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A. J. FATHAUER

COIL WINDING MEANS

Filed Feb. 23. 1926

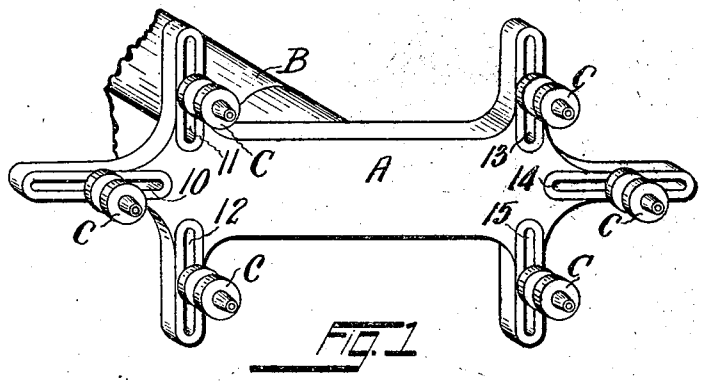

FIG. 1

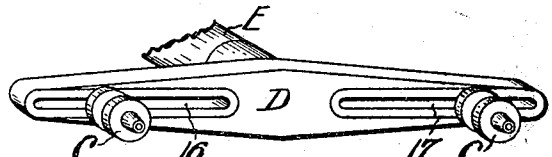

FIG. 2

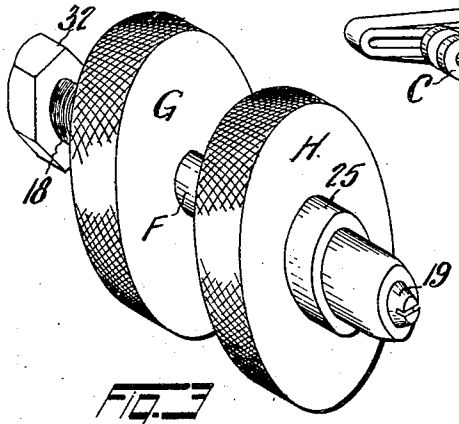

FIG. 3

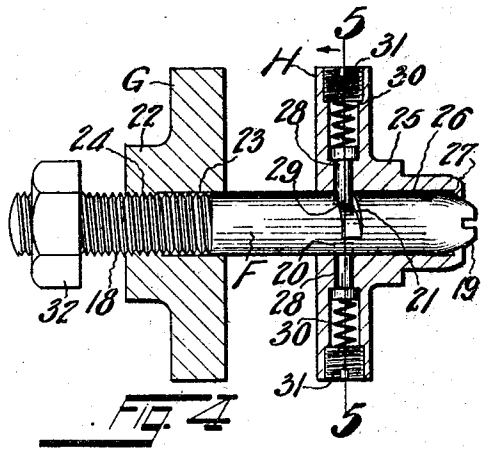

FIG. 4

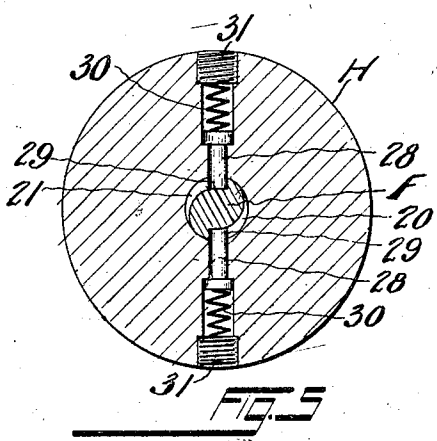

FIG. 5

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UNITED STATES PATENT OFFICE.

ALVIN J. FATHAUER, OF CLEVELAND, OHIO.

COIL-WINDING MEANS.

Application filed February 23, 1926. Serial No. 90,003.

My invention relates to apparatus or devices or means for winding coils generally and for winding such coils as armature coils specifically.

One of the objects of my invention is a simple and efficient coil winding means and adapted to reduce the coil winding operations to a minimum.

Another object of my invention is a simple and efficient means which is adjustable to adapt the same for a variety of differently formed coils.

Another object of my invention is a simple and efficient means which is adjustable to adapt the same for a variety of cross-sectionally different coils.

Another object of my invention is a simple and efficient coil winding means which is adjustable to various forms of coils as well as to various thicknesses of coils and from which the coils can be removed with a minimum amount of time and labor after they are wound.

Another object of my invention is a simple and efficient means of releasing and removing the wound coils from the winding means with a minimum amount of time and labor.

