Oct. 8, 1929. W. L. THACKER 1,731,183

COIL WINDING MACHINE

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FIG. 1

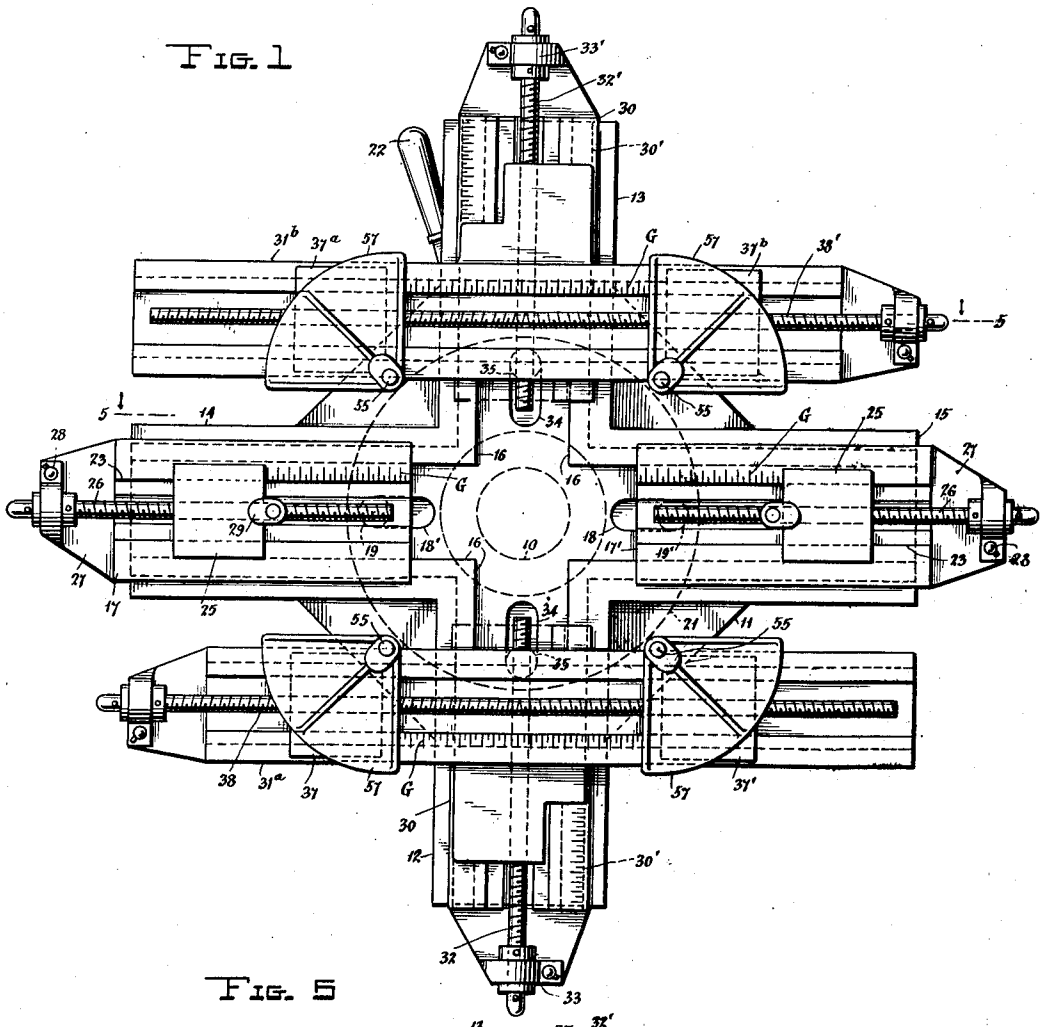
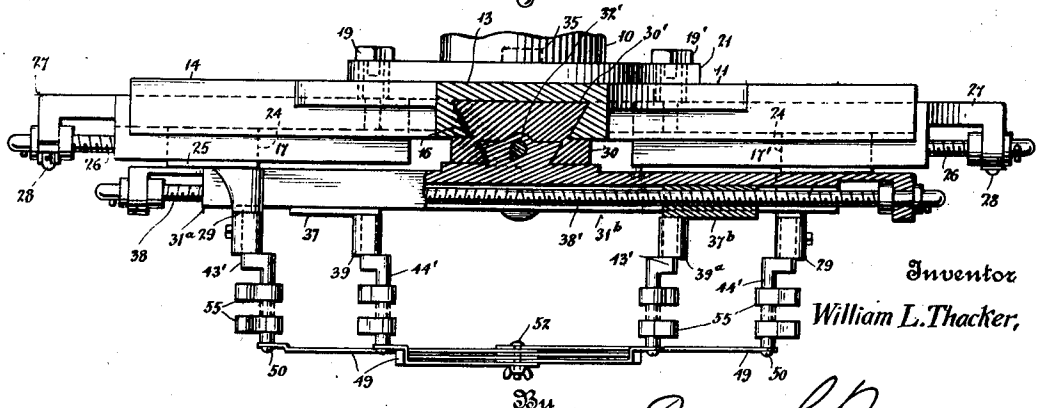


