

[54] **COIL TRANSFER AND STORAGE
TOOL AND MACHINE FOR WINDING
SAME**

984,921 2/1911 Donnell.....220/97
3,091,361 5/1963 Gawron.....220/97
2,955,622 10/1960 Spotten et al.140/92.1

[75] Inventors: **Vernon E. Kieffer**, St. Louis;
Frank S. Korski, St. Louis County,
both of Mo.

Primary Examiner—Lowell A. Larson
Attorney—Polster & Polster

[73] Assignee: **Emerson Electric Co.**, St. Louis
County, Mo.

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[21] Appl. No.: **113,198**

[52] U.S. Cl.140/92.1, 29/596

[51] Int. Cl.B21f 3/00

[58] Field of Search...140/92.1, 92.2; 29/205 D, 596,
29/605; 220/97 R

[56] **References Cited**

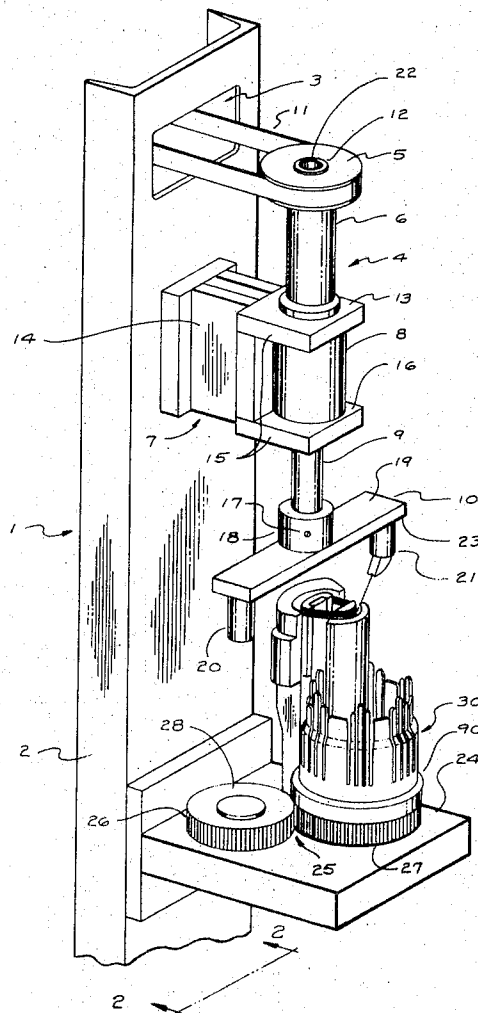
UNITED STATES PATENTS

3,557,432 1/1971 Pavesi140/92.2
3,522,650 8/1970 Cutler et al.....140/92.1

[57] **ABSTRACT**

An apparatus for winding and a method for storing electrical coils used in the axial insertion of motor windings provides for placing the winding coil on a transfer and storage tool in a manner similar to that required for axial insertion. The tool is inverted and the coil is transferred to an axial insertion machine prior to placement in a stator core. The tool preferably is an injection molded plastic, form, with a series of blades arranged similarly to the blades of the axial inserter. While prewound coils may be placed on the tool manually, the apparatus of this invention winds successive coil throws and automatically places them on the transfer and storage tool.