In the accompanying drawing I have illustrated my invention as embodied in certain mechanisms but I am aware that such embodiment is not the only embodiment which is possible with my invention and that modifications may be made as to structural details as well as to general arrangement, within the scope of the appended claims.

In the accompanying drawing:—

Fig. 1 is a general perspective view of a coil winding apparatus embodying the features of my invention and shows such an apparatus with six spools each of which is adjustable to permit a variety of differently formed coils to be formed or wound thereon.

Fig. 2 is a general perspective view of a coil winding apparatus embodying the features of my invention and shows such an apparatus with two spools each of which is adjustable to permit a variety of coils of different lengths to be formed thereon.

Fig. 3 is a general perspective view of a unitary spool on a larger scale, embodying the features of my invention.

Fig. 4 is a longitudinal section of the spool shown in Fig. 3 and shows a threaded engagement between the stem and the flange, and two resilient pins in the washer and engaging two circumferentially disposed grooves in the stem, and the lead of the grooves, and a conical end on the stem abutting a shoulder in the washer, and a threaded end of the stem projecting beyond the flange and having a nut to permit the spool to be attached to a winding apparatus.

Fig. 5 is a transverse section of the spool shown in Fig. 3, taken on a plane indicated by the line 5—5 in Fig. 4 and shows the increasing depth of the grooves and the pins engaging the grooves in the final and definite position on the stem.

Similar reference characters refer to similar parts throughout the views.

Referring now specifically to Fig. 1:—

The frame A is supported in the housing B, either fixedly or rotatably, and has the slots 10, 11, 12, 13, 14, and 15. Six spools C, described later in this specification, are mounted on this frame and each of these spools has a member extending through one of the slots and can be adjusted by sliding the spool to desired position within the limits of the slot. This structure is intended to illustrate, generally, how my invention may be applied to a device adapted to form coils of various forms.

Referring now specifically to Fig. 2:—

The frame D is supported in the housing E, either fixedly or rotatably, and has the slots 16 and 17. Two spools C, described later in this specification, are mounted on the frame D and each of these spools has a member extending through one of the slots and can be adjusted by sliding the spool to desired position within the limits of the slot. This structure is intended to illustrate, generally, how my invention may be applied to a device or apparatus adapted to form plain coils of various lengths.

When it is desired to construct an apparatus for winding a definite form of coil only, the slots may be omitted and the spools may be permanently fixed to the frames A or D or other suitable frames or devices.

Referring now specifically to the spools C shown in Figs. 3, 4, and 5 on a larger scale:—

The stem F has the externally threaded end 18, the conical end 19, and, in the present instance, two grooves 20 and 21.

It is observed that each of the grooves is

disposed circumferentially and that the depth thereof increases progressively (Fig. 5) and that each groove has a lead, or in other words, is at an angle to the longitudinal as well as to the traverse axis of the spool (Fig. 4). The object of this increasing depth and this lead of the grooves will appear presently.

The flange G has the hub 22 and the counterbore 23 and the internally threaded opening 24 adapted to the externally threaded portion 18 of the stem F. This threaded engagement between the stem and the flange permits the flange to be adjusted longitudinally on the stem and thereby adapts the spool to be adjusted for different thicknesses of coils; further details of which will appear later in this specification.

The counterbore 23 is provided to reduce the length of the threaded portion 18 so that a wider range of adjustment of the flange is possible without bringing the threaded portion 18 into the winding space between the flange and the washer.

The washer H has the hub 25 and the bore 26 which has the shoulder 27 adapted to abut the conical portion 19 of the stem F for purposes appearing presently.

In the present instance, the pins 28, two in the present instance, are mounted radially in the washer H and the inner ends 29 thereof are adapted to engage the grooves 20 and 21; the how and why whereof will appear presently.

The springs 30 are disposed in the washer H between the outer ends of the pins 28 and the inner ends of the screws 31 which are threaded into the washer H. The object of the springs 30 is to normally retain the pins 28 inwardly and to provide resiliency for these pins so that they may be pushed back into the body of the washer when necessary.

The grooves 20 and 21 are cut into the material of the stem F and are therefore fixed. The pins 28 are also fixed in position (except longitudinally) in the washer H. Therefore, the washer H attains a fixed position on the stem F when the ends 29 of the pins engage the deepest portions of the grooves 20 and 21 as seen in Fig. 4.

The flange G is threaded to the end 18 of the stem F and, therefore, can be screwed back and forth on the stem and thereby can be adjusted to any desired and available distance from the fixed washer H to attain any available desired thickness of coils when the wire of the coil is wound between the flange G and the washer H.

