Jan. 10, 1939. B. HANSON 2,143,315

WINDING APPARATUS

Filed March 4, 1937 2 Sheets-Sheet 1

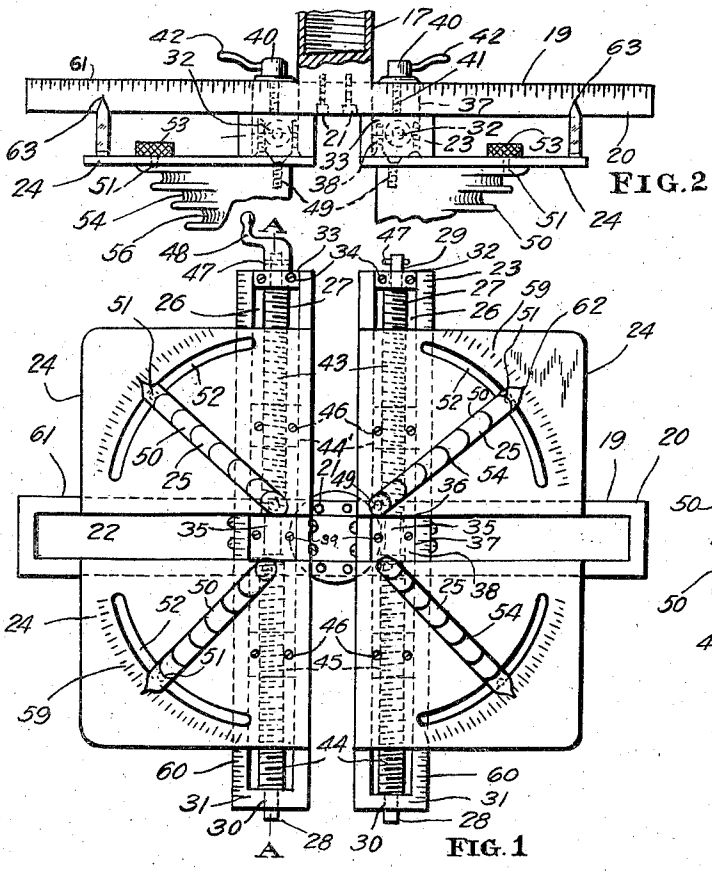


FIG. 2

FIG. 1

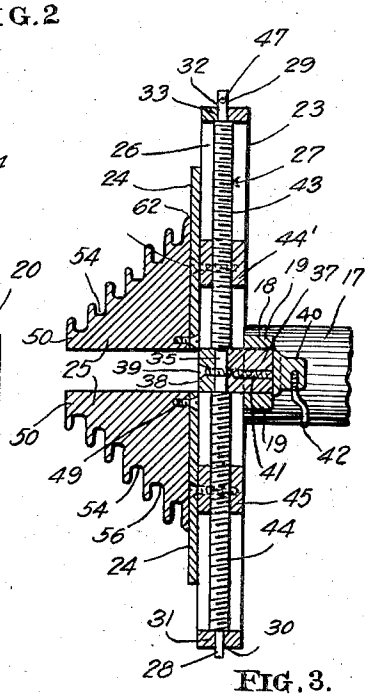


FIG. 3.

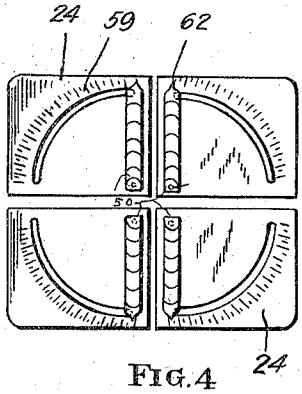


FIG. 4

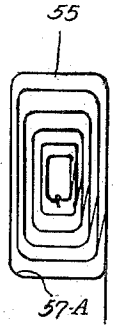


FIG. 5

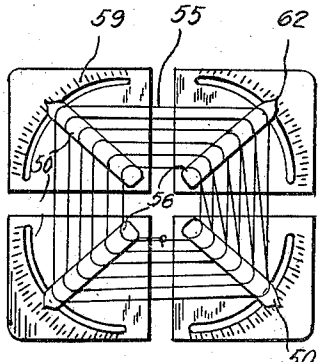


FIG. 6

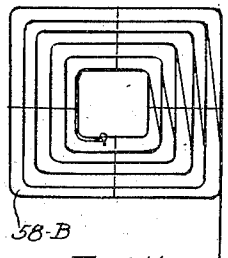


FIG. 7

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Jan. 10, 1939. B. HANSON 2,143,315