18 Claims, 11 Drawing Figures



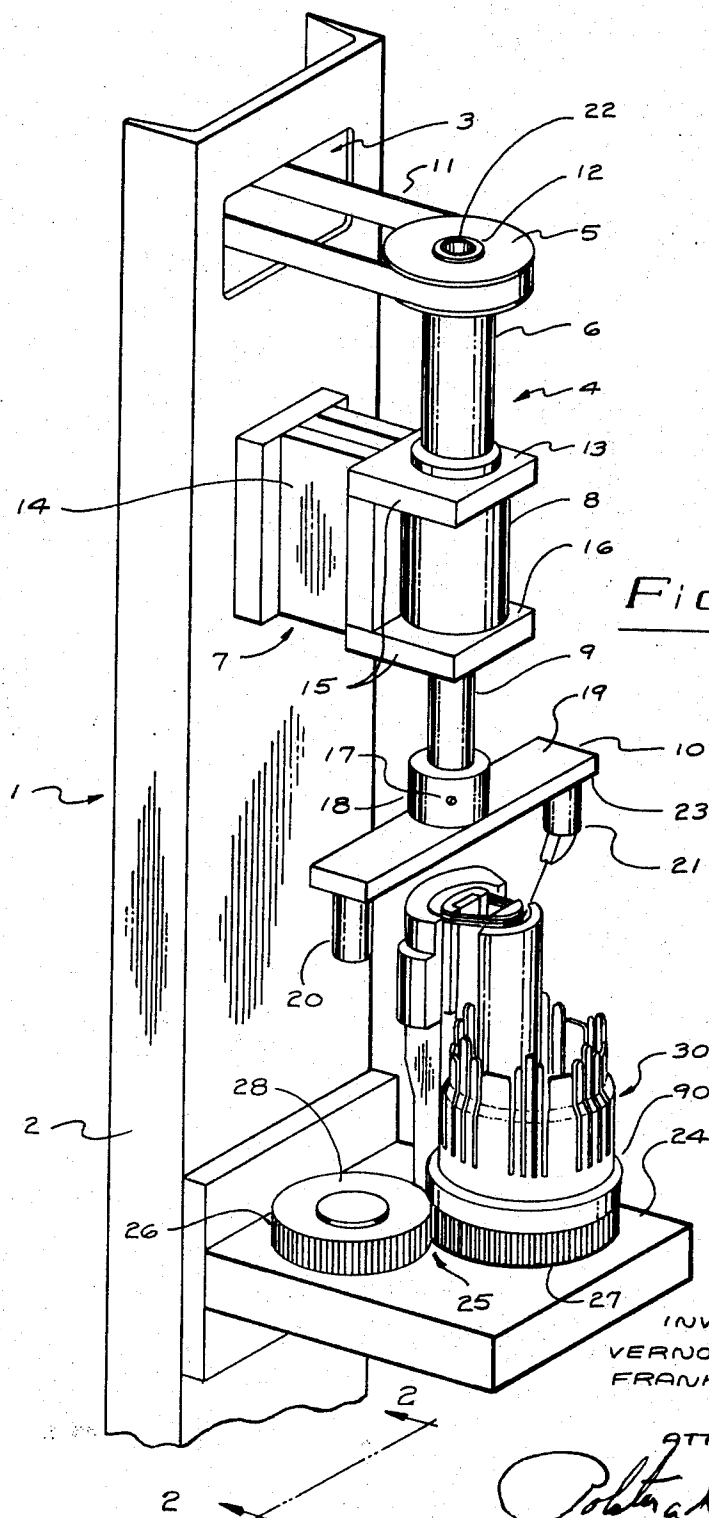
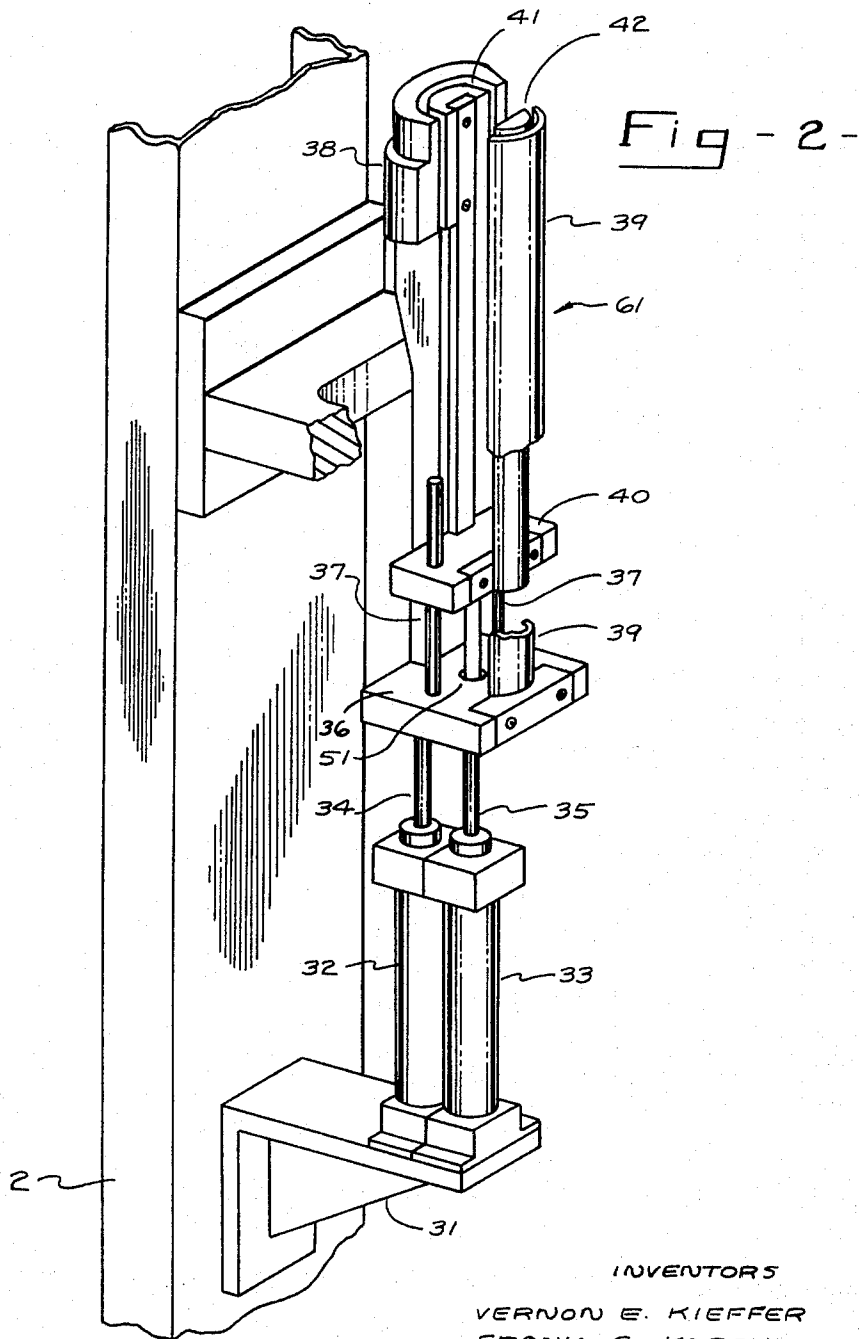


