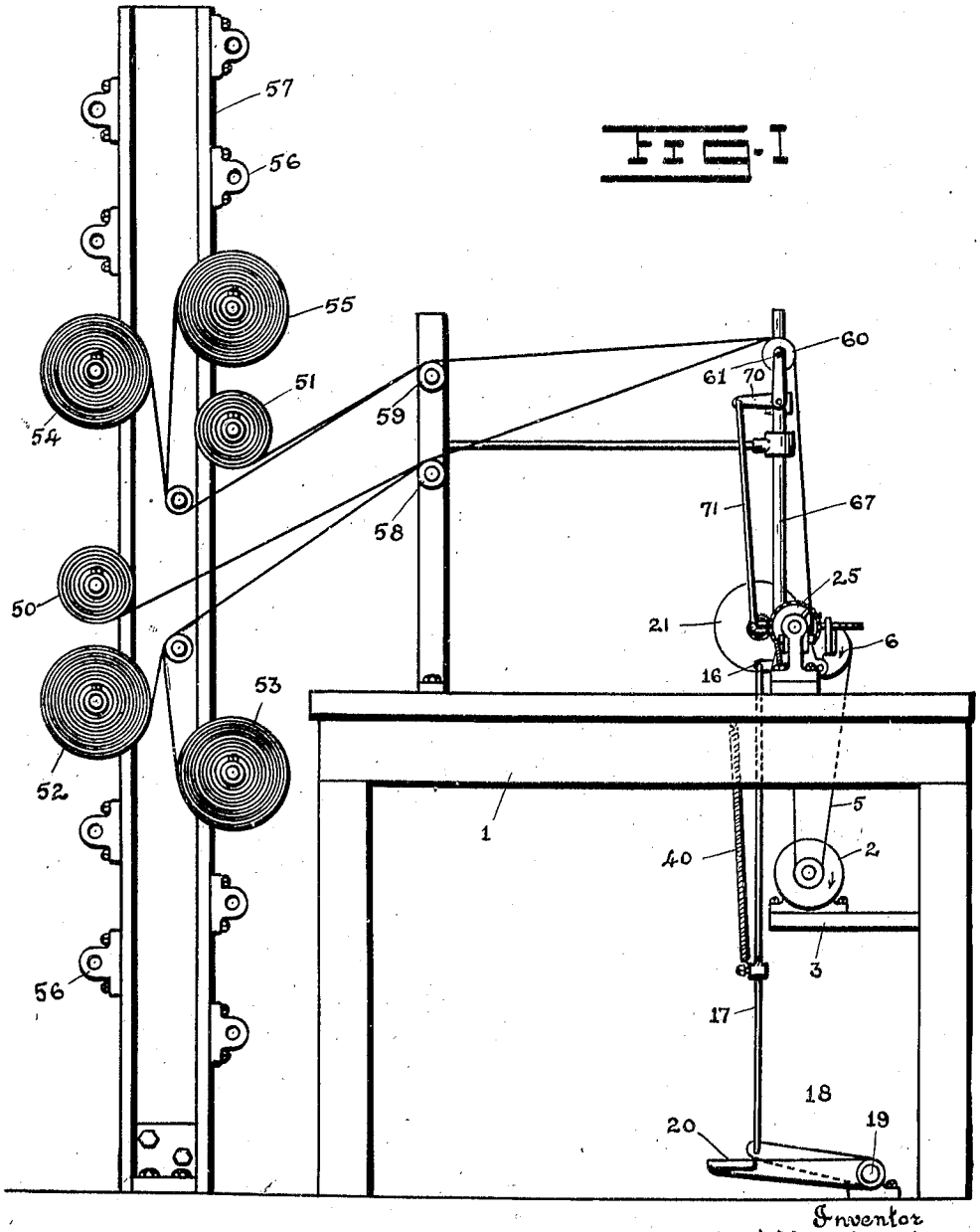
Nov. 23, 1926. 1,608,179

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MACHINE FOR WINDING CONDENSERS