FIG. 5



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Fig. 2

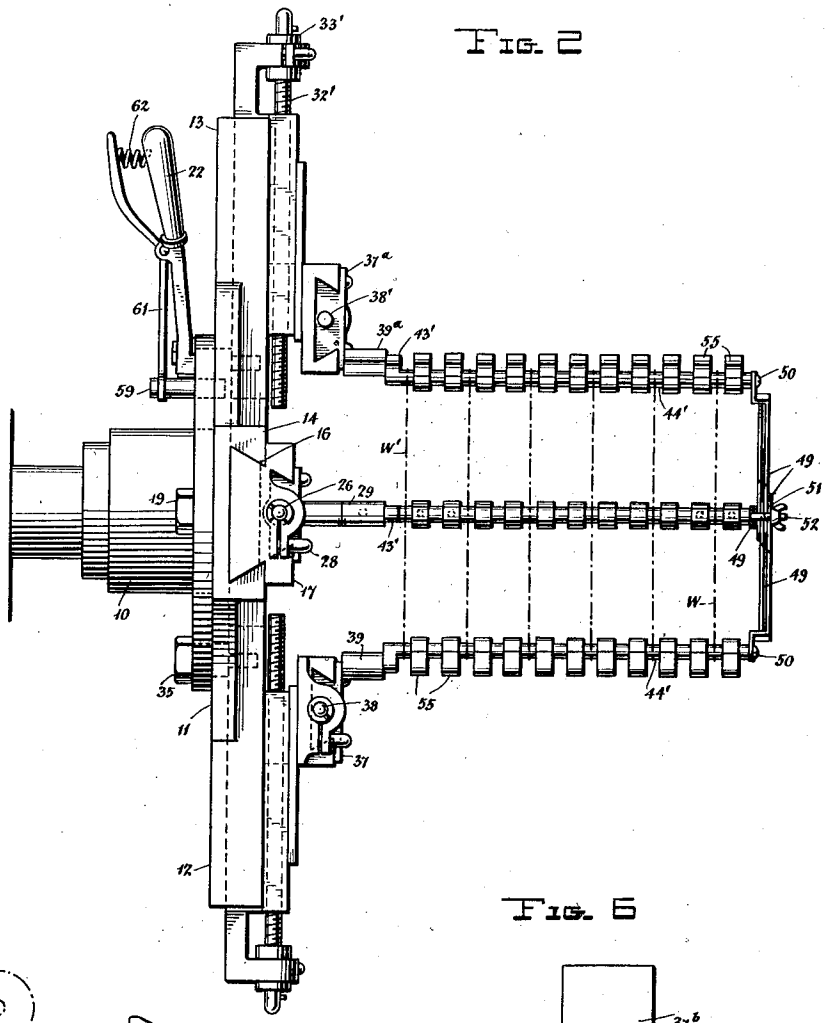
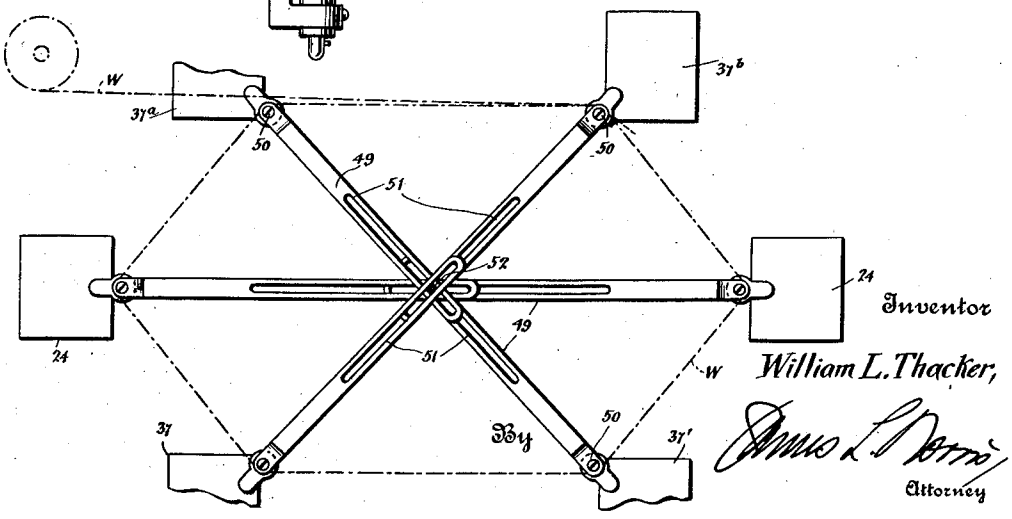