Fig-1-

INVENTORS
VERNON E. KIEFFER
FRANK S. KORSKI

ATTORNEYS
Robert A. Doherty



INVENTORS

VERNON E. KIEFFER
FRANK S. KORSKI

ATTORNEYS

ATTEST

Attorney

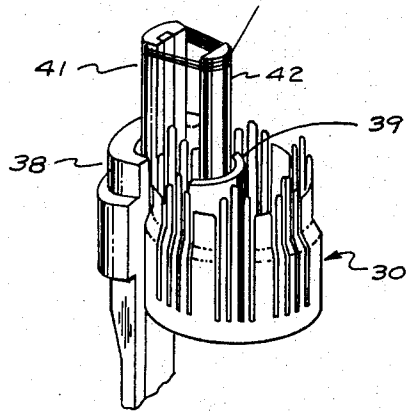


Fig-3-

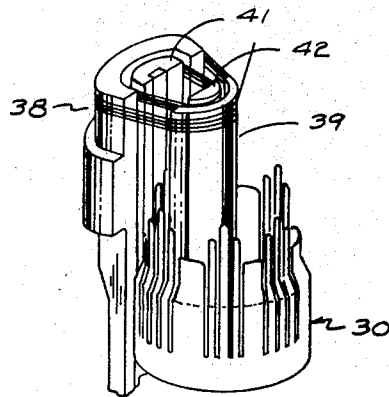


Fig-4-

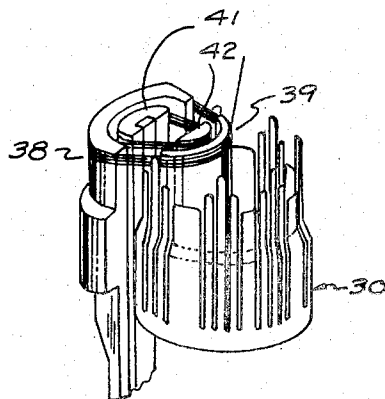


Fig-5-

INVENTORS
VERNON E. KIEFFER
FRANK S. KORSKI

ATTORNEYS
Colt and Colt

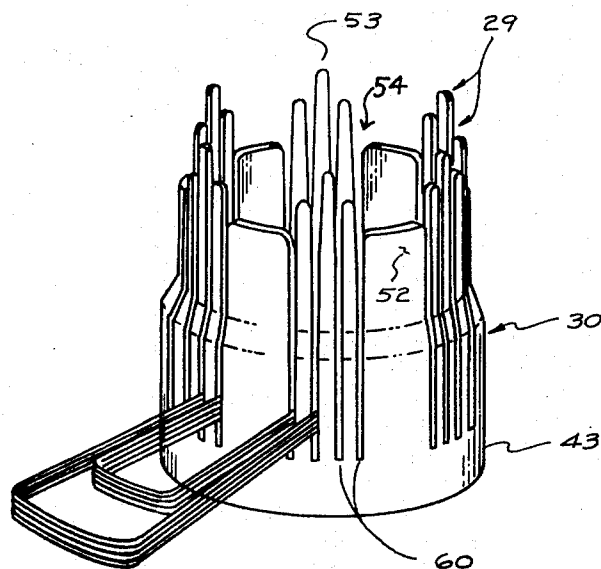


Fig-6-

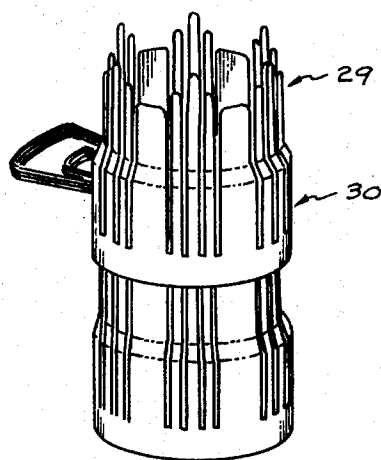


Fig-7-

INVENTORS
VERNON E. KIEFFER
FRANK S. KORSKI

ATTORNEYS
Robert A. Rabin

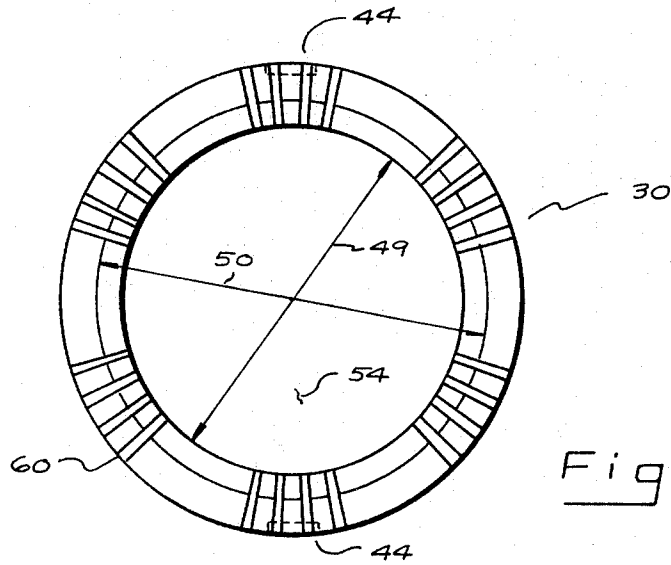


Fig-8-

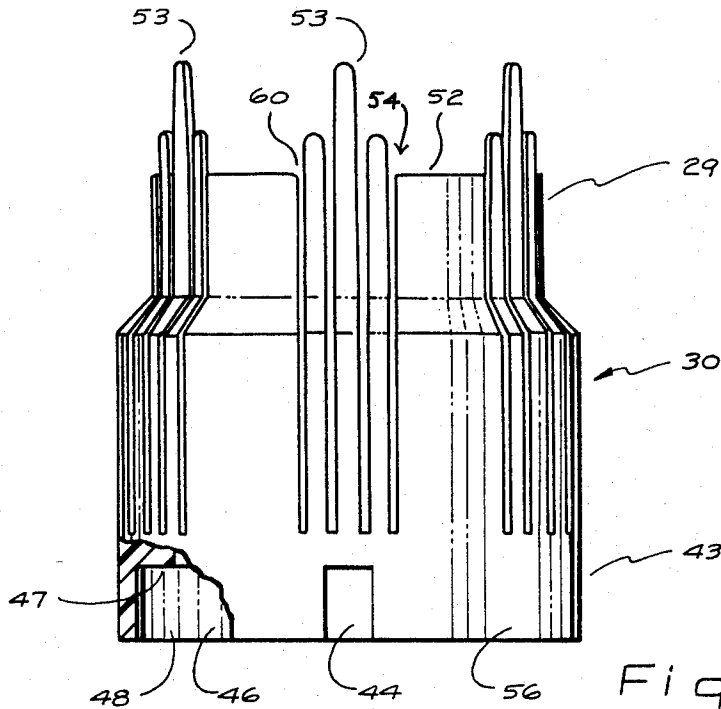


Fig-9-

INVENTORS
VERNON E. KIEFFER
FRANK S. KORSKI

ATTORNEYS
Chas. A. Rohl

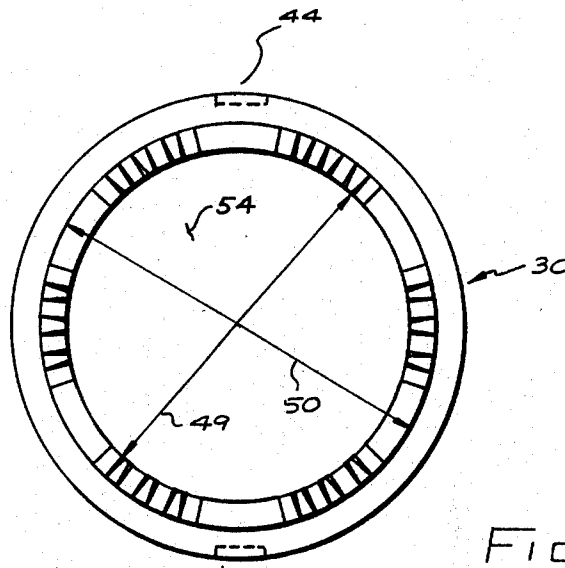


Fig-10-

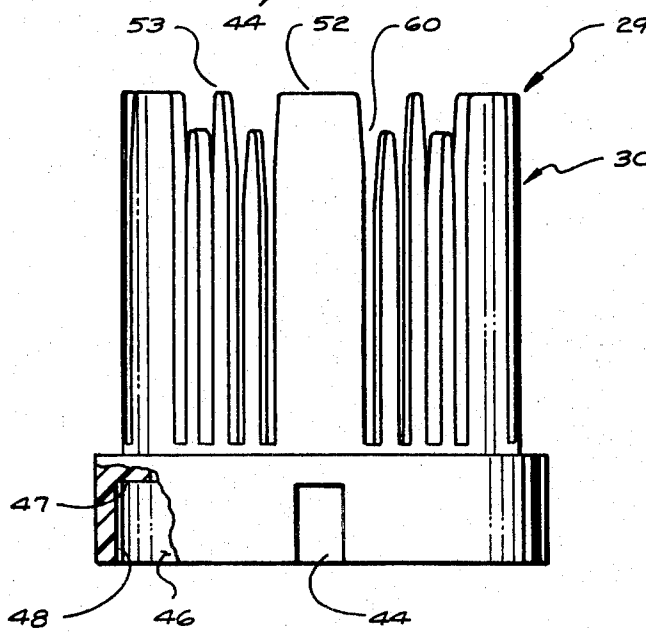


Fig-11-

INVENTORS
VERNON E. KIEFFER
FRANK S. KORSKI

ATTORNEYS
Collier & Peltier

COIL TRANSFER AND STORAGE TOOL AND MACHINE FOR WINDING SAME

BACKGROUND OF THE INVENTION

This invention relates to winding techniques employed with axial coil insertion machines commonly used in the electric motor industry for axially inserting prewound coils into the stator slots of electric motors.

Axial coil inserting machines, exemplified by those illustrated and described in the U.S. Pat. to Hill, No. 3,324,536 are used extensively in motor production. Such inserting machines commonly have a cylindrical array of axially parallel fingers or blades mounted on a platform or base plate at one end, having a free end extending upwardly. The array of fingers is disposed about a central opening and each finger aligns with the face of a stator core tooth. A fluted impeller, commonly referred to as a stripper, is slidably mounted within the finger array. The stripper is conventionally mounted on a free end of a piston rod which permits travel of the stripper from a lower position below the fixed end of the blades to an upper position above the free end of the finger array. It is the action of the stripper that inserts the prewound coils into the stator core. The prewound coils are placed over the blades in some predetermined configuration. The stripper carries the coils over the free end of the blade array as it moves to its upper position. Wedge guide members, pusher rods, guide rods and a wedge magazine commonly are provided for inserting bore wedges simultaneously with winding insertion.

Manufacturers generally strive to obtain maximum production from their existing equipment. Motor production lines utilizing axial inserting machines have a theoretical limit of maximum production defined when the inserting machines are in fact continuously placing prewound coils into stator cores. Theoretical maximum production cannot be attained of course, as the prewound coils must be positioned on the machine before insertion takes place. Additionally, other time consuming operator steps, heretofore associated with axial inserters, function to widen the gulf between actual production and theoretical maximum production.