WINDING APPARATUS

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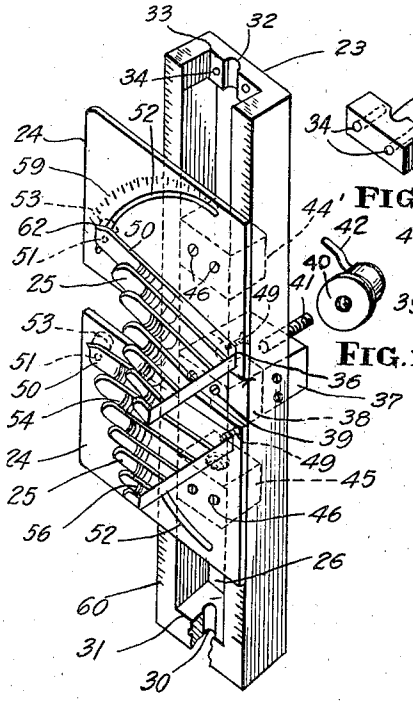


FIG. 8

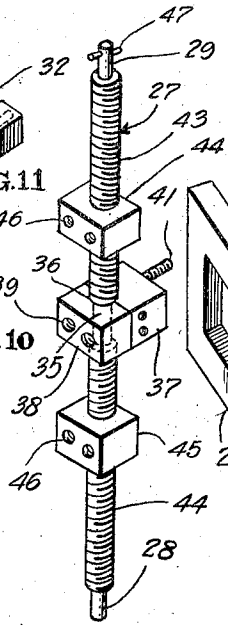


FIG. 9

FIG. 11

FIG. 10

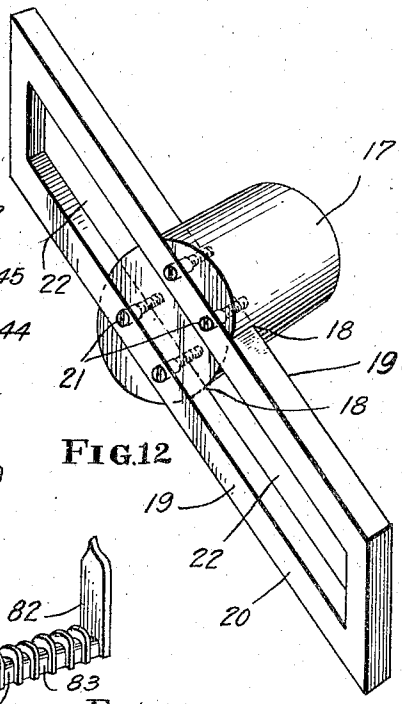


FIG. 12

FIG. 16

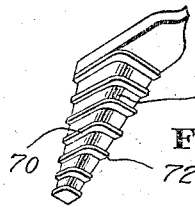


FIG. 13

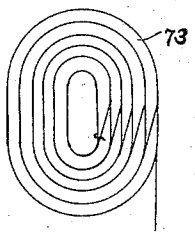


FIG 14

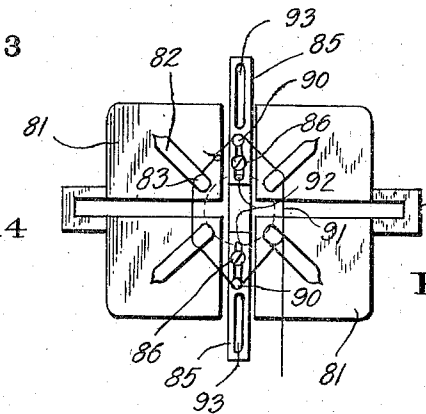


FIG. 15

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Patented Jan. 10, 1939 2,143,315

UNITED STATES PATENT OFFICE

2,143,315

WINDING APPARATUS

Bertrand Hanson, Jamestown, N. Y.

Application March 4, 1937, Serial No. 129,049

6 Claims. (Cl. 140—92.2)

This invention relates to a universal gang winding apparatus or reel particularly adapted for, but not limited to, the winding of the field coils of motors or other electrical apparatus and it generally aims to simplify and render more practical and efficient, a machine of the present character.

It is further sought to provide an apparatus of the foregoing nature which will enable use thereof for the winding of various shapes and sizes of coils through expeditious adjustment of the parts without requiring detachment or removal of parts, such a construction having readily displaceable parts for the release of the coils, and a construction which may utilize novel one-piece jaws.

Another important object is to provide a form wherein a plurality of said jaws are carried by preferably four relatively adjustable plates, on which plates the jaws are mounted for fastening at various angles, certain of the parts optionally having graduations to assist in the accurate positioning of the jaws.

Various additional objects and advantages will become apparent from a consideration of the description following taken in connection with accompanying drawings illustrating operative embodiments by way of example.