Fig. 6



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COIL WINDING MACHINE

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FIG. 3

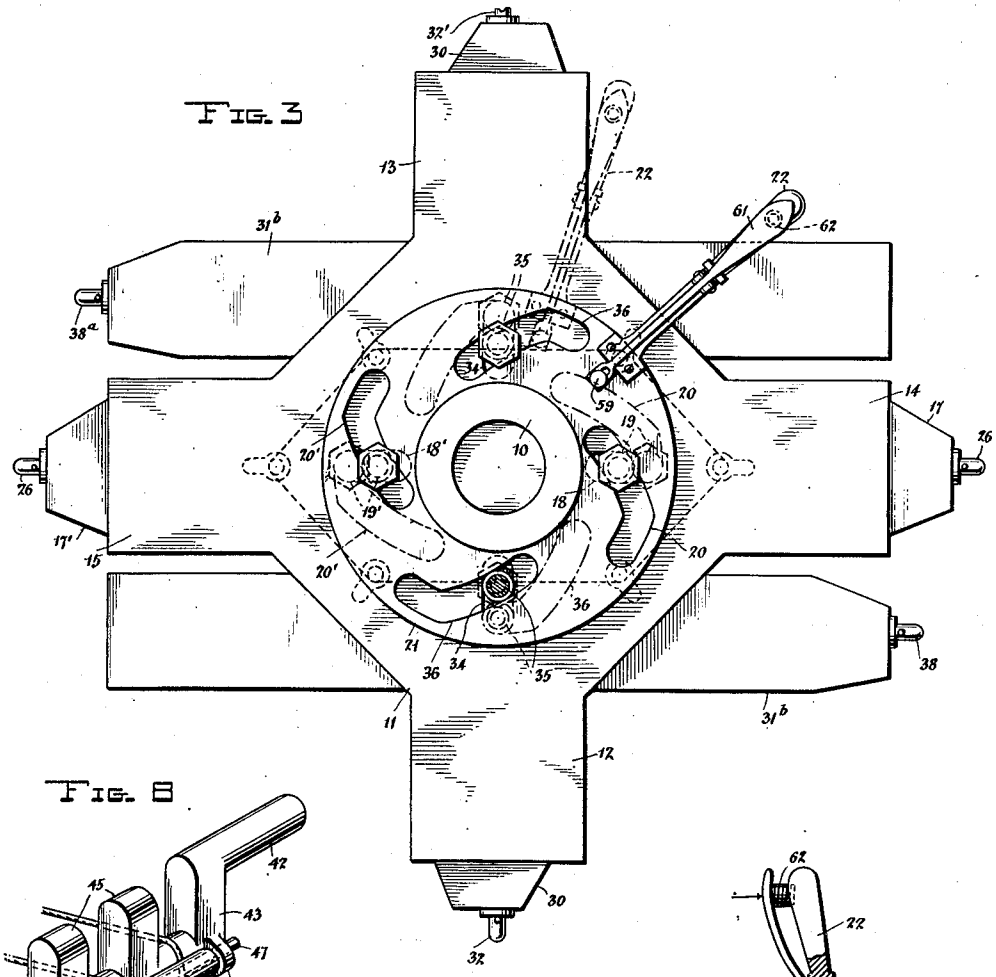


FIG. 8

FIG. 9

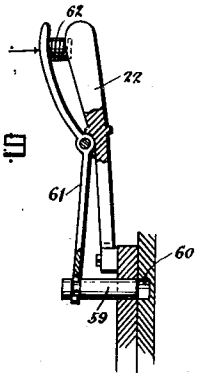
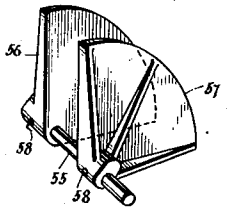