Presently, prewound coils used for axial insertion are wound on coil forms or jigs at a first station, removed from the forms and physically moved to the inserting machine. The jigs are stepped to produce different coil throws for the various coil sets utilized in the final winding. For the purposes of this specification, a coil throw is defined as those continuous magnet wire turns arranged in two stator slots and connected by end wire at each end of a stator core. A group of one or more coil throws defines a coil set. Conventionally, each coil set constitutes a pole for the motor. Jigs are special machine tools and their cost prohibits their use in large numbers. Each lamination type requires its own particular jig set. While the prewound coils may be used directly for winding insertion after their removal from the jigs, common practice, developed because prewinding the coils takes less time than inserting them, is to backlog a quantity of prewound coil sets. During storage, each coil throw of the coil set must be segregated. A number of metal clips, similar to hinged paper clips, are used for this purpose. The clipped coil sets are stored on a peg board. When the board is loaded, it is moved to the insertion station. The boards

are large physically and while they work well for their intended purpose, this form of coil set storage and the operative procedures necessitated thereby have been major reasons for the excessive discrepancy between actual production and theoretical maximum production discussed above.

Depending on the motor type, two or more motor poles are inserted simultaneously. The insertion machine operator must remove each clip individually and place the motor pole over the proper blade span before the inserter is ready for operation. This is a time consuming, arduous process. Several advances in the art, exemplified by the U.S. Pat. to Ericson, No. 3,415,292, attempt to increase actual production rates by combining coil winding apparatuses and axial inserting machines in a single unit. Such apparatuses, in general, wind the coil above the fingers of a conventional axial inserter and thereafter automatically place the coil on those fingers. While these machines work well for their intended purposes, they are complex mechanically and correspondingly represent a large capital expense to the motor manufacture. One reason for their complex construction stems from their purported advantageous combined form. Coil winding is carried out above the blades of the inserter apparatus portion. Placing the prewound coil over the inserter blades requires a certain amount of dexterity when performed manually. Duplicating human dexterity by machine is not achieved easily. Consequently, exceedingly complex machinery is required to wind and thereafter automatically place a coil in the finger array. For example, the Ericson patent uses collapsible wire forms and an intricate gear arrangement to achieve that result.

The invention disclosed hereinafter provides a novel winding machine and storage tool which tool permits simultaneous loading of the insertion machine blades with all coil sets necessary for a single machine pass. It eliminates the need for clips, thereby reducing operator steps and non-operational machine time. A chief distinguishing feature between our invention as described and claimed and that disclosed in the above cited art is our ability to bracket the storage tool with forms for winding the coils. By maintaining individual machines for the winding and inserting functions, we are able to operate upwardly through the base of the storage tool. Collapsible forms are not required because the tool itself strips the wound coil from the winding form. While the method and apparatus disclosed are not fully automated, we have found that motor production output for our system favorably compares with systems automated completely. We achieve this result with considerably lower capital expenditure.

Winding transfer tools and methods of use also are known in the art. The U.S. Pat. to Kieffer, No. 3,525,147 is one example of such tools. Our invention differentiates from prior art tools in that it may be loaded either manually or by machine and that its construction permits convenient storing of prewound coils for extended time periods.

One of the objects of this invention is to provide an improved means for storing prewound coils.

Another object of this invention is to provide a tool which permits the simultaneous transfer of prewound coils from the tool to the blades of an axial insertion machine.

Yet another object of this invention is to provide a machine that winds coils directly on a storage tool.

Still another object of this invention is to provide a storage tool that is low cost and easy to manufacture.

Still another object is to provide a method of storing, handling, and transferring prewound coils in a more orderly and expeditious manner than has been known heretofore.

Other objects will become apparent to those skilled in the art in light of the following description and accompanying drawings.

SUMMARY OF THE INVENTION

In accordance with this invention, generally stated, a machine is provided for winding an improved coil transfer and storage tool. The tool has an annular array of fingers arranged about and attached to a base at one end and extending upwardly at a second end. A portion of the base below the attached fingers has an internal diameter greater than the external diameter of the annular finger array, and the tools are stackable successively. The tool is constructed from a low cost material by a simple process. The tool is insertable in the winding machine and that machine winds each coil throw consecutively and loads the finished coil set on the transfer and storage tool automatically.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, FIG. 1 is a view in perspective, partly broken away, of a top portion of the apparatus of this invention;

FIG. 2 is a view in perspective, partly broken away, of a bottom portion of the apparatus shown in FIG. 1;

FIGS. 3-5 are sequential views in perspective demonstrating the coil winding procedure of the apparatus illustrated in FIGS. 1 and 2;

FIG. 6 is a view in perspective of one illustrative embodiment of coil winding and transfer tool of this invention showing one coil set in its stored position;

FIG. 7 is a view in perspective demonstrating a stacked relationship for the tool of FIG. 6;

FIG. 8 is a top plan view of the transfer tool shown in FIG. 6;

FIG. 9 is a view in side elevation, partly broken away, of the transfer tool shown in FIG. 6;

FIG. 10 is a top plan view of a second illustrative embodiment of coil winding and transfer tool of this invention; and

FIG. 11 is a view in side elevation, partly broken away, of the transfer tool shown in FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 and 2, reference numeral 1 indicates a winding machine having a vertical support member 2 attached to a base not shown. The base may be any conventional structure sufficient to stabilize support member 2.