That portion of the end 18 of the stem F which projects outside of the flange G may extend through the slots in either Fig. 1 or Fig. 2, or through any other support means and the spool as a unit may be securely held in position by the nut 32 which is threaded to the end 18 of the stem F.

It is observed that the projecting portion of the end 18 of the stem F can slide in the slots 10, 11, 12, 13, 14, 15, 16, or 17 and thereby permits of a variety of differently formed coils to be wound; the nuts 32 permit of the spools being securely anchored in adjusted position so that any number of coils of the same form may be wound.

In addition to the adjustable advantages of the spools mentioned, each of the spools also presents a decided advantage in that the coils can be removed from the spools without any tools and with the least amount of time and labor.

After the spools have been adjusted to desired position on the frame to attain a desired form of coil, and the flange G has been adjusted to attain a desired thickness of coil, and the coil has been wound on the spools, the coil can easily be removed from the spools by merely imparting a rotative movement to the washer H and then pulling the same longitudinally off of the stem whereupon the wound coil can readily be taken off of the spools.

The operation of the washer H, to remove the same from the stem, is as follows:— Upon the mentioned rotative movement of the washer, the ends 29 of the pins 28 follow the grooves 20 and 21. Since the grooves are of increasing depth, the pins 28 are pushed into the body of the washer against the springs 30, as the washer is rotated, until the ends 29 leave the grooves and rest against the outer surface of the stem F whereupon a longitudinal pull, outwardly, of the washer slides the same off of the stem.

It is observed here that the grooves 20 and 21 have a lead as previously described; now when the ends 29 engage the grooves and when the coil has been wound, and the washer is given a rotative movement, the ends 29 follow the grooves and, since the grooves lead away from the coil, the washer is moved away from the coil and thereby prevents the washer from abrading or otherwise injuring the insulation of the coil wire or in any other manner affecting the coil.

The operation of the washer, to insert the same on the stem F, is as follows:—

Normally, the springs 30 retain the pins 28 in their innermost positions; the end 19 of the stem F is conical and may have the slot shown to facilitate the adjustment of the spool on a frame.

When the bore of the washer H is telescoped over the conical end 19 of the stem F, the pins 28 are pushed inwardly and this telescoping or pushing inwardly of the washer is continued until the conical end 19 abuts the shoulder 27 which abutment brings the ends 29 in alignment with the grooves. When the shoulder 27 so abuts and the washer is given a rotative movement, the

ends 29 follow the grooves 20 and 21 until the ends 29 abut the deepest and final location portion at one end of the grooves and arrest further rotative movement of the washer. Even if the washer is not manually rotated to this final locating position, the springs 30 normally exert a pressure on the pins longitudinally and, since the ends of the pins abut the inclined bottoms of the grooves, the action of the springs on the pins will automatically rotate the washers to final location position in case the operator fails to rotate the washer to the final location position.

It is believed that the foregoing description is sufficiently clear to show what my invention is and how it may be applied and that the present invention provides a means for winding coils with an expenditure of a minimum amount of time and labor.

I claim:—

1. A spool of the character described, including, a stem having a parallel sided groove having a lead, a washer adapted to be attached to and removed from said stem, and a pin in said washer and adapted to engage the sides of said groove to locate and to retain said washer on said stem.

2. A spool of the character described, including, a stem having a parallel sided groove of increasing depth and having a lead, a washer adapted to be attached to and removed from said stem, and a pin resilient in said washer and adapted to engage the sides and the bottom of said groove to locate and to retain said washer on said stem.

3. A spool of the character described, including, a stem having a groove, a washer adapted to be attached to and removed from said stem, and a pin resiliently mounted in said washer and one end thereof adapted to engage said groove to locate said washer on said stem and to retain the same thereon.

4. A spool of the character described, including, a stem having a groove and a conical end, a washer adapted to be attached to and removed from said stem, a pin resiliently mounted in said washer and one end thereof adapted to engage said groove to locate said washer on said stem and to retain the same thereon, and a shoulder in said washer and adapted to abut the conical end of said stem to primarily locate said washer on said stem in approximate position.

5. A spool of the character described, including, a stem having one end thereof threaded and the other end thereof conical and a groove intermediate the ends thereof, a flange threaded to the threaded end of said stem, a washer adapted to be attached to and removed from said stem, a pin resiliently mounted in said washer and one end thereof adapted to engage said groove to locate said washer on said stem and to retain the same thereon, and a shoulder in said washer and adapted to abut the conical end of said stem to primarily locate said washer on said stem in approximate position.