FIG. 10



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COIL WINDING MACHINE

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FIG. 1

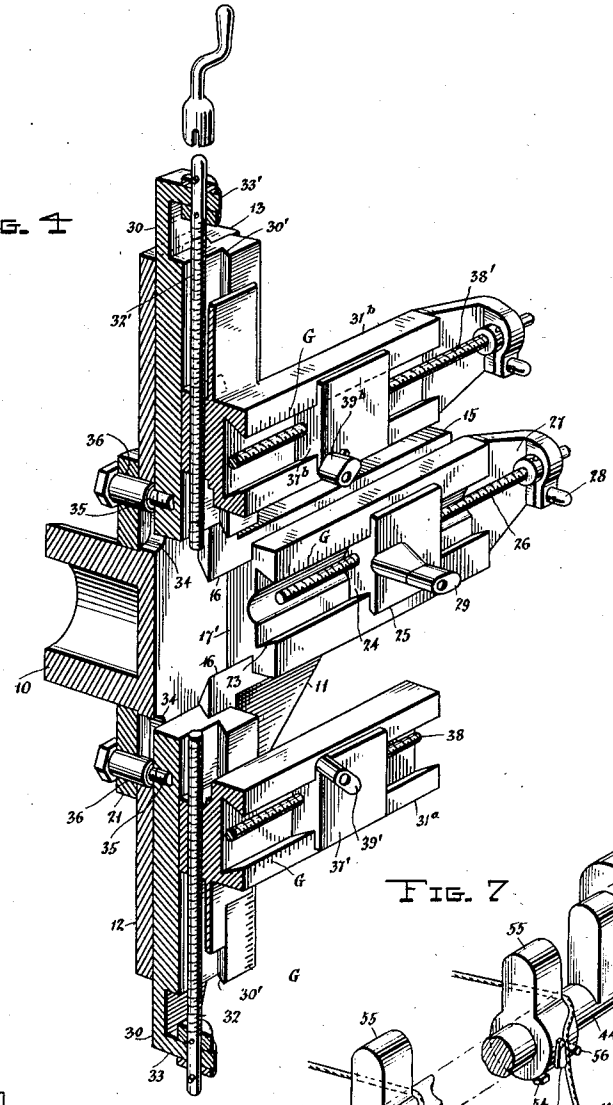


FIG. 7

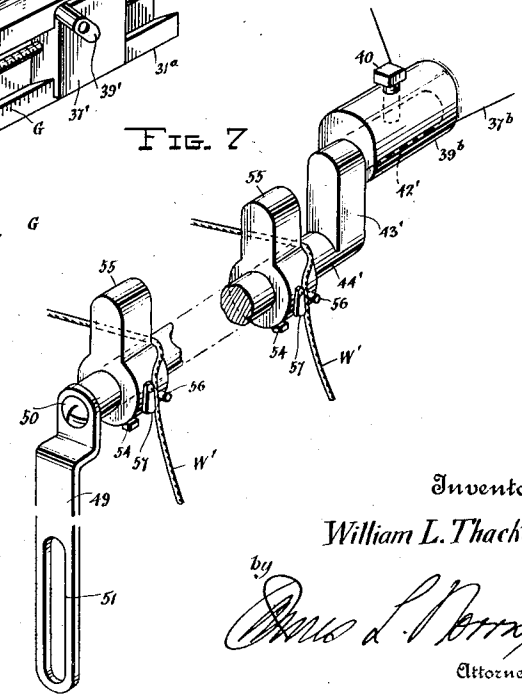
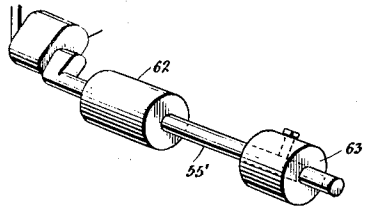


FIG. 11



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Patented Oct. 8, 1929 1,731,183

UNITED STATES PATENT OFFICE

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COIL-WINDING MACHINE

Application filed January 3, 1928. Serial No. 244,251.

This invention relates to improvements in coil-winding machines, that is, to a machine especially designed for winding armature, field and transformer coils, one object of the invention being the provision of a device of this character which is provided with an adjustable sectional reel so that irregular shaped coils of varying sizes may be made, and through the medium of which also a plurality of the same size coils may be simultaneously wound.