Member 2 is a broad, U-shaped beam conventionally constructed of steel or similar metal and has an opening 3 near its top.

A winding assembly 4 is mounted to member 2 below opening 3. Winding assembly 4 includes a pulley 5, a first hollow shaft 6, a support section 7, a gear connector 8, a second hollow shaft 9, and a winding arm 10.

Pulley 5 engages a belt 11 driven by a power source, conventionally an electric motor, not shown. Pulley 5 has an axial opening 12 in it which provides means for mounting pulley 5 to one end of shaft 6. Pulley 5 is secured to shaft 6 by any convenient means, as by a key or a shrink fit. Shaft 6 is a cylindrical, tubular shaft attached to pulley 5 at one end journal mounted to the support section 7 and drivenly connected, through connector 8 at its second end to shaft 9, also journal mounted to the support section 7.

Support section 7 is fixed to vertical member 2 by conventional methods. Tapped screws or spot welds work well. Section 7 has an arm 14 and a brace 15 attached to member 2 in cantilever fashion. Brace 15 comprises an upper platform 13 and a lower platform 16 arranged to resemble the letter "C." Connector 8 is mounted in the C between platforms 13 and 16. Connector 8 is a conventional double screw connector of the type common to the reeling art adapted to produce alternate vertical rise and fall of shaft 9 and arm 10 to fan the coil throw vertically. Connector 8 has a longitudinal opening through it, which opening aligns with tubular shafts 6 and 9.

Arm 10 is removably mounted at the lower end of shaft 9. Preferably, arm 10 and shaft 9 are locked together by set screws 17 through a hub 18 which is part of the arm 10.

Winding arm 10 includes a horizontal plate 19, a counter balance 20 and a winding needle 21. Winding assembly 4 has an axial passageway 22 therethrough, which serves as a magnet wire feedway. Passageway 22 is coincident with the construction of tubular shafts 6 and 9 and their alignment with connector 8. Passageway 22 runs the length of winding assembly 4, opening on a lower surface 23 of plate 19. Magnet wire is hand fed through shaft 6 and thus passageway 22 until it emerges along lower surface 23. The wire is then drawn through needle 21 and anchored at any convenient fixed part of the apparatus. Further operational features of the apparatus will be discussed hereinafter.

Several wire feeding arrangements are compatible with the apparatus illustrated in FIG. 1. It is common to draw magnet wire directly from its shipping container, conventionally a barrel type, into winding machines. This is accomplished easily with our apparatus by feeding the wire into shaft 6 and passageway 22. Some care must be taken to protect the wire insulation from damage. When necessary, a nylon protective tube or a simple guide wheel arrangement adapted to assist in guiding the wire to passageway 22 works well.

A work platform 24 is attached to support 2 by any convenient method. Surface 24 has a pair of geared, indexing wheels 25 rotatably mounted on it. A first wheel 26 is attached to a shaft 28 which in turn is driven by controllable power means, generally an electric motor, not shown. Wheel 26 thus controllably drives a second wheel 27. Wheel 27 is disposed over an opening through platform 24. Wheel 27 has a base section 90 adapted to receive a winding and storage tool 30.

Referring to FIG. 2, an under carriage 61 of our invention, that is, that portion of the apparatus below work platform 24, has the benefit of simple and uncomplicated construction. While the preferred embodiment is adapted to wind two coil throws for each coil set,

those skilled in the art will recognize that similar techniques may be utilized with any reasonable number of coil throws per pole. Our inventive concept can be used with other windings presently utilized in conventional motor design techniques. Carriage 61 includes air cylinder 32 and 33, a pair of piston rods 34 and 35, and a pair of drive blocks 36 and 40, which are described with particularity hereinafter. An angle iron 31 is mounted on vertical support 2 by any of the conventional methods discussed previously. Angle iron 31 supports two air cylinders 32 and 33 mounted on it. Cylinders 32 and 33 are operatively connected to piston rods 34 and 35 respectively.

Piston rod 34 is attached to and supports drive block 36. Block 36 supports a pair of guide rods 37, an external coil form 38 and an internal coil form 39. Block 36 has an opening 51 in it, which permits free passage of rod 35.

External form 38 is a semi-cylindrical trough shaped body widening near its free, upper end. Internal coil form 39 likewise is a semi-cylindrical, trough shaped body.

Piston rod 35 is attached to and supports drive block 40, positioned above block 36. Block 40 has two openings in it, sized to allow block 40 to ride guide rods 37 in a free, close fit. Block 40 has an external mandrel 41 and an internal mandrel 42 fastened to it. Mandrels 41 and 42 preferably are solid, semi-cylindrical shaped bodies. Under carriage 61 is so positioned and arranged that coil forms 38 and 39 encircle a part of, yet are spaced from, mandrels 41 and 42. This is important as it permits relative movement between coil form and mandrel pairs with sufficient clearance even when the mandrel or coil form pairs are loaded with magnet wire.

The design of the free ends of mandrel 42 and coil form 34 may vary. We have found, however, that consideration should be given to the shape of formed coil sets. In transferring coil sets from transfer tool 30 to the blades of the axial inserter, easy transfer and final insertion is facilitated when that portion of a coil turn eventually housed in the stator slot is formed in the winding process so as to be tangential to the blades of the axial inserter.

