July 7, 1936. P. ROBBINS 2,046,883

CONCENTRIC FIELD COIL WINDER

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Fig. 3.

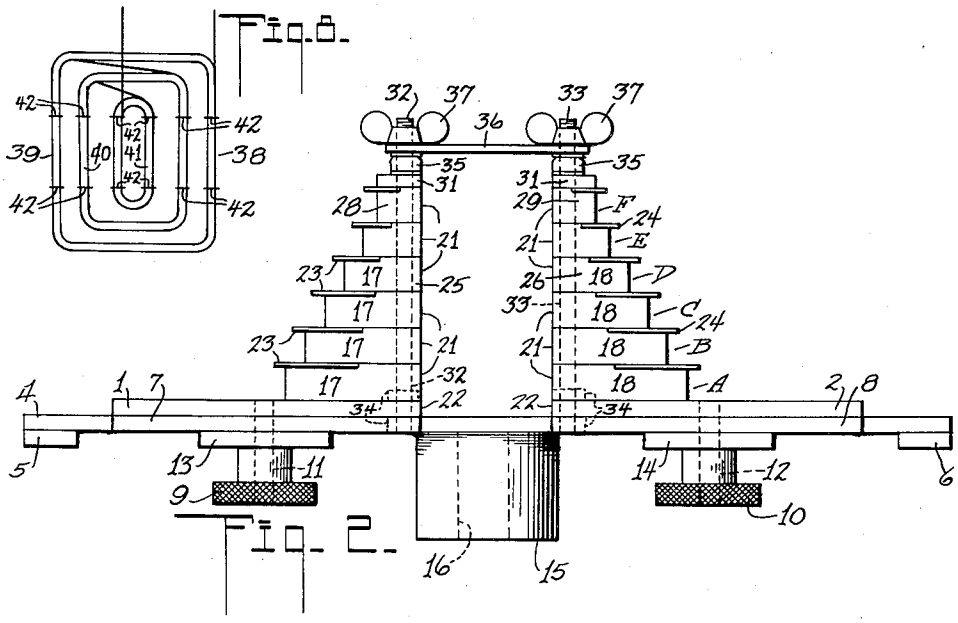


Fig. 2.

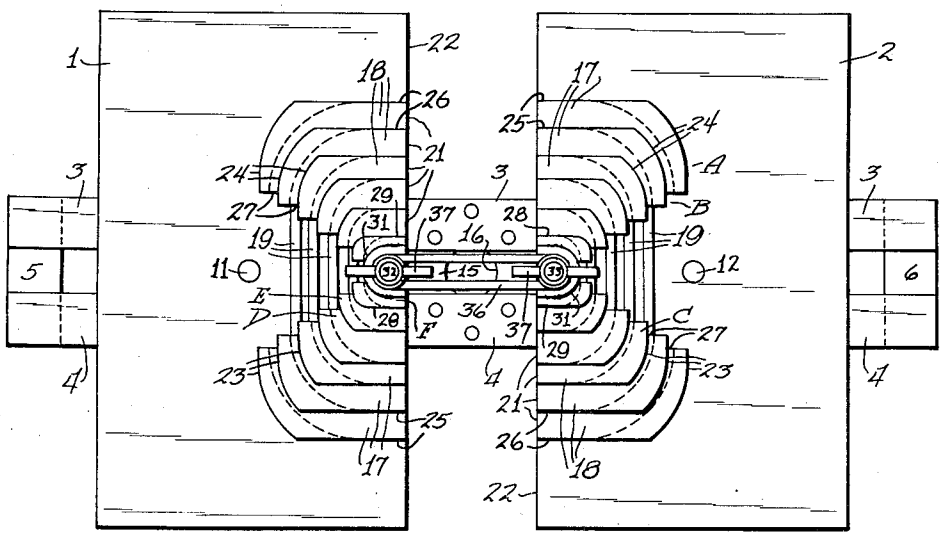


Fig. 1.

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Fig. 5.

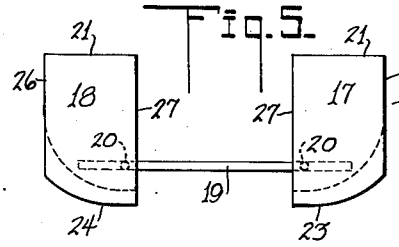


Fig. 6.

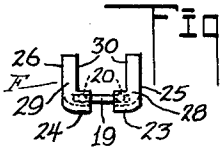
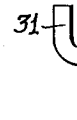


Fig. 7.