A further object of this invention is the provision of a machine of this type in which the revoluble member is provided with a plurality of detachable reel-forming arms, a certain one of which may be provided with means for clamping the terminals of the reels at the starting of the winding operation combined with means for retracting the reel sections so that the coil or coils may be readily removed therefrom.

A still further object of the invention is the provision of a machine of this character which is simple, durable and inexpensive in construction and which is thoroughly efficient and practical in use.

In the accompanying drawings:—

Figure 1 is a front elevation of the complete machine with the coil forming device as shown in Fig. 10.

Figure 2 is a side elevation thereof with a multiple coil former in use.

Figure 3 is a rear elevation thereof.

Figure 4 is a perspective sectional view of one-half of the present device showing the relative position of the parts thereof and without any type of coil former.

Figure 5 is a plan view, partly in section, taken as from above in Figure 1 with the section on line 5—5 of said figure, the coil forming device being similar to those of Fig. 2.

Figure 6 is a plan view of the stabilizing device for the free ends of the reel or coil former sections, as shown in Fig. 2.

Figure 7 is a perspective view of one of the coil sections showing one method of wire clamp.

Figure 8 is a similar view showing another method of wire clamp and a modified form of wire receptacle forming means.

Figure 9 is a detail sectional view of the locking device.

Figure 10 is a view of one of the coil forms per se, as shown in Fig. 1.

Figure 11 is a detail view of another coil form.

Referring to the drawings, the numeral 10 designates the tubular member which is adapted to be fastened upon a rotary device, such as the shaft of an electric motor or the like, and which carries the substantially cruciform member 11 having the respective terminals 12, 13, 14 and 15. The front face of each of these terminals, as clearly illustrated in Figure 4, is provided with two parallel groove-forming edges 16 and which, as illustrated in Figure 1, embodies four of such groove-forming members in cruciform shape and for the reception, respectively, and for sliding movement, of the various adjustable elements of the present construction. The members or terminals 14 and 15 have blocks 17 and 17′ mounted in this groove-forming portion so as to be laterally adjustable or slidable, there being provided the radial slots 18 and 18′ for reception of the respective pins 19 and 19′, said pins being connected to and bodily movable with the slides or blocks 17 and 17′ and being extended through the arcuate slots 20 and 21′ of the operating disk 21. By this means, as the disk 21 is oscillated through the medium of its operating handle 22, the slides 17 and 17′ are moved radially to or from the center of the present device. Each of the respective blocks 17 and 17′ are provided with the dove-tailed portions 23 to receive the male member 24 of the adjustable reel section carrying member 25, the screw 26 engaging the same and being mounted in the clamping terminal 27 so that said screw can be rotated to adjust the position of the member 25 relatively to the slide and then be locked, due to the clamping nut or bolt 28. Each one of these reel-carrying members 28 is provided with an apertured offset 29, the purpose of which will presently appear.

The slides 30 are mounted in the dove-tailed grooves 30′ of the terminals 12 and 13, and each of these slides is provided with an offset 33 in which is mounted for rotation the

adjusting screw 32, and this screw, in turn, is connected to operate its respective T-shaped member 31ª and 31ᵇ to regulate the adjustment thereof with regard to the slide, whereas the slide itself has movement imparted thereto through the medium of the pin 35 which is mounted for radial movement within the slot 34 of the support 10 and for actuating movement in the arcuate slot 36 of the oscillatory plate.

Mounted upon and within the respective T-shaped members, that is, in the lateral terminals thereof for adjustment and to be bodily carried thereby are the reel section carrying blocks 37 and 37′, 37ª and 37ᵇ, and these blocks are mounted in pairs, so as to be controlled for adjustment by means of the respective right- and left-hand screws 38 and 38′, which, when operated, tend to move the blocks, as, for instance, 37 and 37′ to or from the vertical center line, as viewed in Figure 1. By this means, these blocks may be adjusted relatively to the center line, as viewed in Figure 1, whereas the T-shaped members are adjusted relative to the horizontal line, and then after being adjusted, by means of the operating plate 21, they are moved with the respective section-carrying slides 17 and 17′ to or from the center of the present structure, as and for the purpose hereinafter set forth.

Each one of the respective blocks 37, 37′, 37ª and 37ᵇ are provided with the respective reel section receiving projections 39, 39′, 39ª and 39ᵇ, and each one of which carries its respective reel section of a type to be later described.

As the construction of these various type reel-carrying members are identical, the description of one will suffice for all.