Coil storage and transfer tool 30 may assume various configurations. Two such configurations are illustrated in FIGS. 8 through 11. In general, tool 30 includes a cylindrical, open ended base 43 having a longitudinal opening 54 through it. A plurality of integrally attached and annularly disposed blades 29 extend upwardly from base 43. Individual blades define a gap 60 between adjacent blade pairs. In the preferred embodiment of our invention, blades 29 are arranged to represent a visual marking system. A relatively wide, in angular dimension, blade 52 indicates the center of each coil set. Coil throws are placed, either mechanically or manually, in successive gaps 60, as is demonstrated in FIG. 6. A tall blade 53 marks the dividing line between successive coil sets.

Another form of blade marking system is illustrated in FIG. 11. While this embodiment employs a different blade height arrangement, it is analogous to the preceding description and is not discussed in detail.

Conversely, where storage and transfer tool 30 is loaded exclusively by the apparatus of our invention, blades 29 may be uniform in size and geometry.

Construction of tool 30 may vary. However, by utilizing injection molds and associated techniques, large numbers of low cost tools may be produced. While any suitable material, for example, plastic or metal, may be used, certain plastic compounds require additional structural rigidity to prevent blade breakage, particularly where the axial length of blades 29 is long. By thickening blades 29 near base 30, as exemplified in FIG. 9, extra structural strength is provided.

Base 43 preferably has at least one notch 44 in it. The tools illustrated use two symmetrically placed notches. Notch 44 mates with a corresponding knob (not shown) in wheel 27. Their engagement holds and locates tool 30 during the winding and indexing procedures described hereinafter. We prefer notch 44 in an external surface 56 of base 43, but other conventional mating adaptations may be utilized with the notch along an internal wall 46.

Internal wall 46 has a step 47 in it, giving tool 30 a first internal diameter 49 and a second internal diameter 50. Diameter 50 is sized slightly larger than the external diameter of the free end of blades 29. Step 47 and diameter 50 thus define a stacking section 48. This is an important feature as stacking section 48 allows successive accumulations of storage tools 30, one atop another, either loaded or unloaded, as demonstrated in FIG. 7.

In spite of the fact that making the tools 30 out of plastic would be inexpensive, plastic construction was initially thought to be unsuitable because of plastic flexibility, even in the structurally stabilized tool of FIGS. 8 and 9. However, unexpected results were obtained when tool 30 was constructed of commonly available acrylonitrile butadiene styrene copolymer, polyphenyleneoxide, polycarbonate or similar commercial plastics. When formed from these plastics, blades 29 cure into highly flexible arms. Instead of being disadvantageous, as was originally forecast, it was found that the flexing of blades 29 allows rapid manual distribution of prewound coils. Consequently, tools 30 made of suitable plastics may be used commercially even where the apparatus of our invention is not available. In addition, the flexible arms do not require the enlarged blade assembly shown in FIGS. 8 and 9. Rather, uniform structural embodiments, similar to the illustrations of FIGS. 10 and 11, work well except in aggravated stressing situations.

Operation of the apparatus of our invention is uncomplicated. An empty transfer and storage tool 30 is mounted on wheel 27. Assuming prior magnet wire threading, actuation of conventional controls, not shown, commences the winding operation by actuating cylinder 33, which in turn forces piston rod 35 upwardly. Upward movement of piston rod 35 causes block 40, internal mandrel 42, and external mandrel 41 to rise to the position shown in FIG. 3. As there shown, the mandrels have tool 30 between them. Block 40 rides guide rods 37 during this upward travel. Coil winding is commenced by rotating arm 10. Connector 8 lowers and raises arm 10 simultaneously with that rotation. Vertical movement by arm 10 produces a fanned coil. The number of turns in a particular coil throw is determined by conventional motor design considerations and corresponds to the number of complete revolutions of arm 10. Conventional counting means in

conjunction with winding assembly 4 may be used in establishing the proper number of arm rotations.

Internal and external wire forms 39 and 38 respectively are next raised to position by actuating cylinder 32 and its associated piston rod 34. Movement by piston rod 34 and block 36 forces the wire forms to the positions shown in FIG. 4. Arm 10 is again rotated until the required number of fanned wire turns is obtained. Two coil throws complete one pole of the motor winding of this embodiment of our invention. Thereafter, both mandrels and wire forms are drawn downwardly by cylinders 32 and 33. This downward movement deposits the wound coils on storage and transfer tool 30. Transfer tool 30 is rotated thereafter by index wheels 25 and the above process is repeated until the required number of coil sets is obtained. FIG. 6 illustrates a coil set obtained from the apparatus of this invention. The procedure as described produces series wound coil sets. Parallel connections require cutting the magnet wire between coil sets as necessary.

After winding, wire laden transfer tool 30 is removed from wheel 27. Storage of the tool and winding is very convenient. Successive tools may be stacked to any convenient handling length. Individual coil throws are always separated by the tool itself.

At the insertion station, tool 30 is inverted and aligned with the inserter blades. The entire prewound coil is placed on the inserter blades by a single downward stripper motion, manual or mechanical. The unloaded tool is then returned to the winding station for reuse.