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FIG. 1



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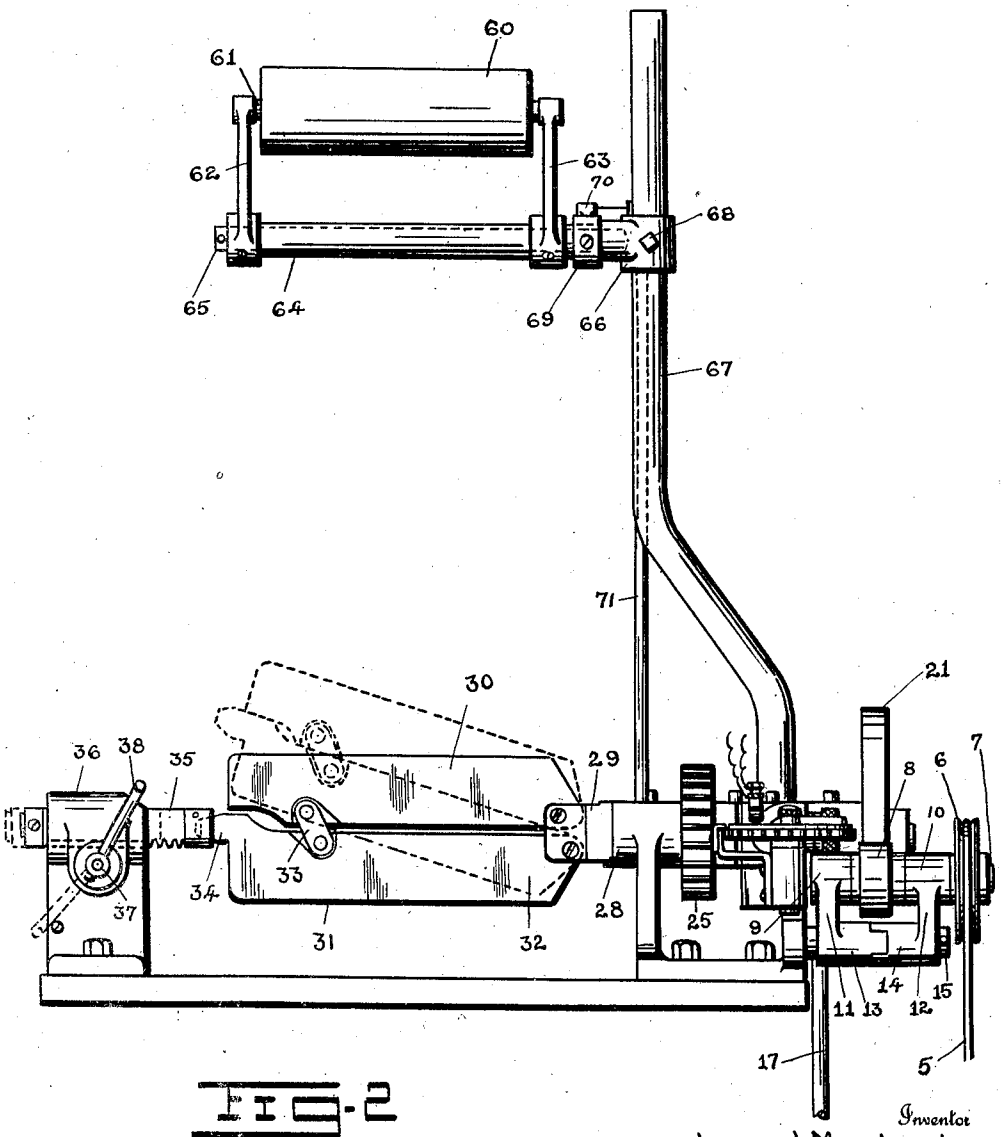