As viewed in Figs. 1 and 10, a support 55 is detachably connected to four of the projections 29 and each carries the pair of segmental coil formers or plates 56 and 57, a countersunk set screw 58 being employed to attach the outer plate 57 at its desired adjustment upon the rod.

As viewed in Figure 8, each member consists of the supporting shank 42 which is adapted to be secured to its respective supporting member 29 through the instrumentality of the set-screw 40. The off-set portion 43 carries the cylindrical portion 44 provided with the spaced teeth 45 which form wire- and coil-receiving receptacles throughout the full length of the member or section of the reel, so that the wires W may be positioned therein and securely clamped at the initial winding of the reel through the eccentric roller 46 carried upon the rod 47, and journaled in the apertured lugs 48, a manipulating handle 48′ being provided to release the wires, whereas the insertion of the wires between the eccentric roller 46 and the portion 44 of the device and the slight pulling upon the wire will tend to lock the clamp and hold the wire firmly in position.

By this construction, it will be noted that a plurality of coils, one to each space between the teeth 45, may be formed, but in the form shown in Figure 8, the width of the respective coils will be according to the space, whereas in the structure shown in Figure 7, the adjustable space-forming members 55 are attached by means of set-screws 54 to the shank 44′, the portions of this construction that are identical with that shown in Figure 8 employing similar numbers with the prime indication.

In this construction, the wires, instead of being clamped by a single eccentric clamping device, as in Figure 8, are clamped by individual clamping devices consisting of the pin 56 and pivoted locking eccentric 57.

It is desirable, when a plural number of coils are being formed, that the outer ends of the respective reel section forming members be stabilized or held in their fixed adjusted relation and with as little vibration as possible, as the winding of the coils therearound has a tendency to draw the free ends inwardly, and in order to prevent this and thus insure the proper shape to the coils, there are provided a plurality of plates 49, as particularly viewed in Figure 6, the terminals of which will movably fit upon the outer ends of the members 41, while the slotted portions 51 meet or cross at the center and are secured together by the winged bolt 52. By this means, the device may be readily placed in position and removed, and, as before stated, the stability of the reel insured.

As shown in Fig. 11, each rod 55′ is provided with a pair of adjustable disks 62 and 63, whereby coils of loop form or irregular shapes may be constructed, the space between the disks regulating the thickness of the coil or loop to be constructed.

As it is desirable to lock the reel in extended position, the lock, as shown in Figure 9, is employed, wherein the headed locking pin 59 is controlled by the lever 61, carried by the handle 22, the spring 62 normally holding the pin seated in the recess 60 of the base 11.

Graduations G are formed on various faces of the devices so that exact adjustments for varying sized coils may be quickly set.

From the foregoing description, taken in connection with the drawings, the operation of the present device is readily understood, and the advantages fully appreciated, but, briefly stated, it is as follows:—

The respective reel section forming members 41 are positioned in place and the respective slides are adjusted in the cruciform carrying member, so that these members assume, when fully extended, the size of the coils to be formed. The terminals of the wires are then positioned through the medium of the clamps shown in the respective views,

Figures 7 and 8, and the device rotated through any means, such as an electric motor, as the spindle 10 of the support is adapted to be attached upon and rotatable with the prime mover. The motor, when used, is provided with a counter, so that the operator can see at a glance the number of revolutions the winding machine has made and to stop the same when a sufficient number of coils have been wound between the respective receptacle-forming members of the reel sections. When this is completed, the handle 61 is depressed and the handle 22 is oscillated so as to retract the slides, and, in turn, the reel sections or reel-forming members 41, and by such contraction permitting the easy removal of the respective coils from the reel.

Where the device as shown in Figure 6 is employed, the same is inserted in place before the initial winding operation. By loosening thumb screw 52, this device will collapse to permit of the removal of the coils from the reel.

It is evident that with a device of this character provided with so many adjustments that various shapes and sizes of coils, as regards circumference, may be produced simultaneously, and also, where desired, coils of considerable bulk, that is, with greater turns, can also be formed, thus providing in this one winding machine a universal device for use in constructing many sized coils, and also a plural number of coils at the same time.

It will be seen that this device is so constructed as to expedite the quick setting up for various sizes and shapes of coils, and for the receiving of various attachments or devices for forming the coils.

I claim:—

1. A coil-winding machine, including a support having a plurality of radiating arms, an adjustable coil-receiving member slidably mounted upon each arm, a manually oscillatable member carried by the support, and cooperating means carried by the latter and said members which when the oscillatable member is operated simultaneously moves the members into extended or contracted position.