Numerous variations, within the scope of the appended claims, will occur to those skilled in the art in light of the foregoing description and accompanying drawings. Thus, the apparatus of our invention may be enclosed in a stylized cabinet. Certain operational features may be varied. For example, magnet wire may enter needle 21 directly, rather than through winding assembly 4. Where direct feed is used, winding assembly 4 need not have passageway 22 through it. Consequently, shafts 6 and 9 may be solid structures. Winding needle 21 itself may be redesigned and need be little more than a simple wire guide. Additional features may be introduced. Conventional means to cut the magnet wire automatically after coil set completion may be desirable in commercial embodiments of our invention. As indicated, the design of storage and transfer tool 30, coil forms 38 and 39 or mandrels 41 and 42 may be altered. Thus, while individual forms and mandrels were described, the form and mandrel may be a single unit, with a stepped exterior portion corresponding to successive coil throws. In this situation, winding arm 10 would, besides providing vertical movement for forming the coil, move vertically in discrete movements corresponding to the step sections of the form. Diameter 49 may be either greater or less than the diameter of the inserter blades, depending upon whether tool 30 is designed to be placed internally or externally of those blades. We prefer the tool to mount the blades internally. When interior use is contemplated, the blades 29 of tool 30 may be grooved along their exterior surface as an aid in tool placement and wire removal. Additionally, while cylinders 32 and 33 were described as being of a compressed air variety, they may be hydraulic or hydraulic-air combinations. These variations are merely illustrative.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A winding machine, which comprises:

- a supporting structure;
- a winding assembly mounted on said structure, said winding assembly comprising a rotating shaft, winding means operatively connected to said shaft, and means for rotating said shaft;
- a platform mounted on said structure below said winding assembly, said platform having at least one opening therethrough;
- indexing means attached to said platform about said opening, said indexing means comprising a first and a second mating wheel, said first wheel being controllably power driven and said second wheel being disposed about said opening;
- a plastic coil storage and transfer tool adapted for mounting in said second wheel, said tool comprising an open ended base having a longitudinal opening therethrough, and a plurality of blades spaced about said opening having a first end attached to said base and a free, upwardly extending second end, said blades being flexible with respect to one another and to said base;
- a carriage mounted to said structure below said platform, said carriage including at least one portion thereof movable from a downward retracted position to an upward extended position; and
- means for forming a coil, said coil forming means comprising at least one internal form and one external form responsive to said carriage movement and adapted to bracket said indexing means in the extended, upward position of said carriage.

2. The winding machine of claim 1 wherein said coil storage and transfer tool has a first internal diameter along said blade portion and a second larger internal diameter along a portion of said base, said diameters delimiting a stacking section whereby said tools may be stacked successively.

3. The winding machine of claim 2 wherein said second internal diameter portion of said coil storage and transfer tool has at least one notch in it.

4. The winding machine of claim 3 wherein said blades of said coil transfer and storage tool blades have substantially similar geometric construction.

5. The winding machine of claim 3 wherein said winding assembly includes means for varying vertical rise and fall of said winding means.

6. In combination, a winding machine having an internal form, an external form spaced laterally from said internal form, means for winding a coil of magnet wire around said forms from one to another, a plastic coil storage and transfer tool comprising an open ended base having a longitudinal opening therethrough and a plurality of spaced blades about said opening, attached to said base at one end and free at the other end, said blades being flexible with respect to one another, said tool being positioned with said blades between said internal and said external forms during coil winding with the free ends of the blades being directed toward but spaced from said magnet wire coil, said tool and forms being movable relative to one another, whereby reaches of said coil are placed between blades of said tool while said tool is held between said forms, said flexible blades of said tool facilitating said coil placement.

7. A plastic coil storage and transfer tool comprising an open ended base having a longitudinal opening therethrough, and a plurality of blades spaced about said opening, said blades having a first end attached to said base and a free, upwardly extending second end, said blades being flexible with respect to one another under manual manipulation.

8. The coil storage and transfer tool of claim 7 wherein said blades are disposed annularly about said opening.

9. The coil transfer and storage tool of claim 8 wherein said tool has a first internal diameter along said blade portion and a second larger internal diameter along a portion of said base, said diameters delimiting a stacking section whereby said tool may be stacked successively.

10. The coil transfer and storage tool of claim 9 wherein said blades have substantially similar geometric construction.

11. The coil transfer and storage tool of claim 9 wherein said second internal diameter portion has a notch in it.

12. A coil storage and transfer tool for an axial insertion machine having an annular array of fingers extending upwardly to receive a coil set, which comprises:
a base portion having a longitudinal opening therethrough; and
a plurality of blades disposed annularly about said opening, the diameter of said blades being less than the diameter of the annular finger array of said axial inserter, said blades being flexible with respect to one another under manual manipulation.

13. The tool of claim 12 wherein said coil storage and transfer tool has a first internal diameter along said blade portion, said first internal diameter being less

than the diameter of the annular finger array of said axial inserter, and a second larger internal diameter along a portion of said base, said last mentioned diameter delimiting a stacking section whereby said tools may be stacked successively.

14. The tool of claim 13 wherein said second internal diameter portion of said coil storage and transfer tool has at least one notch in it.

15. The tool of claim 14 wherein said blades of said coil storage and transfer tool have substantially similar geometric construction.

16. The tool of claim 15 wherein said coil storage and transfer tool is constructed from plastic material.

17. A method of winding a stator core of a dynamoelectric machine comprising:

winding a first coil set comprising the main winding of said dynamoelectric machine;

mounting said first coil set on a first plastic coil storage and transfer tool;

winding a second coil set comprising the secondary winding of said dynamoelectric machine;

mounting said second coil set on a second plastic coil storage and transfer tool;

transferring said coil set from one of said first and said second coil storage and transfer tools to an axial inserter;

transferring said coil set from the other of said first and said second coil storage and transfer tools to an axial inserter; and
axially inserting said first and said second coil sets into said stator core.

18. The method of claim 17 further characterized by the step of backlogging a plurality of coil laden first and second coil storage and transfer tools prior to said first mentioned transferring step.

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