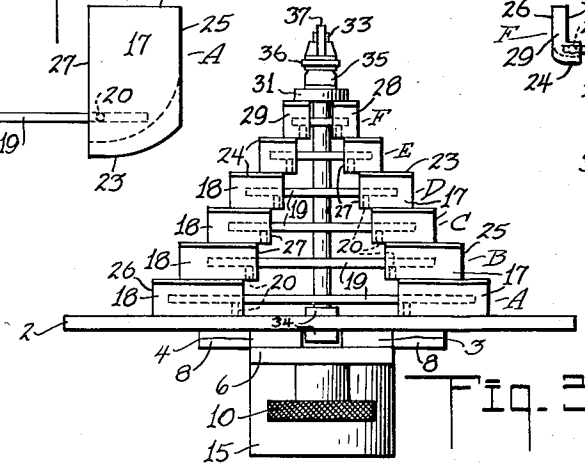


Fig. 3.

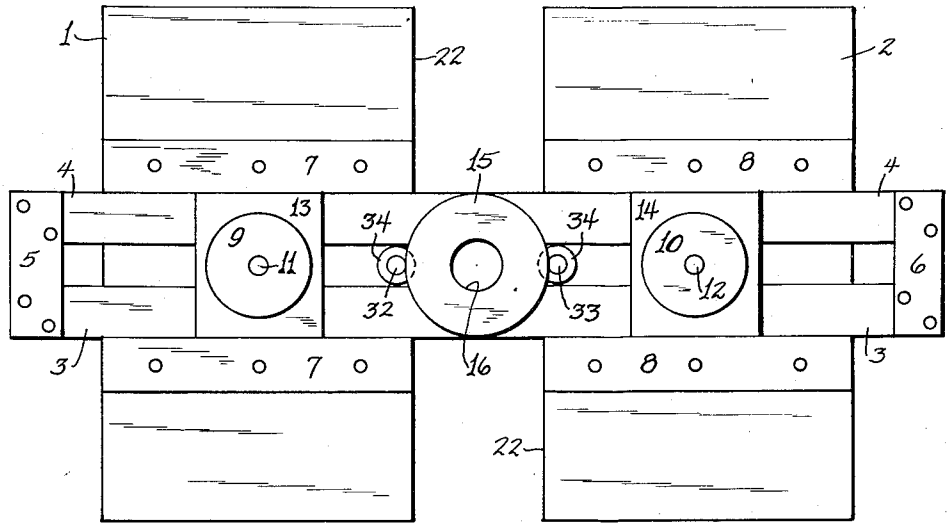


Fig. 4.

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2,046,883

CONCENTRIC FIELD COIL WINDER

Phil Robbins, Santa Rosa, Calif.

Application July 22, 1935, Serial No. 32,629

6 Claims. (Cl. 140—92.2)

My invention relates to improvements in concentric field coil winders, and it consists of the combinations, constructions and arrangements hereinafter described and claimed.

An object of my invention is to provide concentric field coil winders in which a number of coils in one gang can be wound, these coils being of different sizes. The device makes use of adjustable forms for each coil, and these forms are adjustable longitudinally and laterally. The forms carry coil retaining portions, and when the forms are moved toward each other these portions free the coils and allow the entire gang to be removed as a unit.

The device is extremely simple in construction and quickly adjustable. After the adjustment of all of the forms has been made, the device can be mounted on a rotating shaft and then the wire fed onto the device.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming a part of this application, in which

Figure 1 is a plan view of the device;

Figure 2 is a side elevation;

Figure 3 is an end elevation;

Figure 4 is a bottom plan view;

Figure 5 is a plan view of a portion of one of the forms;

Figure 6 is a plan view of a portion of another one of the forms;

Figure 7 is a plan view of a spacing member; and

Figure 8 shows the coil.

In carrying out my invention I make use of two sliding base members 1 and 2, and these members ride on guide rails 3 and 4. The rails 3 and 4 are spaced from each other, and have their ends connected together by end pieces 5 and 6. Figure 4 shows the under surfaces of the sliding base members 1 and 2 provided with guide strips 7—7 and 8—8. These strips bear against the outer edges of the guide rails 3 and 4.

The members 1 and 2 are held in adjusted position by adjustable holding means consisting of lock nuts 9 and 10, see Figure 2, threaded on screws 11 and 12, and bearing against plates 13 and 14. The plates 13 and 14 ride upon the under surface of the guide rails 3 and 4, and clamp the sliding base members 1 and 2 in place.

At the center of the guide rails 3 and 4 I mount a tubular member 15, see Figures 2 and 4, and this member has an internally threaded bore 16. The member 15 can be screwed upon a rotatable shaft not shown, and the rotation of this shaft will rotate the members 1 and 2 and the guides 3 and 4 about the axis of the shaft as a unit.

