Oct. 21, 1952 E. H. LAYCOCK 2,614,588

COIL WINDING REEL ASSEMBLY

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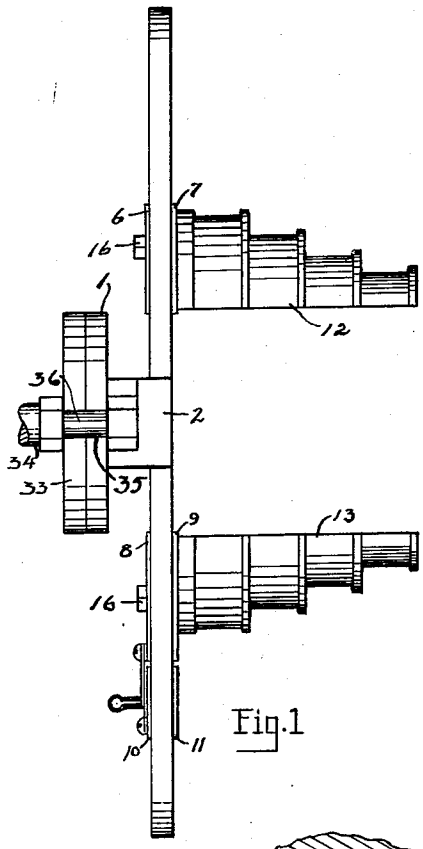


Fig.1

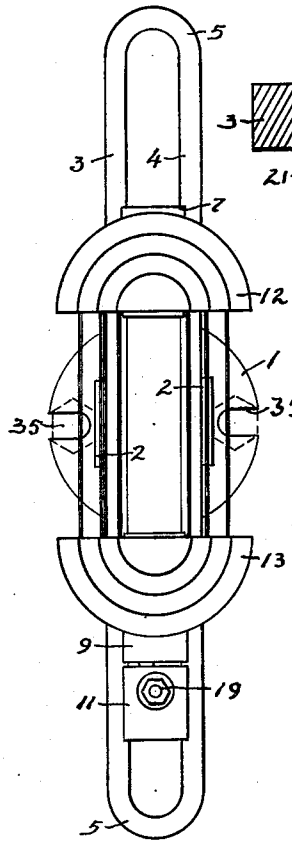


Fig.2

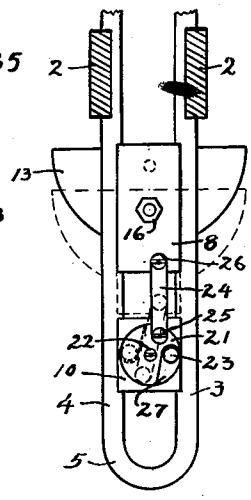


Fig.3

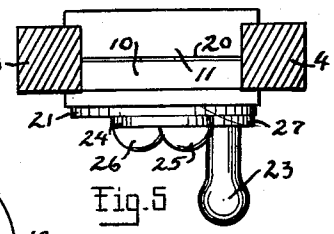


Fig.5

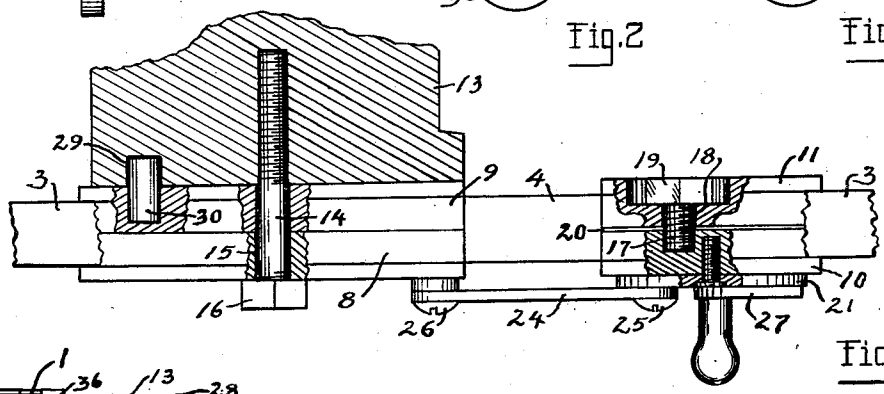


Fig.6

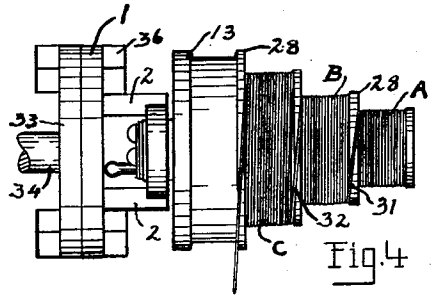


Fig.4

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COIL WINDING REEL ASSEMBLY

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1 Claim. (Cl. 140—92.2)

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This invention relates to devices for winding a plurality of coils of wire of different sizes in tandem.

