

[54] DOUBLE NEEDLE WINDING HEAD

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[56] **References Cited**

UNITED STATES PATENTS

3,458,145 7/1969 Eichelmann242/1.1 R

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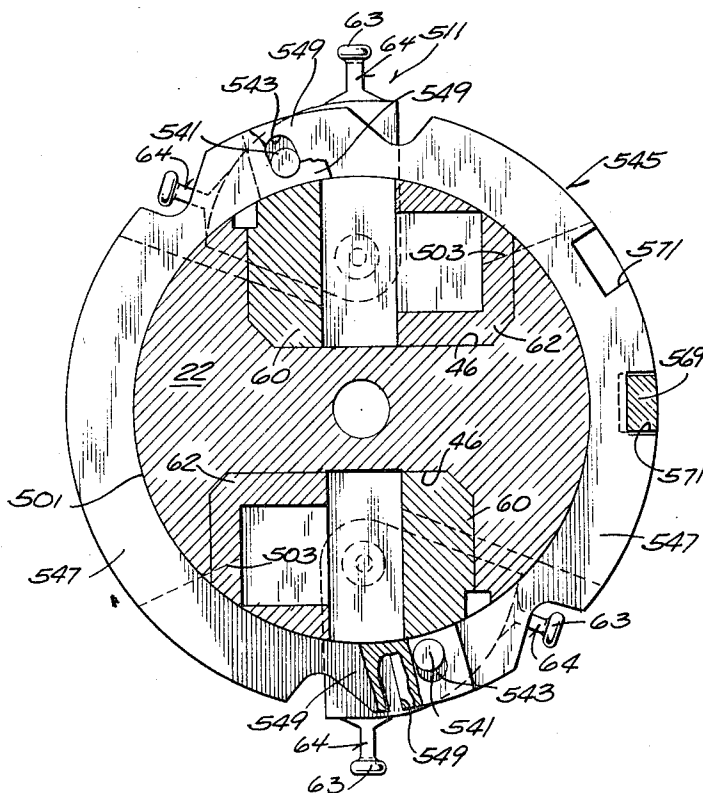
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[57] ABSTRACT

Disclosed herein is a winding head having a needle assembly which is mounted on a housing for movement between first and second positions and which includes first and second needles located in spaced relation to each other such, that when the needle assembly is in the first position, one of the needles extends from the housing and the other needle is retracted and such that, when the needle assembly is in the second position, the other needle extends from the housing and the one needle is retracted. Also included in the winding head is means for displacing the needle assembly between the first and second positions and means for releasably and selectively locking the needle assembly in either of the first and second positions.

5 Claims, 4 Drawing Figures



DOUBLE NEEDLE WINDING HEAD

BACKGROUND OF THE INVENTION

Some stators are provided with windings which are wound with wires of different sizes. In the past, it was the usual practice to rethread a winding machine with a second size wire to provide the second series of windings or to relocate the partially wound stator on another winding machine. This additional operation and the time lost consequent thereto are avoided by the disclosed invention.

Reference is made to the Peters U.S. Pat. No. 3,524,600 issued Aug. 18, 1970, which discloses a construction prior to this invention.

SUMMARY OF THE INVENTION

The invention provides a winding head which is adapted to be reciprocated and oscillated to effect the winding of coils on a stator or other dynamo machine member. In accordance with the invention, the head is provided with one or more needle assemblies which respectively include at least two needles and which can be selectively located in two or more operating positions so as to effect winding in response to reciprocating and oscillating head movement. One of the needles in each needle assembly can be threaded with a wire of one size and the other of the needles in each needle assembly can be threaded with a wire of another size to permit the successive winding of coils of the stator or other dynamo electric machine member with wire of two sizes.

In the preferred construction, more than one needle assembly is provided and there is a common means for displacing each of the needle assemblies between two operating positions. In addition, releasable means are provided for selectively locking the needle assemblies in their operating positions.

One of the principal objects of the invention is the provision of a winding head having one or more needle assemblies which can be alternately located to afford alternate winding operation with wires of different sizes.

Another principle object of the invention is the provision of such a "flip needle" head as indicated above including needle assemblies with two needles and provision of means for readily locating the needle assemblies between alternate operating positions.

Another principal object of the invention is the provision of a construction which is economical to manufacture and which will provide reliable operation through a long and useful life.

Other objects and advantages of the invention will become known by reference to the following description and the accompanying drawings.

DRAWINGS

FIG. 1 is a fragmentary elevational view, with parts omitted and broken way and in partial section, of a winding head embodying various of the features of the invention.

FIG. 2 is an enlarged sectional view taken along line 2-2 of FIG. 1.

FIG. 3 is an enlarged fragmentary sectional view taken along line 3-3 of FIG. 1.

FIG. 4 is an exploded perspective view of various of the components embodied in the construction shown in FIG. 1.