On the top of each sliding base member 1 and 2 I dispose a plurality of winding forms. Each form consists of two sets of identical pairs, and for simplicity I have designated the forms by the letters A to F inclusive. Figure 5 shows one set or pair of the lowermost form A. This set or pair is composed of two halves 17 and 18, and these halves rest upon the base plate 2. The halves are spaced from each other by adjustable spacing means consisting of a rod 19, and set screws 20 which enter the under sides of the halves 17 and 18 and secure the rod 19 in adjusted position, see Figure 3. The other two halves composing the form A are mounted on the base plate 1, and are spaced the same distance apart from each other by a similar adjustable spacing means. The edges 21 of the four parts of the winding form A are aligned with the inner edges 22 of the base plates 1 and 2. The two halves 17 and 18 of each set or pair are also centered with respect to a medial line passing between the guide strips 3 and 4.

The halves 17 and 18 of each set are provided with overhanging lips 23 and 24, and it will be noted that the outer sides 25 and 26 of the halves are not provided with lips. The purpose of the lips will be hereinafter described.

The forms B to E inclusive are identical to the form A except as to size, and therefore a detailed description of each is not necessary. Corresponding parts will be given like reference numerals. Figures 2 and 3 show how the forms B to E inclusive are superimposed one above the other and arranged into two groups and how the inner edges 21 of each group of sets or pairs are disposed in the same plane. However, the adjacent edges 27 of the pairs in each group are staggered with respect to corresponding edges in the adjacent pairs of the same group so that a stepped effect is produced by these edges as shown in Figure 3. Each half of each pair is held the required distance from its associate half by the rod 19, and the base plates 1 and 2 determine the distance between the groups.

The uppermost form F is shown in Figure 6. The halves 28 and 29 forming a set of the form F are cut away at 30. The halves 28 and 29 carry the overhanging lips 23 and 24, and a rod 19 separates the two halves the required distance from each other.

On top of each set of the uppermost form F, I dispose a washer or spacer 31 which is U-shaped as shown in Figure 7. The means for holding all of the forms as a unit to the plates 1 and 2 consists of two bolts 32 and 33 that are carried by the plates 1 and 2 respectively. The bolts pass through the plates 1 and 2 and are secured in position by lock nuts 34. The tops of the bolts pass through the U-shaped washers 31, and collars or nuts 35 are mounted on the bolts. A closed link 36 is dropped over both bolts and limits the extreme limit of movement of the plates 1 and 2 away from each other. The link also acts as a stiffening member for the two groups of the forms. Wing nuts 37 are screwed upon the tops of the bolts 32 and 33, and clamp the forms together.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood.

In Figure 8 I show a gang 38 of three coils 39, 40, and 41. In the forming of this coil only three of the forms are used. The dimensions of the various coils are carefully determined and the forms A to F inclusive are adjusted in accordance therewith. As already stated, if only three coils are to be formed only three forms need be used. The forms are adjustable laterally and also longitudinally. The lateral adjustment is accomplished by moving the halves in each pair away from each other to the desired point, and then locking the halves in adjusted position by the rods 19 and the set screws 20. The two pairs composing form A, for example, are then laid upon the base plates 1 and 2. In like manner, the halves of the next form B are adjusted, and are then laid upon the halves of the form A so that the edges 21 of the halves align with the similar edges of the halves in the form A. The edges 27 of the halves composing the form B will be stepped with respect to the same edges of the halves of the form A. The form C is then made up, and if additional coils in the winding are used, additional forms are used. After all of the forms have been properly placed so that two groups of form sets are provided, one for each base plate, the washers 31, nuts 35, link 36, and the wing nuts 37 are assembled for securing the groups to the base plates. The forms will now be locked as a unit to the slides or base plates 1 and 2, and the pairs of halves on each slide will constitute one-half of the complete form.

The two groups of the complete forms can now be moved toward or away from each other to give the desired longitudinal lengths to the forms, and then the slides or base plates 1 and 2 can be locked against further movement by tightening the nuts 9 and 10. The device is now placed upon a rotating shaft, not shown, by screwing the tubular member 15 onto the shaft.

The winding is now started, and the operator takes a wire and attaches it to any place at the top of the device, such as for example by winding it around the link 36 or the wing nuts 37. It should be noted that in the adjustment of the slides 1 and 2 toward and away from each other the wing nuts 37 are temporarily loosened. The collars 35 are threaded onto the bolts 32 and 33, and constitute locking means for holding the two groups of form sets in position when the wing nuts 37 are loosened.

The device is rotated in a clock-wise direction when looking at Figure 1, and the wire is first fed around the top form, which in the present instance is the form F. The operator has noted how many turns of wire must be placed on the form F. For example, if sixteen turns are designated, the device will rotate sixteen times and will place sixteen loops around the form F. The wire can now be led to the next form E without breaking the wire, and the desired number of turns wound on the form E. In like manner the other forms D, C, B, and A may be wound with wire. For simplicity I have shown only three coils in Figure 8, and therefore only three forms would be used.