2. A coil-winding machine, including a support having a plurality of radiating arms, an adjustable coil-receiving member slidably mounted upon each arm, a manually oscillatable member carried by the support, cooperating means carried by the latter and said members which when the oscillatable member is operated simultaneously moves the members into extended or contracted position, and means for locking said members in one of said positions.

3. A coil-winding machine, including a support having four radiating arms, two T-shaped members slidably mounted in two opposite arms thereof, two longitudinally adjustable wire-receiving means carried by each T-shaped member, two wire-receiving members carried by the remaining arms of the support, a manually oscillatable member carried by the support, and cooperating means carried by the latter and said members which when the oscillatable member is operated simultaneously moves the T-shaped members and the last two wire-receiving members into coil-forming and coil-releasing positions.

4. A coil-winding machine, including a support having four radiating arms, two T-shaped members slidably mounted in two opposite arms thereof, two longitudinally adjustable wire-receiving means carried by each T-shaped member, two wire-receiving members carried by the remaining arms of the support, a manually oscillatable member carried by the support, and cooperating means carried by the latter and said members which when the oscillatable member is operated simultaneously moves the T-shaped members and the last two wire-receiving members into coil-forming and coil-releasing positions, and means for locking the last means in coil-forming position.

5. A machine for winding a plural number of coils, including a main support having four radiating arms, a slidable auxiliary support carried by each arm, a manually oscillatable member mounted in the main support, cooperating means carried by the latter member and auxiliary supports for sliding all of the auxiliary supports in unison, and a plural coil-forming means, one portion of which is carried by each auxiliary support.

6. A machine for winding a plural number of coils, including a support having four radiating arms, a slidable auxiliary support carried by each arm, a manually oscillatable member mounted in the main support, cooperating means carried by the latter member and auxiliary supports for sliding all of the latter in unison, a reel-forming member projecting outwardly from each auxiliary support, and each of said members being provided with a plural number of wire receptacles, whereby a plural number of coils may be simultaneously formed upon the reel.

7. A machine for winding a plural number of coils, including a support having four radiating arms, a slidable auxiliary support carried by each arm, a manually oscillatable member mounted in the main support, cooperating means carried by the latter member and auxiliary supports for sliding all of the latter in unison, a reel-forming member projecting outwardly from each auxiliary support, each of said members being provided with a plural number of wire receptacles, whereby a plural number of coils may be simultaneously formed upon the reel, and means for clamping the initial terminals of the coils to one of the reel-forming members.

8. A machine for winding a plural number of coils, including a support having four

radiating arms, a slidable auxiliary support carried by each arm, means for sliding all of the latter in unison, a reel-forming member projecting outwardly from each auxiliary support, each of said members being provided with a plural number of wire receptacles, whereby a plural number of coils may be simultaneously formed upon the reel, and adjustable stabilizing means attached to the free ends of the reel-forming members.

9. A machine for winding a plural number of coils, including a support having four radiating arms, a slidable auxiliary support carried by each arm, means for sliding all of the latter in unison, a reel-forming member projecting outwardly from each auxiliary support, each of said members being provided with a plural number of wire receptacles, whereby a plural number of coils may be simultaneously formed upon the reel, means for clamping the initial terminals of the coils to one of the reel-forming members, and adjustable stabilizing means attached to the free ends of the reel-forming members.

10. A machine for winding a plural number of coils, including a support having four radiating arms, a slidable auxiliary support carried by each arm, means for sliding all of the latter in unison, a plural coil-forming means, one portion of which is carried by each auxiliary support, and means for locking the latter means to hold the supports in extended position.

11. A machine for winding a plural number of coils, including a support having four radiating arms, a slidable auxiliary support carried by each arm, means for sliding all of the latter in unison, a reel-forming member projecting outwardly from each auxiliary support, each of said members being provided with a plural number of wire receptacles, whereby a plural number of coils may be simultaneously formed upon the reel, and means for locking the latter means to hold the supports in extended position.

12. A machine for winding a plural number of coils, including a support having four radiating arms, a slidable auxiliary support carried by each arm, means for sliding all of the latter in unison, a reel-forming member projecting outwardly from each auxiliary support, each of said members being provided with a plural number of wire receptacles, whereby a plural number of coils may be simultaneously formed upon the reel, means for clamping the initial terminals of the coils to one of the reel-forming members, and means for locking the latter means to hold the supports in extended position.