DETAILED DESCRIPTION

Shown in the drawings is a winding head 10 embodying various of the features of the invention. Except as noted herein, the winding head 10 is generally as disclosed in the specification of the Peters U.S. Pat. No. 3,524,600 issued Aug. 18, 1970, which specification is included herein by reference.

The same terminology and numerology employed in the Peters specification will be employed herein.

In accordance with the invention, the winding head is adapted for reciprocating and oscillating movement during the winding of a stator or other dynamo-electric machine member and includes at least one needle assembly which is

mounted on a housing for movement between first and second positions and which includes first and second needles located in spaced relation to each other such that, when said needle assembly is in the first position, one of the needles extends from the housing and the other of the needles is retracted relative to the extending needle and such that, when the needle assembly is in the second position, the other needle is in a position extending from the housing and the first mentioned needle is retracted relative to the other needle. The invention also includes means for displacing the needle assembly between the first and second positions and means for releasably and selectively locking the needle assembly in either one of the first and second positions.

The head 10 includes a main body or housing 22 as generally described in the Peters U.S. Pat. No. 3,524,600 except that an interrupted annular groove 501 is provided approximately midway of the head and one or more pockets or recesses 503 which communicate with the groove 501 and with the channels or slots 46 which contain the body cams 60 and body slides 62. The number of pockets 503 is equal to the number of slots 46 and, in general, depends upon the number of wires to be simultaneously wound on the stator. Thus, while various arrangements can be employed, in the disclosed construction, two needle pockets 503 are disclosed. It should, however, be understood that the three or four, or even more, needle pockets could be employed.

Because the needle pockets 503 are located, in major part, in the body cams 60 and in the body slides 62, as well as in the main body or housing 22, the body cams 60 and the body slides 62 are somewhat modified from the construction shown in the Peters U.S. Pat. No. 3,524,600. Specifically, the adjacent ends of the body cams 60 and the adjacent ends of the body slides 62 are formed to provide a continuation of the interrupted annular groove 501 and to cooperate with the housing 22 to provide the needle assembly pockets 503. In this regard, the adjacent body cams 60 respectively include end walls 505 which partially define the associated pockets 503 and which, as will be explained in greater detail, support the respective needle assemblies.

Located within each needle pocket 503 is a needle assembly 511 comprising first and second needles 64 and means for mounting the needles 64 in angularly spaced relation to each other and for common movement between first and second positions. When the needle assembly is located in the first position, one of the needles extends from the housing 22 of the winding head 10 in proper location for winding and the other of the needles 64 is retracted within the associated pocket 503. When the needle assembly 511 is in the other or second position, the other needle extends relative to the housing 22 of the winding head and the first mentioned needle is located in a retracted position in the associated pocket 503.

The needles 64 are generally of conventional construction except as is hereinafter mentioned and include an eye 63 and an interior bore 521 leading from the eye 63 and affording wire passage.

While various arrangement can be employed, in the disclosed construction, the needle mounting means comprises a pair of needle mounting plates 513 each of which includes two angularly related channels 515 which, when the side plates 513 are assembled, are located in facing relationship and receive the stems or base 517 of the needles 64. Outward withdrawal of the needles 64 from the side plates 513 is precluded by studs or pins 66 which extend between recesses in the needles and bores 525 in the side plates 513.

While various arrangements can be employed, in the disclosed construction, the needle assemblies 511 are mounted on the housing 22 by means including a pivot pin 527 having ends 526 which extend through aligned bores or apertures 529 in the base of the side plates 513 and which are received in aligned bores or apertures 531 in the adjacent end walls 505 of the body cams 60.

Means are also provided for maintaining the side plates 513 in assembled relation to each other with the needles 64 cap-

tured therebetween and, simultaneously, for affording displacement of the needle assemblies 511 between their first and second positions. While various arrangements can be employed, in the disclosed construction, each needle assembly 511 includes a shaft 533 which has a shoulder 535 and which extends through an aperture 534 in one of the side plates 513 and is threaded into another aligned aperture 536 in the opposing side plate 513 to assemble together the side plates 513.

Each shaft 533 also includes a projecting end 541 which extends into an opening 543 in an actuating ring 545 which is located in the groove 501. More particularly, the actuating ring 545 can be formed of two semi-circular segments 547 having at their ends overlapping ears 549 which are apertured to provide the opening 543, and which are connected by insertion of the projecting ends 541 of the shafts 533. Thus, while other arrangements could be employed, the actuating ring 545 and the shafts 533 serve to provide means for displacing the needle assemblies 511 between their first and second positions. Such displacement can be obtained simply by rotating the actuating ring 545.

Means are provided for preventing unwanted rotation or displacement of the actuation ring 545 so as to releasably and selectively lock the needle assemblies 511 in either of their first and second positions. While various arrangements can be employed, in the disclosed construction, there is provided an operating lever 563 which is received in a slot or recess 565 in the housing 22 and which is pivoted on a pin 567 supported in the housing 22. One end of the operating lever 563 includes an ear or tab 569 which is selectively receivable in a pair of angularly spaced notches or cutouts 571 on the periphery of the actuating ring 545. When the ear 569 is in one of the notches 571, the needle assemblies 511 are locked in one of their positions and when the ear 569 is in the other one of the notches 571, the needle assemblies are locked in the other positions.