Fig-2

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Fig. 3

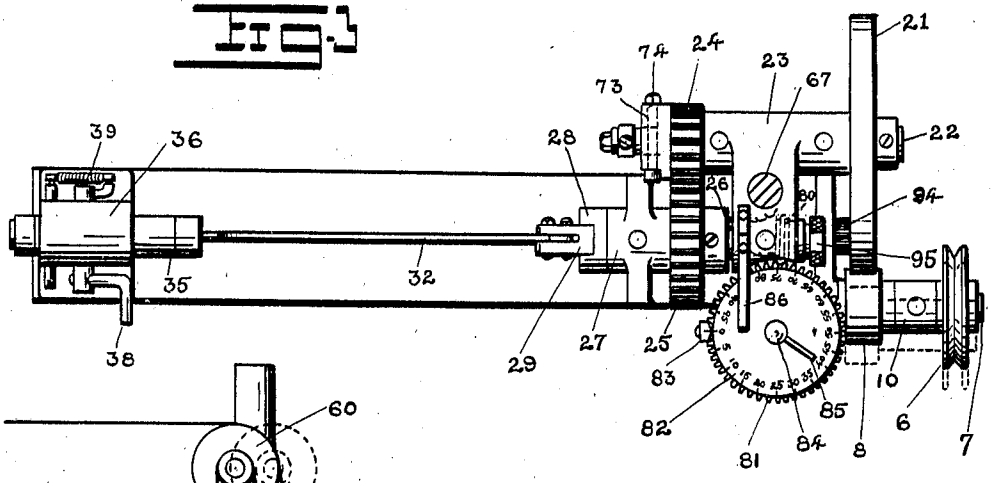


Fig. 4

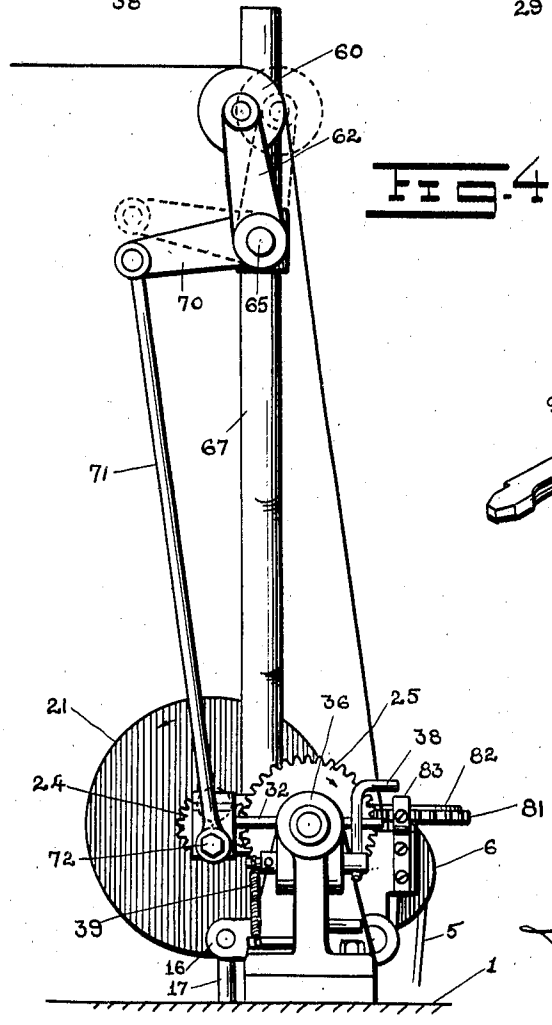
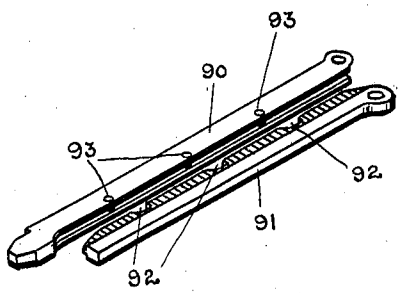


Fig. 5



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UNITED STATES PATENT OFFICE.

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MACHINE FOR WINDING CONDENSERS.

Application filed November 2, 1925. Serial No. 66,411.

The object of this invention is to provide a new and useful machine for winding fixed electric condensers. Another object of the machine is to permit it to operate in feeding or drawing several webs of material that are all used in forming the condenser so that a uniform tension is kept thereon and so that they are fed as nearly uniformly in speed as possible. Another object is to wind the condenser so that it is formed originally almost flat and so that when it is finished and withdrawn from the mandrel it is nearly in its final shape so that it can be flattened out to its final shape with little or no disturbance to its layers. Another object is to provide a flattened mandrel or form on which the condenser is wound and from which it can be easily taken off.

These and other objects of the invention will be illustrated in the drawings, described in the specification and pointed out in the claims at the end thereof.

In the drawings:

Figure 1 is a side elevation of my improved machine.

Figure 2 is an enlarged detailed view of the winding and take-up mechanism.