A primary object of the invention is to provide a rotary reel assembly in which a selected pair of stepped winding forms may be spaced from each other longitudinally of a form holder to receive a wire wound in a coil on each of a desired number of steps in sequence, and in which one form of the pair may be slid toward the other on the holder to permit ready disengagement of the coils.

Commercial electric motors are made in many sizes and with many differences in the relative lengths of consecutive coils as well as in the number of coils used in a group. A factory producing a standard motor in quantity will need only a single winding assembly for the coils of a great many motors, but a repair shop may be called upon to rewind coils of a great variety of sizes and of many different sequences in tandem.

An important object of the present invention is to provide a form holder upon which different forms may be secured and adjusted quickly and with little difficulty to wind coils of any length and of any relative differences in sizes in tandem, while still permitting quick release of the coils when wound without disturbing the adjustment of the forms or dismantling the assembly.

In stator windings, the coils for single phase are preferably made with the two sides straight and the ends curved. Since the length of the straight sides is merely a matter of the adjustment of the distances between the two forms of a selected pair, and the curvature is readily varied in putting the coils into place, it has been found that less than a dozen different winding forms are needed to supply coils of the proper sizes and sequential differences for all standard commercial single-phase motors.

A preferred embodiment of the invention is illustrated in the accompanying drawings, in which Figure 1 is a side elevation of the winding assembly secured upon a shaft; Fig. 2 is a plan view of the assembly looking from the right in Fig. 1; Fig. 3 is a fragmentary plan view as seen from the left in Fig. 1; Fig. 4 is an end elevation as seen from the bottom in Fig. 1, showing coils wound on three steps of the forms; Fig. 5 is an end elevation on an enlarged scale of the holding block carrying the release link; and Fig. 6 is a side elevation of the sliding carrier block and of the holding block with parts in section and with one of the guide bars of the form holder broken away.

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In the device illustrated, a flat base 1 has two standards 2, 2, secured thereto, as by welding, these standards being spaced supports to hold two parallel guide bars 3 and 4, which are connected at their ends by curved portions 5, 5. Between the bars are three pairs of blocks, a normally fixed pair, 6, 7, holding a winding form, a slidable pair 8, 9, holding a second winding form, and a normally fixed pair 10, 11, serving as a holding means for the releasing mechanism for the sliding form.

As best seen in Fig. 5, these blocks have side flanges to engage opposite faces of the guide bars, and when free, they can be slid lengthwise of the guide bars for adjustment at any desired distance apart, preferably with the blocks 7 and 9 at equal distances from the axis of rotation of the base 1 which will be attached to a suitable rotary shaft.

The standards 2, 2 engage the outer faces and half of one side of the guide bars, as seen in Fig. 4, and they are out of the way of the flanges of the blocks if one desires to slide them past the center of the guideway.

The winding form 12 is carried by the blocks 6 and 7 and the winding form 13 is carried by the blocks 8 and 9. Each of these forms has a threaded stud 14 which passes through perforations 15 in the blocks and receives a nut 16 which secures the form to the blocks.

Form 12 is adjusted at a predetermined distance from the center of rotation and is clamped securely in place by tightening the nut 16 on the stud, the flanges of the blocks being thereby brought into tight contact with the opposite faces of the guide bars before the adjacent faces of the blocks touch each other.

Form 13 is secured to the blocks 8 and 9 by its stud 14 and nut 16, but, as shown in Fig. 6, the blocks engage each other before the flanges clamp the guide bars, sufficient clearance being left to permit easy sliding of the form 13 with its blocks toward and from the form 12. The blocks 10 and 11 are tightly clamped to the guide bars by a stud 17 in the block 10 passing through a perforation 18 in the block and engaged by a nut 19, preferably below the outer surface of the block 11 when large forms are to be used on the block 9. The space 20 between the blocks 10 and 11 causes the blocks to be secured against any sliding movement on the bars 3 and 4 when the nut 19 is tightened.

A disk 21 is pivoted to the face of the block 10 by a screw 22 and is provided with a fingerpiece 23 to cause partial rotation of the disk. A link

24 is pivoted at one end at 25 to the disk 21 and at its other end at 26 to the block 8.

In Figs. 3 and 6, the link 24 is shown in full lines as holding the block 8 away from the fixed block 10. As the fingerpiece is used to turn the disk on its pivot, the link will swing sidewise as its pivot 25 rotates through about a quarter turn of the disk and then back for about another quarter turn, where it comes into contact with a stop member 27, preventing further rotation of the disk. The block 8 will be pulled back from the full line position of Fig. 3, and with it, the form 13 until they reach their broken line position, which is the operative position indicated in Fig. 2. It will be seen that the pivot 25 now lies on the opposite side of the line passing through the centers of the pivots 22 and 26, so that any pull on the form tending to move the block 8 away from the block 10 will cause the link to press more closely against the stop 27, yet very little force will be required to move the pivot sidewise across the dead center of the line to free the link when desired. The link 24 and the stop 27 hold the form 13 accurately in its adjusted position.