In said drawings:

Figure 1 is a view of the apparatus in front elevation;

Figure 2 is a view of said apparatus in plan, partly broken away;

Figure 3 is a vertical section taken on the plane of line A—A of Figure 1;

Figure 4 is a front elevation showing the jaws at a different adjustment from Figure 1; the plates being detached;

Figure 5 is a front elevation of a coil as wound on the apparatus adjusted according to Figure 4;

Figure 6 is a front elevation of the apparatus showing the jaws detached, at a different adjustment from Figure 4, with a coil wound thereon;

Figure 7 is a front elevation of a coil as wound on the device adjusted according to Figure 6;

Figure 8 is a detail perspective view showing two of the plates and jaws in connection with the mounting means therefor;

Figure 9 is a detail perspective view of one of the adjusting screws and associated parts;

Figure 10 is a detail perspective view of one of the binding nuts for securing one of the rails or brackets to the support;

Figure 11 is a detail perspective view of one of the cleats used for securing the adjusting screws in place;

Figure 12 is a detail perspective view of the supporting and driving means;

Figure 13 is a detail perspective view of a modified form of jaw;

Figure 14 is a front elevation of a coil produced by using a jaw according to Figure 13;

Figure 15 is a front elevation of a modified form of the apparatus, and

Figure 16 is a detail perspective view of the form of jaw used in the apparatus of Figure 15.

Referring specifically to the drawings wherein like reference characters designate like or similar parts, 17 designates a horizontally deposed shaft which is adapted for rotation in either direction by any suitable means, manual or power, and for instance by means of an electric motor. The outer end of said shaft has parallel grooves 18 therein occupied by portions of spaced apart rails 19 of a support or mount 20, said portions being detachably secured in place as at 21 and the support or mount having slots 22 on opposite sides of said shaft.

Adjustable toward and away from each other along and supported on said mount 20 on opposite sides of the axis of rotation are auxiliary mounts or brackets 23. A pair of plates 24 are carried by each auxiliary mount or bracket 23 so as to move with the auxiliary mounts and also so that the plates of each pair will be adjustable toward and away from each other. Said plates 24 carry jaws 25 about which the wire or other material is wound.

More specifically, each auxiliary mount or bracket 23 is in the shape of an open, rectangular frame providing spaces 26 in which adjusting screw rods 27 have trunnions or reduced end portions 28 and 29, respectively, journaled in an opening 30 of an end wall 31, and in an opening 32 provided collectively in a reduced end wall 33 and a cleat screwed thereto at 34.

Said adjusting screw rods 27 have a reduced portion 35 affording a journal midway of their ends, journaled in an opening 36 collectively formed in a block or projection 37 rigid on the auxiliary bracket and a cleat 38 detachably screwed at 39 to such block 37. Blocks or projections 37 project rearwardly beyond the auxiliary bracket and are slidably disposed in the slots 22 and are adapted to be rigidly clamped in various adjusted positions by means of nuts 40 engageable against the rails 19 and operable on screw studs 41 carried by the blocks. Nuts 40

preferably have cranks 42 to facilitate manual operation.

Screw threads of opposite pitch are provided at 43 and 44 on each adjusting screw rod 27 on opposite sides of its journal portion 35 and engaged on said threads 43 and 44 are non-rotatable nuts 44 and 45 to each of which, one of the plates 24 is fastened as by means of screws 46. Said nuts slide in the spaces 26 and the plates 24 slide on the rails 19.

Said trunnions 29 have pins 47 fastened diametrically thereof and they are adapted for engagement by a slot in one end of a crank or equivalent tool 48 used in rotating the screw rods 27 when adjusting the position of the plates 24.

Pivotally connected to each plate 24 adjacent the corner nearest the axis of rotation, as by means of a pin or screw 49, is a jaw member 50 which has a bolt 51 extending therefrom through an arcuate slot 52, enabling adjustment and positioning of the jaw at various angles, in which the jaw is rigidly fastened as by means of nuts 53 on the bolts 51, engageable against the rear surfaces of the plates.

Said jaw members 50 are preferably made in a single piece, relatively narrow and substantially triangular, with a series of guides, notches or the like 54 in the inclined edges thereof for engagement by the wire or material 55 being coiled, as best shown in Figure 6, the bases of the said guides or grooves preferably being rounded or convex as at 56 so that the coils wound will be correspondingly rounded at the corners as shown at 57 and 58 on the coils A and B of Figures 5 and 7, respectively, which have been wound on the apparatus.

Since the adjustment or positioning of the jaws must be very accurate in many instances, various millimeter or micrometer graduations are provided to facilitate the same, as at 59 on plates 24; at 60 on the auxiliary mounts 23 and at 61 on the support or mount 20. The jaws 50 are pointed at 62 to cooperate with the graduations 59 and the plates have pointers or indicators 63 on the rear thereof coacting with the graduations 61.