Figure 3 is a top plan view of the mechanism shown in the lower part of Figure 2.

Figure 4 is an end elevation of the mechanism shown in Figure 2 as viewed from the left of that figure. It is also an enlargement of the upper righthand corner of Figure 1.

Figure 5 is a detailed view of the modified form of the mandrel.

In the several figures of the drawings like reference numerals indicate like parts.

In the drawings reference numeral 1 indicates the table on which the machine is mounted. 2 indicates the electric motor by which the machine is driven. This motor is mounted on a shelf or platform 3 fastened on the table legs. The motor drives the belt 5 which in turn drives the pulley 6 which is mounted to rotate on a shaft 7. On this shaft is mounted a friction wheel 8 which is driven thereby. The shaft is mounted in bearings 9 and 10 which are carried by arms 11 and 12 which are integral with hubs 13 and 14 which are mounted to rock on a stud 15. The hub 13 carries a crank 16 to which a rod 17 is connected which extends down to an arm 18 keyed to a shaft 19 on which is keyed a treadle 20. By pressing the treadle 20 the assembly just described is rotated so as to bring the friction wheel 8 into driving contact with the friction wheel 21. The two hubs 13 and 14 are interlocked with each other as shown in Figure 2 so that they will move positively together and keep in line with each other and so that they can be easily separated to permit the assembling of the parts as shown in Figure 2. The friction wheel 21 is of large diameter as compared with the wheel 8 so that the angular velocity of the shaft 22 is reduced thereby as compared with the angular velocity of the shaft 7.

The shaft 22 is mounted to rotate in a bearing 23 forming part of the frame of the machine and on the other end of the bearing this shaft carries a pinion 24 which drives a pinion 25 carried on the shaft 26 which is mounted to rotate in a bearing 27. The block 28 is provided on which is formed the fork 29. This block is attached to the left hand end of the shaft 26. For this purpose the shaft is made hollow and a bolt 95 passes through the shaft and is threaded into the block so that the block is rigidly fastened to the shaft and rotates with it as the shaft is turned by the pinion 25. By turning the bolt it can be unscrewed from the block permitting the ready removal of the block and the mandrel which it carries so that it can be replaced with another mandrel. In the slot of this fork is mounted to swing two parts 30 and 31 of the mandrel 32. Each of these pieces 30 and 31 are mounted to swing on bolts which pass through the fork 29. At their outer end they are connected by the link 33 and when the parts stand in the horizontal position as shown in Figure 2 the two halves of the mandrel are spaced apart by an eighth of an inch or more. This link is inclined about 18 degrees to the vertical and the pivot points in the block are inclined to the vertical to the same extent. This may be varied within wide limits, the object being to draw the two halves of the mandrel together when the mandrel is raised at one end. One half of the mandrel is provided with a forwardly extending tongue 34 that engages in a bearing provided in the rack 35. The rack 35 is mounted to slide in a bearing 36 and is moved in and out by a pinion carried on the shaft 37 which shaft is turned by the crank 38 to move the rack to

engage and disengage the mandrel. When the mandrel is in the position as shown in Figure 2 the rack has been moved to the right so as to engage with the end tongue on the mandrel and support it thus furnishing bearing for the outer end thereof. The rack is held in the position shown in Figure 2 by a tension spring 39. This spring is stretched when the rack is drawn back to the left and it shortens when the rack is moved to the right and holds the rack in that position so that it will stay in position to furnish a bearing to the tongue 34.

When the rack is moved to the left, the mandrel 32 can be swung to the dotted line position shown in Figure 2. This will cause the two halves of the mandrel to collapse or be drawn together so that the width of the mandrel is less and this releases the condenser that has been wound tight on the mandrel so that it can be easily drawn off of the mandrel, after which the mandrel can be returned to the position shown in Figure 2 and the winding of another condenser can be started thereon. To remove the condenser it is necessary to stop the rotation of the mandrel and this is done by the operator raising his foot from the treadle 20. The spring 40 then draws the link 17 up and causes the friction wheel 8 to swing away from the friction wheel 21 so that the wheel 21 is no longer driven and this permits the mandrel to come to rest. A friction brake 94 carried on the part 11 engages the periphery of the wheel 21 and holds it against rotation thus holding the mandrel from turning on its axis. As soon as the mandrel is adjusted to wind the next condenser the operator again presses down on the treadle 20 and holds it down until the winding is complete, after which the treadle is raised and the condenser is removed and this operation is repeated indefinitely.