Means are also provided for biasing the lever 563 so as to urge the ear or tab 569 into the notches. While various arrangements can be employed, in the disclosed construction, a spring 575 is engaged between the other end of the lever 563 and a seal formed in a radial bore 577 in the housing 22 of the head 10.

If desired, a wire guide tube 579 can be mounted interiorly of the housing 22 so as to terminate adjacent to the inner ends of the bores 521 in the needles 64.

In operation, wires of one thickness are fed through the wire guide tube 579 and through the bores 521 of one set of the needles 64 for forming the main windings of a stator. Wires of a different thickness are also fed through the guide tube 579 and through the bores 521 of the other needles 64 for forming an auxiliary winding. The wires emerging from the needles which are not in use at the time can be anchored or secured by wrapping the wire several times around the needle and beneath the head thereof.

After winding with one set of needles is completed, the lever 563 is displaced to remove the ear 569 from the previously engaged one of the notches 571. The actuating ring 545 is then manually or otherwise rotated to shift the needle assemblies 511 to their other position. When thus shifted, the operator releases the pressure on the lever 563 to permit engagement of the gear 569 in the other one of the notches 571, thereby locking the needle assemblies 511 in their other position. The winding head 10 then can be employed for a second winding.

Because of the volume necessary in the pockets 503 to permit alternate positioning of the needles 64 in retracted positions, the body cams 60 and body slides 62 may have a greater radial depth than as disclosed in the before mentioned Peters U.S. Pat. No. 3,524,600. In addition, the slides which are operable in the body slides 62 can be of greater dimension and can be notched out in the area of the pockets 503 so as to accommodate pockets of ample size to receive the needles 64 in retracted position. Such modifications in size of the various components is believed to be well within the skill in the art.

Various of the features of the invention are set forth in the following claims.

What is claimed is:

1. A winding head adapted for reciprocating and oscillating movement during the winding of a stator, said head comprising a housing, a needle assembly including first and second needles, and means connecting said first and second needles in fixed and spaced relation to each other, and means mounting said needle assembly on said housing for movement between first and second positions such that, when said needle assembly is in said first position, one of said needles extends from said housing and the other of said needles is retracted relative to said one needle and such that, when said needle assembly is in said second position, said other needle extends from said housing and said one needle is retracted relative to said other needle, and means on said housing for displacing said needle assembly between said first and second positions.

2. A winding head in accordance with claim 1 in further combination with means on said housing for releasably and selectively locking said needle assembly in either of said first and second positions.

3. A winding head in accordance with claim 2 including a plurality of said needle assemblies mounted on said housing and movable respectively between first and second positions, and common means on said housing including said first mentioned needle assembly displacing means, for displacing all of said needle assemblies in unison between said first and second positions, and wherein said locking means coacts with said common needle assembly displacement means to selectively and releasably lock all of said needle assemblies.

4. A winding head adapted for reciprocating and oscillating movement during the winding of a stator, said winding head comprising a housing, a first needle, a second needle, means mounting said first and second needles on said housing for common angular movement about an axis parallel to the direction of intended reciprocation and in angularly spaced relation to each other about said axis, means for selectively moving said needles about said axis to a first position wherein one of said first and second needles extends from said housing and the other of said first and second needles is retracted, and a second position wherein the other of said first and second needles extends from said housing and said one of said first and second needles is retracted, and means on said housing for selectively and releasably locking said needles in said first and second positions.

5. A winding head adapted for reciprocating and oscillating movement during the winding of a stator, said head comprising a housing, a plurality of body slides on said housing, a plurality of body cams on said housing, means on said housing, on said body slides, and on said cam slides defining an annular groove and a plurality of pockets spaced angularly about the axis of intended oscillation and communicating with said groove, a plurality of needle assemblies, a pivot in each of said pockets supported by said body cams in parallel relation to the axis of intended oscillation and supporting one of said needle assemblies for pivotal movement between first and second positions, said needle assemblies each including a pair of side plates respectively including pairs of opposing channels located in angularly spaced relation to each other about said pivot, and first and second needles received in said channels such that, when said needle assemblies are in said first position, one of said needles of each needle assembly extends from said housing and the other of said needles is retracted relative to said one needle and such that, when said needle assemblies are in said second position, said other needle of each needle assembly extends from said housing and said one needle is retracted, a ring member located in said groove and connected to said needle assemblies for displacing said needle assemblies between said first and second positions in response to angular ring member movement, a pair of notches on the periphery of said ring member and respectively associated with said first and second positions, a lever pivotally mounted on said housing and including an ear adapted to be selectively received in said notches, and means biasing said lever toward a position in which said ear is engaged in a selected one of said notches to prevent rotary movement of said ring member and thereby to releasably lock said needle assemblies in either selected one of said first and second positions.

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