6. A spool of the character described, including, a stem adapted to be attached to a coil winding means and having a conical end and a groove inwardly of the conical end, a flange adjustable longitudinally on said stem, a washer adapted to be attached to and removed from said stem, a shoulder in said washer to abut the conical end of said stem to primarily locate said washer on said stem in approximate position, a pin resiliently mounted in said washer, and said pin adapted to engage said groove to definitely locate said washer on said stem each time said washer is attached to said stem.

7. In a coil winding apparatus, a spool to wind the wires of a coil thereon, a washer holdable on said spool to confine said wires on one side of said coil, means in said washer to engage said spool to locate said washer in a definite position on said spool, and said means mounted to recede into said washer and out of engagement with the spool when said washer is partly rotated.

8. A spool of the character described including, a stem, and a washer attachable to and locatable on said stem and having a bore and a shoulder therein; said stem having a conical end abutting said shoulder when said washer is located in a position approximate to the final locating position thereof.

9. A spool of the character described including, a stem, a washer attachable to and locatable on said stem and having a bore and a shoulder therein, and a pin resiliently mounted in said washer and normally projecting into said bore; said stem having a conical end moving said pin out of said bore while said washer is being attached to said stem and abutting said shoulder when said washer is located in a position approximate to the final locating position thereof.

10. A spool of the character described including, a stem having a groove, a washer attachable to and locatable on said stem and having a bore and a shoulder therein, and a pin resiliently mounted in said washer and normally projecting into said bore and engaging said groove when said washer is in locating position on said stem; said stem having a conical end moving said pin out of said bore while said washer is being attached to said stem and abutting said shoulder when said washer is attached to said stem in a position approximate to the final locating position thereof.

11. A spool of the character described including, a stem, a washer attachable to said stem, and resiliently mounted means between said stem and said washer to effect

the locating of said washer on said stem; said stem having a conical end to push said resiliently mounted means out of the locating position thereof during the beginning of the movement which attaches said washer to said stem.

12. A spool of the character described including, a stem, a washer attachable to said stem, a pin movable in said washer, and a spring between said pin and said washer and normally extending said pin into the bore of said washer; said pin having a conical end to push said pin out of said bore during the beginning of the movement which attaches said washer to said stem.

13. A coil winding apparatus including a frame having a plurality of angularly disposed slots, a plurality of spools each having a stem insertable into and adjustable in either one of said slots, the end of each of said stems being conical and each of said stems being provided with a groove having a lead, a plurality of washers each having a bore adapted to said stems and attachable to and removable from the same, and a pin movable in each of said washers and normally extending into said bore thereof; said conical end of the stem contacting said pin to move the same out of said bore while said washer is being attached to said stem and said lead of the groove arranged so that said pin engages the sides thereof to locate said washer longitudinally on said stem upon a rotative movement thereof in one direction and to move said washer away from a coil wound on said spool upon a rotative movement thereof in the opposite direction.

14. A coil winding apparatus including a spool having a stem provided with a groove extending circumferentially and having walls inclined circumferentially, a washer attachable to and removable from said spool, and a member mounted in said washer and adapted to move into said groove to engage one of said walls to locate said washer on said spool in a definite position upon a rotative movement thereof in one direction and to engage the other one of said walls to move said washer longitudinally and away from said spool upon a rotative movement thereof in the opposite direction.

15. A coil winding apparatus including a spool member, a coil confining member attachable to said spool member, a movable element between said members and adapted to normally obstruct the attachment of said confining member to said spool member, and taper surface on one of said members to engage said movable element to move the same into an unobstructing position to permit said confining member to be attached to said spool member.

16. A coil winding apparatus including a frame made of one piece of material to provide rigidity and to avoid joints and having a plurality of slots through the same, a plurality of spools each having a stem, said stems extendable through said slots and movable therein to adjust said spools to wind variously formed coils thereon, and fastening means to clamp said spools onto said frame in the adjusted position thereof.

17. A coil winding apparatus including a spool member, a coil confining member attachable to and removable from said spool member, tapering surface on one of said members and a movable element between said members and adapted to engage said tapering surface to locate said confining member in a definite position on said spool member when the same is attached thereon and to move said confining member longitudinally away from said spool member during the first portion of the removal movement thereof.

18. A coil winding apparatus including a spool member, a coil confining member attachable to and removable from said spool member, a movable element between said members and adapted to normally obstruct the attachment of said confining member to said spool member, tapering surface on one of said members to engage said movable element to move the same into an unobstructing position to permit said confining member to be attached to said spool member, and indented tapering surface in said one member to engage said movable element to retain said confining member on said spool member longitudinally in both directions.

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