The condenser is formed by two strips of tinfoil which are suitably insulated from each other by strips of paper. The tinfoil is carried on rolls 50 and 51 and the paper is carried in the rolls 52, 53, 54 and 55. These rolls are mounted on shafts which are supported in suitable bearings 56 mounted on either side of the upright I beam 57. The shafts rotate in the bearings. A web of tinfoil is drawn from the roll 50 and under it are drawn two webs of paper one from each of the rolls 52 and 53 and these webs are superimposed or assembled as they pass over the roller or idler 58. In a like manner a web of tinfoil is drawn from the roll 51 and is supported by two webs of paper drawn from the rolls 54 and 55 all of which webs are assembled as they pass over the roller or idler 59. While two sets of webs are shown in position to form a condenser made up of two webs of tinfoil and four webs of paper it will be understood that six webs of paper may be drawn with the two webs of tinfoil and formed into one condenser and provision for extra rolls of paper therefor has been shown on the upright 57. It will also be understood that three webs of tinfoil may be wound with six webs of paper, thus forming two condensers in one pack. It will also be understood that each web of paper may contain one or more holes, thus making the paper defective as an insulator and to avoid breaking down of the insulation two or three or more layers may be used together with each web of tinfoil to make the insulation more secure. These two sets of webs are brought together as they pass over the roller or idler 60 which is carried on a shaft 61 mounted to rotate between the two arms 62 and 63 which arms at their lower end are keyed to a sleeve 64 which turns on the shaft 65, which shaft is carried in the bracket 66 which is slidably mounted on the upright stem 67 which is supported from a boss forming a part of the bearing 23 or the frame of the machine. It is clamped at any height on the stem by means of the set screw 68. On the sleeve 64 is fastened a boss 69 having an arm 70 thereon which is substantially the same as the arm 62 and 63 except that it stands at right angles thereto and forms a bell crank therewith. From this arm extends downwardly a link 71 which engages with a wrist pin 72. This pin is adjustably carried on a block or an extension 73 which is formed on or fastened to the end of the shaft 22, the pinion 24 being keyed to the same shaft. Across the end of this block is a slot in which is mounted to move a bracket of which the wrist pin forms a part. The righthand end of this bracket is threaded and a bolt 74 engages therewith so that by turning the bolt the bracket may be moved up or down and it may be positioned on one side or the other of the center and the degree of its excentricity may be varied as well, so that it will have a longer or shorter throw as may be desired. As this wrist pin rotates with the shaft 22 it will move the link 71 endwise and through the bell crank 70 will cause the roller 60 to swing and either draw the paper and tinfoil forward from the rolls or take up the slack thereon or do both. It will be understood that the mandrel 32 is relatively wide and thin and is not round like a spool, but is flat like a plate, and as it rotates it will draw the paper forward rapidly as it passes the horizontal centers and will draw the paper slowly or not at all as it passes the vertical centers. To avoid jerking of the paper, between the two extremes of the velocity caused thereby, the idler 60 is caused to swing so as to compensate for this uneven motion and draw the paper with fair uniformity. The wrist pin is set so that the roll 60 moves to the left as

the mandrel is passing the horizontal centers and moves to the right as the mandrel passes the vertical centers, and the gearing is such between the pinions 24 and 25 that the wrist pin makes two complete revolutions for each complete revolution of the mandrel. In this way the paper is fed with fair uniformity and jerking of the paper is avoided.

On the end of the shaft 26 a worm 80 is provided which engages with the teeth of the gear 81 so that the gear is turned as the mandrel revolves. In frictional engagement with this gear is placed the dial plate 82 so that it revolves therewith. A gauge mark is placed on a fixed bracket 83 so that the zero of the dial can be set opposite thereto and as the dial turns it indicates the number of rotations that the mandrel has made and the number of layers that have been wound on the condenser. Mounted to rotate with the gear 81 is the shaft 84 which carries a pin 85 which can be set in any desired position. Before the machine is started the dial plate is turned so that the zero thereon stands opposite the zero mark on the bracket 83 and the pin 85 is turned to point to any desired number on the dial. When the machine is started the gear, dial and the pin all turn together. A stationary contact 86 is provided with which the pin 85 makes contact as it turns. The contact is suitably set so that the pin will reach it and make contact therewith when it points to the zero starting point on the bracket. The pin and contact then close an electric circuit which causes a bell to ring and this indicates to the operator that he should take his foot off the treadle and stop the rotation of the mandrel.