In operation, as the device as a whole is rotated through rotation of shaft 17, the workman applies the wire or material 55 which coils about the jaws 50 to produce a field coil for a motor, as in Figure 5 when the jaws are adjusted like in Figure 4, or as in Figure 7 when the jaws are adjusted as in Figures 1 and 6. It will be realized that all parts are in rigidly connected relation as the coil is wound. In order to vary the sizes and shapes of the coils to be wound, the nuts 40 may be loosened and the auxiliary mounts 23 slidably moved manually toward or away from each other, being guided by the blocks 37 and slots 22, following which the nut or nuts 40 are tightened. The plates 24 and jaws, of course, move with said auxiliary mounts 23. In addition, the plates 24 of each auxiliary mount may be adjusted toward or away from each other through the turning of the proper screw rod 27 by means of crank 48, the plates remaining in the different positions because of the screw thread engagement between the nuts 44' and 45 and threads 43 and 44. This adjustment through the medium of the screw rods 27 also enables contraction of the plates 24 and jaws to release coils after completion, avoiding the necessity of removing and replacing any of the parts. It will also be realized that the one size of jaw will enable many sizes and shapes of coils to be wound on the same machine, since the jaws may be readily and expeditiously disposed at any desired angle when the nuts 53 are loosened for that purpose. Two of the many adjusted positions of the jaws 50 are shown in Figures 4 and 6.

A modified form of jaw is shown in Figure 13 being designated 70. One face, that is the outer face thereof 71 is rounded while such face and the side faces are also inclined or tapered. The grooves or guides are formed by the various ribs 72. The jaws 70 like the preceding form, are substantially triangular and they are used four at a time or one on each plate 24, being either rigidly or adjustably fastened to such plates as desired. With such a jaw used in the apparatus, an oblong coil with rounded ends as at 73 in Figure 14 is produced.

In Figures 15 and 16 another form of apparatus and jaw is disclosed. This form has a mount or support adapted for rotation at 80 to which four plates 81 are fastened in the same manner as the plates 24 in the first form, each of which has a jaw 82 fastened thereon provided with notches 83, the base walls of which are rounded or convex as shown at 84. In connection with such jaws, arms 85 are removably clamped to mount 80 as by means of screws 86. Said arms 85 carry pins or pegs 90 around which, in combination with the jaws 82, the wire or material 91 is wound to provide a polyphase winding. In order to provide such a winding in different lengths, the pegs 90 are not midway of the ends of the arms, and the arms are reversible, having slots 92 and 93 through which the screws 86 may be passed selectively, according to the length or size of coil desired.

Various changes may be resorted to within the spirit and scope of the invention.

What is claimed is:

1. Apparatus of the class described comprising plates, material-coiling jaws on said plates, and means to adjustably position and clamp said jaws relatively to said plates comprising elements pivotally connecting the jaws to the plates, the plates having arcuate slots, and the jaws having clamp means coacting with said slots.

2. Apparatus of the class described comprising a rotatable support, parallel mounts on opposite sides of the axis of rotation of the support adjustable one relatively to the other, a pair of plates on each mount, rods each having opposite screw threads and journalled one on each mount, means connecting the plates of each mount to the opposite screw threads of the rod thereof so that rotation of the rod will move such plates relatively, and material-winding jaws on said plates.

3. Apparatus according to claim 2 wherein said jaws are pivoted to the plates, said plates having arcuate slots, and means coacting with said slots and jaws to clamp the latter to said plates.

4. Apparatus of the class described comprising a rotatable support having aligned spaces on opposite sides of the axis of rotation, parallel mounts at a right angle to said slots disposed one on each side of said axis, each mount having an elongated slot, a screw rod disposed in each slot longitudinally thereof and having a journal, means on the mounts journalling opposite ends of the rods, block means on the mounts journalling said journals, said block means projecting beyond the mounts and being slidably disposed in said spaces, means operable to clamp the mounts against the support, non-rotatable nuts

disposed slidably in each slot on opposite sides of the block means, each screw rod having opposite threads engaged by the nuts, a plate carried by each nut, and material-winding jaws carried one by each plate.

5. Apparatus of the class described comprising a rotatable support, material-coiling jaws thereon, bars having pins about which the material is also adapted to be coiled, said pins being eccentrically disposed on the bars, said bars having slots of unequal length on opposite sides of the pins, and means coacting with said slots enabling end to end reversal of the bars and clamping thereof to the support.

6. Apparatus of the class described comprising a rotatable support, material-coiling jaws thereon, bars having pins about which the material is also adapted to be coiled, one of said pins being eccentrically disposed on its bar, the latter bar being reversible end to end, and means to secure the bars to the support.

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