13. A machine for winding a plural number of coils, including a support having four radiating arms, a slidable auxiliary support carried by each arm, means for sliding all of the latter in unison, a reel-forming member projecting outwardly from each auxiliary support, each of said members being provided with a plural number of wire receptacles, whereby a plural number of coils may be simultaneously formed upon the reel, adjustable stabilizing means attached to the free ends of the reel-forming members, and means for locking the latter means to hold the supports in extended position.

14. A machine for winding a plural number of coils, including a support having four radiating arms, a slidable auxiliary support carried by each arm, means for sliding all of the latter in unison, a reel-forming member projecting outwardly from each auxiliary support, each of said members being provided with a plural number of wire receptacles, whereby a plural number of coils may be simultaneously formed upon the reel, means for clamping the initial terminals of the coils to one of the reel-forming members, adjustable stabilizing means attached to the free ends of the reel-forming members, and means for locking the latter means to hold the supports in extended position.

15. A coil-winding machine having a base of cruciform shape, a slide mounted in each terminal thereof, two T-shaped reel section carrying members attached respectively to two of said slides upon opposite terminals of the base, two adjustable reel section carrying members carried by each T-shaped member, a reel section forming member carried by each of the two remaining slides, and means for operating upon all of the slides for extending or contracting the reel-forming members.

16. A coil-winding machine having a base of cruciform shape, a slide mounted in each terminal thereof, two T-shaped reel section carrying members attached respectively to two of said slides upon opposite terminals of the base, two adjustable reel section carrying members carried by each T-shaped member, a reel section forming member carried by each of the two remaining slides, means for operating upon all of the slides for extending or contracting the reel-forming members, and means for locking the latter means with the reel-forming members in extended position.

17. A coil-winding machine having a base of cruciform shape, the terminals of which are provided with grooves upon the outer face thereof, four slides mounted in said grooves, means for actuating the slides to move them to and from the center of the base, a double reel section forming member carried by two opposite slides, a single reel-forming member carried by each of the remaining slides, and each of said members being provided with a plural number of reel receptacles, whereby a plural number of coils can be formed at one time with the reel.

18. A coil-winding machine having a base

of cruciform shape, the terminals of which are provided with grooves upon the outer face thereof, four slides mounted in said grooves, means for actuating the slides to move them to and from the center of the base, a double reel section forming member carried by two opposite slides, a single reel-forming member carried by each of the remaining slides, each of said members being provided with a plural number of reel receptacles, whereby a plural number of coils can be formed at one time with the reel, and means for clamping the terminals of the wires to form the coils carried by one of the reel-forming members.

19. A coil-winding machine having a base of cruciform shape and grooved upon the front face thereof, four slides, one mounted in each terminal to slide in the respective grooves thereof, an oscillatory plate attached to the base, co-acting means carried by the slides in said plate whereby the slides have movement imparted thereto due to the oscillation of the plate, two T-shaped members, one carried by the respective opposite slides, two adjustable blocks mounted in each T-shaped member, and a removable and adjustable reel-forming member mounted in each of said blocks and the two remaining slides, the same, when assembled, constituting an expansible reel.

20. A coil-winding machine having a base of cruciform shape and grooved upon the front face thereof, four slides, one mounted in each terminal to slide in the respective grooves thereof, an oscillatory plate attached to the base, co-acting means carried by the slides and said plate whereby the slides have movement imparted thereto due to the oscillation of the plate, two T-shaped members, one carried by the respective opposite slides, two adjustable blocks mounted in each T-shaped member, a removable and adjustable reel-forming member mounted in each of said blocks and the two remaining slides, the same, when assembled, constituting an expansible reel, and an adjustable stabilizing member adapted to engage the free terminals of the reel-forming members.

21. A coil winding machine including a support, a plurality of radially slidable members mounted thereon, a coil support carried by each member, a manually oscillatable plate carried by the support, and cooperating pin and eccentric slot connections between the plate and slidable members whereby as the plate is moved in one direction the coil supports are extended and when moved in the opposite direction the coil supports are retracted.

22. A coil winding machine including a support, a plurality of radially slidable members mounted thereon, a coil support carried by each member, a manual oscillatable plate carried by the support, cooperating pin and eccentric slot connections between the plate and slidable members whereby as the plate is moved in one direction the coil supports are extended and when moved in the opposite direction the coil supports are retracted, and manually operable locking means carried by the plate for cooperation with the support to lock the plate with the coil supports extended.

In testimony whereof I have hereunto set my hand.

WILLIAM L. THACKER.