The forms 12 and 13 are preferably made of a light metal or of a light metallic alloy. Each form has a stud 14 projecting from its base to attach the form to the perforated blocks and also has a recess 29 to receive a pin 30 on the adjacent face of the block 7 or 9, the studs and pins serving to maintain the forms in a desired alignment, preventing them from shifting on the blocks.

Each form has a series of concentric steps, usually four in number, decreasing in size from the base outward, each step having a flange 28 to limit the width of the coil wound on the step and acting as a retaining means to hold the coil on the forms.

The relative radii of the steps in a sequence and the widths of the steps used in each matched pair are determined experimentally on the basis of the measurements actually used in commercial motors. The operator will be provided with tabulated information by which he can learn which specific pair of forms is to be used and the number of coils required for each pole for any specific motor to be rewound. Other information such as the number of turns to a coil, wire gauges, coil lengths, etc. will be learned by examining the motor being repaired.

Selecting the proper pair of forms and adjusting them and their blocks at the desired distances apart on the guide bars of the form holder, the operator passes one end of a wire of the proper gauge between the forms and secures it by two or three turns around the fingerpiece 23. The wire is then drawn outward between the forms to the outer step and the required number of turns are wound for the coil A. The wire is then passed across as at 31 to the next larger step for a second coil B of the required number of turns and then across at 32 to the third step for the third coil C. In many cases only three coils are needed but a fourth coil could, of course, be wound if desired, only three being shown. A tape or other suitable securing means is wrapped around each side of each coil in the space between the forms to hold the wire in place after the coils are removed from the forms. The fingerpiece is released from the wire and pulled around to swing the link 24 and slide the blocks 8 and 9 with the form 13 to the solid line position of Fig. 3, this being a much greater movement of the form than is necessary to allow the coils to be lifted over the flanges 28 and off the forms. The wire will be cut at any convenient time to free the group of coils thus wound in tandem from a single wire. A push on the fingerpiece will return the form 13 to the same exact adjustment as before, ready for the next group of coils. There is no need for any changes in forms or in adjustments until the required number of groups of coils for any motor have been completed.

A coil winding assembly will usually be provided with a number of spare parts to replace anything not functioning properly. If the releasing mechanism comprising blocks 10 and 11, disk 21 and link 24 are temporarily out of use, it is evident that the operator having two sets of blocks 6 and 7 can discard the blocks 8 and 9, and can adjust the two forms of a pair at the proper distance apart, each on a pair of blocks 6, 7, that can be clamped on the form carrier in fixed position by tightening the nuts 16 to hold the flanges firmly on the bars. He can then wind a series of coils in the normal manner as just described and tape them for removal. Then, by loosening either nut 16 enough to let the blocks held by that nut slide in the guideway, the form carried by these blocks can be moved toward the other form to release the coils. With the coils removed, the loose blocks will then be slid back to the proper place and the nut tightened to secure the form in place for another set of coils. Any suitable stop can be placed in the guideway to provide for the quick and accurate readjustment of the released form. Normally, the link 24 and the stop 27, in a very true sense, form a positive stop for the block 8 to determine the desired adjustment of the form 13.

In Figs. 1 and 4, the base 1 is shown as attached to a similar member 33 formed upon or secured to the end of a shaft 34 which is rotated by any suitable means. As seen in Fig. 2, the base has oppositely arranged notches 35 for bolts 36, indicated in that figure in broken lines, these bolts holding the assembly base upon the member 33 for rotation by the shaft 34.

While the embodiment of the invention herein disclosed constitutes a preferred form, it is to be understood that it is not limited to the exact details described and shown since many changes may be made in the relative forms, sizes, and arrangement of parts without departure from the invention as claimed.

I claim:

A reel assembly comprising a base rotatable about an axis, a pair of parallel bars supported by the base and forming a guideway, a pair of perforated blocks slidable longitudinally of the bars for adjustment thereon at one side of the axis of rotation, the blocks having flanges engaging opposite faces of the bars, a stepped winding form having a threaded stud in its base passing through the perforations in the pair of blocks, and a nut engaging the stud, the spaces between the flanges of the blocks being less than the thickness of the bars, whereby the blocks will be clamped to the bars when the nut is tightened on the stud, a second pair of perforated blocks slidable on the bars on the other side of the axis of rotation from the first mentioned pair, a stepped winding form having a threaded stud in its base passing through the perforations in the second pair of blocks and a nut engaging the stud, the blocks having flanges on opposite faces of the bars, the spaces between the flanges being

greater than the thickness of the bars, whereby the blocks are free to slide upon the bars when the nut is tightened on the stud of the form secured to the slidable blocks, and operating means for the slidable blocks movable in one direction to cause a sliding movement of the blocks and their stepped form toward the fixed form, and movable in the reverse direction to cause a return of the stepped form to a predetermined operative winding position.

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