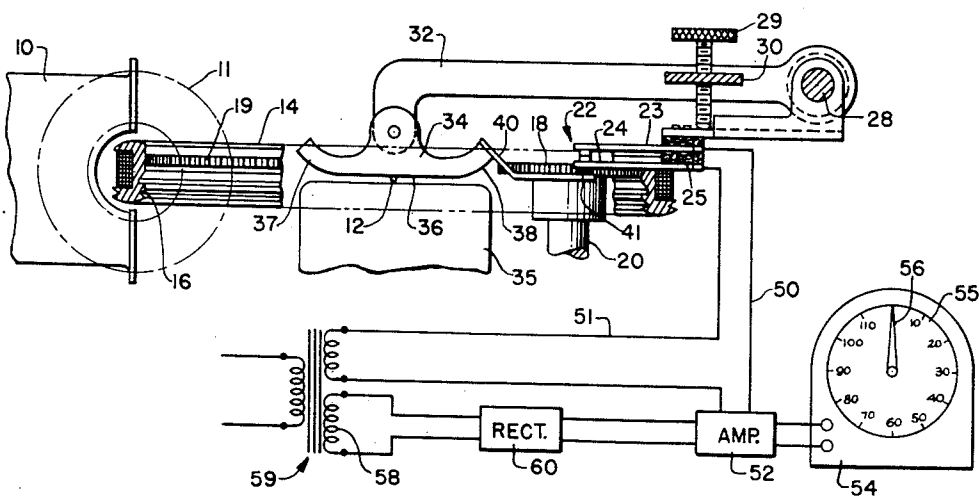


FIG. 2



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2,662,693

COUNTER FOR COIL WINDING MACHINES

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Application May 19, 1951, Serial No. 227,194

4 Claims. (Cl. 235—92)

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This invention relates to counters for coil winding machines, and more particularly to counters for the slider type toroidal winding machines.

Toroidal winding machines are employed in winding coils of insulated electrical conductors on annular cores, and include shuttles usually equipped with removable segments so that the annular cores may be singly mounted for the shuttle to travel therethrough about its axis. Such a shuttle is filled with a supply of insulated wire sufficient to form a coil on the core, and the leading end of the wire is threaded on the core. If the machine is of the slider type, that is, if it employs a wire guide slidably mounted on the shuttle for movement therewith and relative thereto, the wire is threaded through the usual groove in the guide or slider.

In the present state of the art, it has been difficult to count the exact number of turns which the slider winds on the core. This condition has existed because, while the shuttle rotates at a constant rate of speed during the winding of the coil, the slider slips backwards on the shuttle an amount sometimes equal to the length of one turn of the coil during each revolution of the shuttle, giving the slider a constantly varying rate of speed. It has been proposed to provide a counter and means operable by the loop of wire between the core and the slider, but no apparatus sufficiently sensitive to be consistently actuated by the loop has been provided hitherto.

An object of the invention is to provide new and improved counters for coil winding machines.

Another object of the invention is to provide a counter for a coil winding machine which is sensitive, simple in structure and highly accurate in counting the exact number of turns wound on a core.

A counter illustrating certain features of the invention may include an abutment positioned in the path of a strand being wound around a core, a flared shoe, means urging the shoe toward the abutment, a counter, means for operating the counter, and an arm carried by the shoe for actuating the counter-operating means when the shoe is moved away from the abutment by a loop advanced between the abutment and the shoe.

A complete understanding of the invention may be obtained from the following detailed description thereof, when read in conjunction with the appended drawing, in which:

Fig. 1 is a fragmentary vertical section of a

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toroidal winding machine including a counter embodying the invention, and

Fig. 2 is a fragmentary horizontal section taken along line 2—2 of Fig. 1.

Referring now in detail to the drawings, there is shown therein a toroidal winding machine including a clamp 10 for holding an annular core 11 during the winding of a given number of turns of insulated wire 12 upon approximately one-half of the core also for supporting the partially wound core during the winding of convolutions of the wire upon the other half of the core. The clamp is rocked about the centerline of the core in the conventional manner during the winding operations. The machine includes a shuttle 14 having a section closed by a removable segment 15 after the core has been mounted in the clamp 10. The shuttle 14 has an annular track 16 completed by the segment 15, and has a supply of the wire 12 thereon prior to the operation of the machine to wind the convolutions of the wire on the core. The shuttle is supported by rollers 17—17 and a driving gear 18, which engages teeth 19—19 on the inner periphery of the shuttle 14 and its segment 15. A driving shaft 20 for the gear 18 is driven by suitable means (not shown).

A switch 22 including a rigid contact arm 23, a spring contact arm 24 and a block 25 of electrical insulating material is mounted on one end of a torsion spring 26 fastened and mounted at its other end to a fixed post 28. The spring urges the switch in a clockwise direction, as viewed in Fig. 2, to hold the contact arm 23 against a thumb screw 29 supported by a bracket 30 rigidly secured to the base 31 of the machine. An arm 32 mounted pivotally on the post 28 is urged by a torsion spring 33 in a counterclockwise direction to press an elongated shoe 34 against a boss 35 having a rounded edge. The shoe 34 is mounted pivotally on the arm at the central portion of the shoe. The shoe is provided with a straight central portion 36 and rocker-like end portions 37 and 38. A switch-closing arm 40 fastened rigidly to one end of the shoe carried an insulating presser 41 thereon.