After the winding operation the rotation of the device is stopped, and then the operator ties strings 42 around the various bunches of wire as shown in Figure 8, and the coil is now ready to be removed from the device. The operator loosens the wing nuts 37 and the nuts 9 and 10, and slides the base plates 1 and 2 toward each other. This frees the lips 23 and 24 of the various forms from their coils, and the entire number of coils can now be lifted off the device, and will take the appearance shown in Figure 8.

The principal advantage of the entire device is the quick adjustment of the forms to form a coil of any desired dimensions within the limits of the machine. The device can be quickly collapsed to permit the winding to be removed. The device is primarily designed for a concentric type field winding for single phase motors. It is obvious that more than six coils may be wound in one gang if additional forms are added. Each segment or form is independent of the others, and is only locked as a unit to the others by the bolts 32 and 33. The projections or lips 23 and 24 are only on the ends of the halves 17 and 18 in order that the winding may be quickly removed when the device is collapsed without the necessity of moving the sides of the coils outwardly to free the forms. If desired the device may be calibrated so that the lengths and widths of the various forms can be quickly determined. The coil as formed in Figure 8 can now be placed in the stator of the motor, and then the tying strings 42 may be cut. The device will make the winding of the desired number of coils, each coil having the desired number of loops.

I claim:

1. A field coil winder comprising a two-piece base, a winding form carried by the base, the form consisting of two sets of identical pairs, a pair being mounted on each part of the base, each pair consisting of two separable halves, means for holding the halves of each pair the desired distance from each other, and means for holding the pairs the desired distance apart, whereby the width and the length of the form can be varied, said base being rotatable as a unit for winding a coil of wire around the form, the halves of each pair having wire-retaining lips extending only in the direction of the length of the form, said lips freeing the coil from the form when the two parts of the base are moved toward each other.

2. A concentric field coil winder comprising a two-piece base in which the parts are adjustable toward and away from each other, a plurality of winding forms carried by the base, each form consisting of two sets of identical pairs, a group of sets being carried by each part of the base, each pair consisting of two separable halves, means for spacing the halves of each pair the desired distance apart, the forms being superimposed one upon the other and progressively diminishing in size from the lowermost form and upward, means for securing the forms to the base

parts, and means for securing the base parts in adjusted position, said base being rotatable as a unit for winding a wire around the forms.

3. A concentric field coil winder comprising a two-piece base in which the parts are adjustable toward and away from each other, a plurality of winding forms carried by the base, each form consisting of two sets of identical pairs, a group of sets being carried by each part of the base, each pair consisting of two separable halves, means for spacing the halves of each pair the desired distance apart, the forms being superimposed one upon the other and progressively diminishing in size from the lowermost form and upward, means for securing the forms to the base parts, and means for securing the base parts in adjusted position, said base being rotatable as a unit for winding a wire around the forms, the halves of each pair having wire-retaining lips extending only in the direction of the length of the forms, said lips freeing the coils from the forms when the two parts of the base are moved toward each other.

4. A concentric field coil winder comprising a supporting guide, two base members slidable along the guide, means for securing the base members in adjusted position, a plurality of wire winding forms for coils of progressively reducing size, each form consisting of two separable sets, each set consisting of two separable halves, means for spacing the halves the desired distance from each other and for securing them in such spaced relation, said sets being superimposed one above the other for forming two groups, means for securing each group to a base member, said base members and forms being rotatable as a unit for coiling a wire on the forms.

5. A concentric field coil winder comprising a supporting guide, two base members slidable along the guide, means for securing the base members in adjusted position, a plurality of wire winding forms for coils of progressively reducing size, each form consisting of two separable sets, each set consisting of two separable halves, means for spacing the halves the desired distance from each other and for securing them in such spaced relation, said sets being superimposed one above the other for forming two groups, means for securing each group to a base member, said base members and forms being rotatable as a unit for coiling a wire on the forms, said halves being provided with lips for holding the wire on the forms, the lips extending only in the direction of the lengths of the forms.

6. A concentric field coil winder comprising a two piece base, a plurality of superimposed forms of different sizes, each form consisting of two sets of pairs, the sets being arranged in two groups and secured to the base pieces, the largest form being disposed at the base and the smallest at the top of the forms, means for altering the width of each form independently of the others by adjusting the pairs toward or away from each other, the lengths of the forms being determined by the distance separating the base pieces, all of the forms being simultaneously shortened in length when the base pieces are moved toward each other, whereby the concentric sections of the field coil may be removed from the forms.

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