In Figure 5, I have shown a modified form of the mandrel in which the part 90 is grooved and the part 91 is provided with a tongue to engage with the groove. The tongue is recessed as indicated at 92, etc., and the part 90 is provided with pins 93 on either side of which the tongue on the part 91 engages because of the recesses. It will be understood that the tongue on the part 91 always remains in engagement with the groove on the part 90. It will also be seen that the recesses 92 are shaped so as to provide a cam on one side thereof and when the parts are in horizontal position or in line with the bearings as shown in Figure 2 the cam part of the slot 92 acting on the pins 93 will hold the parts 90 and 91 apart. When the parts are swung to the dotted line position shown in Figure 2 the cam moves beyond the pin permitting the pin to sink deeper in the recesses and this in turn permits the two parts of the mandrel to be drawn together. It will also be noticed both in Figures 2 and 5 that the pivots of the two parts of the mandrel are out of line with each other in the slot in the block 29 and this causes the two parts of the mandrel to draw together at the right hand end as they are swung to the dotted line position, the link 33 drawing them together at the left hand end of Figure 2 and the cam slots 92 permitting them to draw together at the left-hand end in the mandrel as shown in Figure 5.

It will also be understood that the mandrels can be removed from the machine for replacement so that different sizes can be used. The mandrel is removed by unscrewing the bolt 95 which passes through hollow shaft 26 and engages the block carrying the forks 29 one of which blocks is attached to each mandrel.

I claim:

1. In a winding machine, the combination of a hollow shaft, a mandrel having a block on the end thereof, a bolt passing through the hollow shaft and threaded into the block on the mandrel by which the block is held firmly against the end of the hollow shaft.

2. In a winding machine, the combination of a block having a groove formed on the end thereof, two bars pivoted in said groove, the pivot centers being placed out of line with each other so that one bar extends beyond the other, said bars being spaced apart by their pivots and being brought together by being swung sideways.

3. In a winding machine, the combination of a mandrel composed of two bars spaced apart and pivotally connected together at both ends, the pivots at one end being rigidly mounted and placed diagonally with reference to the horizontal axis of the mandrel.

4. In a winding machine, the combination of a mandrel composed of two parallel bars spaced apart and pivotally connected together at both ends, the pivots at both ends being placed diagonally with reference to the horizontal axis of the mandrel.

5. In a winding machine, the combination of a mandrel composed of two parallel bars spaced apart and pivotally connected together at both ends, the pivots at both ends being placed diagonally with reference to the horizontal axis of the mandrel, the pivots at one end being placed in a fixed support which joins the two ends together, the pivots at the other ends being placed in a link that swings with the free ends of the bars, the swinging of the bars in one direction from the horizontal being adapted to draw the bars together.

6. In a winding machine, the combination of a mandrel composed of two parallel bars spaced apart and pivotally connected together at both ends, the pivots at both ends being placed diagonally with reference to the horizontal axis of the mandrel, the pivots at one end being placed in a fixed support which joins the two ends together, the pivots

at the other ends being placed in a link that swings with the free ends of the bars, the swinging of the bars in one direction from the horizontal being adapted to draw the bars together by a parallel movement.

7. In a winding machine, the combination of a mandrel comprising a block, mounted on an axis, two parallel bars pivoted on the end thereof and extending parallel with the axis thereof, means for holding them parallel to said axis, said means including a bearing that is in line with the axis of the block, and an extension on one of said bars in line with the axis of the mandrel, means for moving said bearing forward and back to engage with said extension and support it during the rotation of the mandrel.

8. In a winding machine, the combination of a rotating block, a pair of arms pivoted on said rotating block, a link connecting said pair of arms to keep them parallel to each other, a second block pivotally engaging one of said pair of arms and locking them in a predetermined position with relation to each other and said pivot blocks.

In testimony whereof I affix my signature.

LOUIS J. MARCHAND.