The wire 12 (Fig. 1) is revolved around the core by the shuttle 14, and is payed off the shuttle by a slider 43, the operation of which is such that a loop of the wire is formed for each complete revolution of the slider. Each loop is pulled laterally of the wire between the boss 35 and the shoe 34. At first, the wire pushes the righthand end of the shoe, as viewed in Fig. 2, away from

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the boss, and the arm 32 is moved away from the boss against the action of the spring 33. This swings the arm 40 in a counterclockwise direction. These movements of the arms 32 and 40 and the shoe 34 continue until the wire reaches the center of the shoe, and the arm 40 presses the spring contact arm 24 into engagement with the contact arm 23. This completes a circuit including the contact arms 23 and 24 and conductors 50 and 51 to an amplifier 52, which actuates an impulse counter 54. The counter includes a dial 55 and a pointer 56. The amplifier and the counter are energized from a secondary winding 58 of a transformer 59 through a rectifier unit 60. The impulses from the main circuit are amplified by the amplifier, each impulse causing rotary movement of the pointer 56 of the counter one position relative to the dial 55.

Operation

The shuttle 14 with its segment 15 is rotated at a constant rate of speed, the slider 43 following the shuttle at varied speeds under the control of the wire 12 during the forming of the each loop which eventually becomes one turn or convolution on the core. The wire in passing from the slider 43 is guided between the shoe 34 and the boss 35 by the tapering approach portions thereof, and pivots the shoe 34 and the arm 40 in a clockwise direction, as viewed in Fig. 2. The arm 40 presses the switch contact arm 24 toward the contact arm 23, and as the wire is moved toward the center of the shoe, the contact arms are closed to actuate the impulse counter to indicate the turn. After the wire passes the center of the shoe, the shoe is pivoted clockwise and the switch 22 opens. The length of the arm 40 and the pivotal mounting of the shoe are such that the effect of the pivotal movement of the shoe is greatly magnified. Hence, the apparatus works very accurately on even very small wires. The operation of the apparatus continues, and when the pointer indicates the desired number of convolutions for the present portion of the core, the machine may be stopped and conditioned for another operation.

Although specific improvements of the invention have been shown and described, it will be understood that they are but illustrative and that various modifications may be made therein without departing from the scope and spirit of this invention as defined by the appended claims.

What is claimed is:

1. A counting device for a winding machine provided with means revoluble relative to a core for winding a strand on the core with a loop between the winding means and the core moved along a predetermined path each turn, which comprises an abutment positioned on one side of said path, an elongated shoe having a rounded end portion, means mounting the shoe pivotally at a point between the ends thereof and urging the shoe toward the abutment from the side of said path opposite that at which the abutment is positioned so that the loop of the strand pivots the shoe away from the abutment as the loop is advanced therebetween; a counter, and an arm secured rigidly to and projecting from one end of the shoe for actuating the counter when the shoe is pivoted by the loop of the strand.

2. A counting device for a winding machine provided with means revoluble relative to a core

for winding a strand on the core with a loop of the strand between the winding means and the core moved along a predetermined path each turn, which comprises an abutment extending along on one side of said path, an elongated rocker, a pivotal arm carrying the rocker pivotally at a point between the ends of the rocker, means urging the arm in a direction such as to urge the rocker toward the abutment from the side of said path opposite the abutment so that the loop of the strand pivots the rocker relative to the abutment, a counter, means including a switch for actuating the counter, and an arm secured to and projecting from one end of the rocker for actuating the switch when the rocker is pivoted by the strand.

3. A counting device for a winding machine including means for holding an annular core and a shuttle revoluble relative to the core for winding a strand on the core with a loop of the strand between the winding means and the core moved along a predetermined path each revolution of the shuttle, which comprises an abutment positioned on one side of said path, a rockable shoe having rounded end portions, a post, a mounting arm mounted pivotally on the post mounting the rocker pivotally and urging the shoe toward the abutment from the side of said path opposite the abutment so that the strand pivots the shoe away from the abutment as it is advanced therepast, a counter, an actuating arm secured to and projecting from one end of the shoe, means for operating the counter, a switch for actuating the counter-operating means mounted pivotally on the post in the path of the actuating arm, means urging the switch away from the actuating arm, and adjustable means for limiting movement of the switch away from the actuating arm.

4. A counting device for a winding machine, which comprises a counter, an abutment, a post, an L-shaped arm mounted pivotally on the post, an elongated shoe having a flared end mounted pivotally on the arm at a point on the shoe intermediate the ends of the shoe, a torsion spring on the post urging the shoe toward the abutment, a second arm mounted pivotally on the post, a switch mounted on the second arm for actuating the counter, a second torsion spring mounted on the post urging the second arm in such a direction as to move the switch toward the first arm, an adjustable stop limiting movement of the switch toward the first arm, and a switch actuator carried by the shoe and extending substantially therebeyond for actuating the switch when a strand is moved between the shoe and the abutment to pivot the shoe.

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