April 6, 1926. 1,579,923

N. E. GIBSON

WINDING MACHINE

Filed May 31, 1923 3 Sheets-Sheet 1

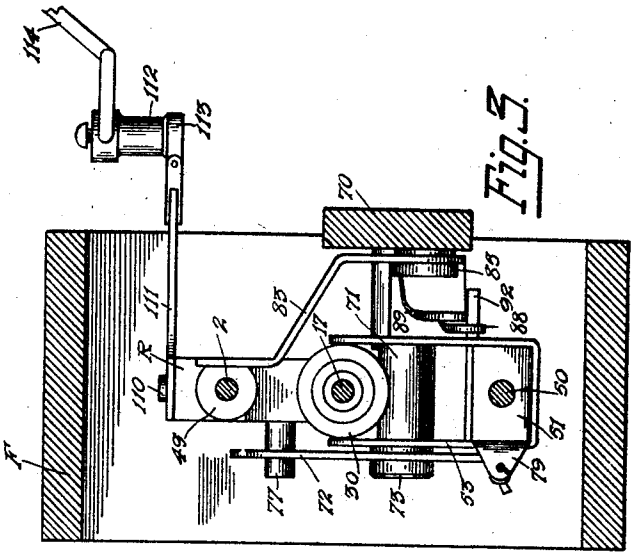

Fig. 3.

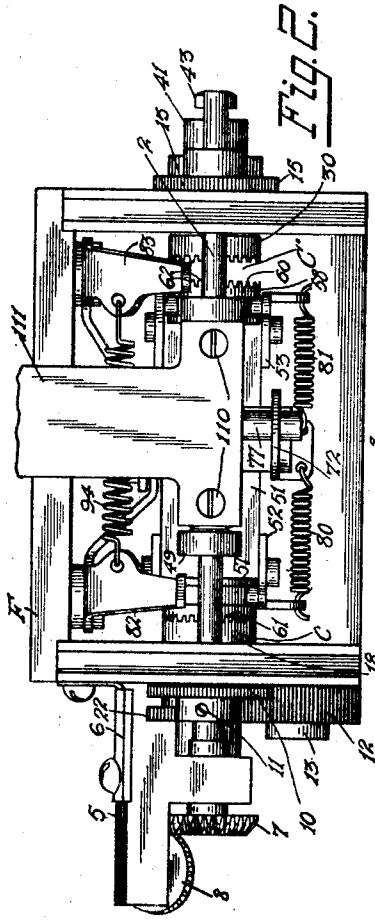

Fig. 2.

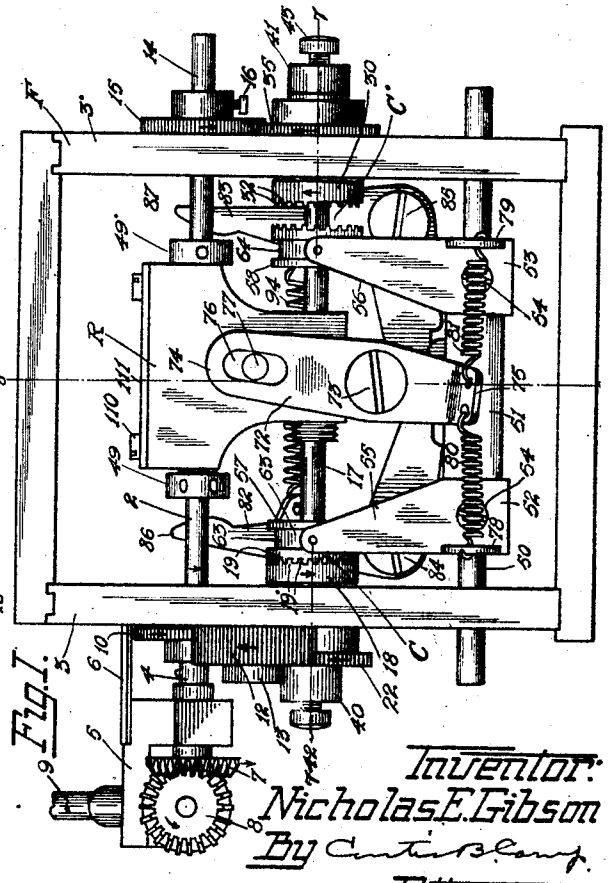

Fig. 1.

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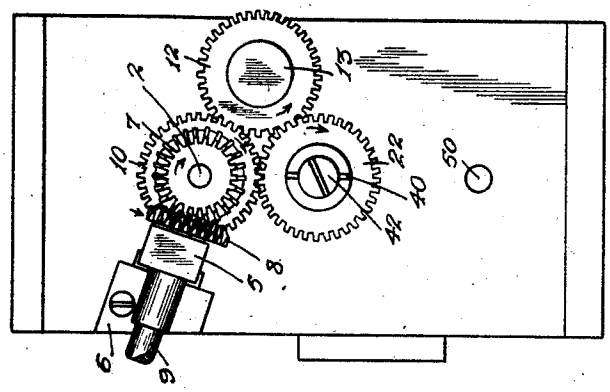

Fig. 6.

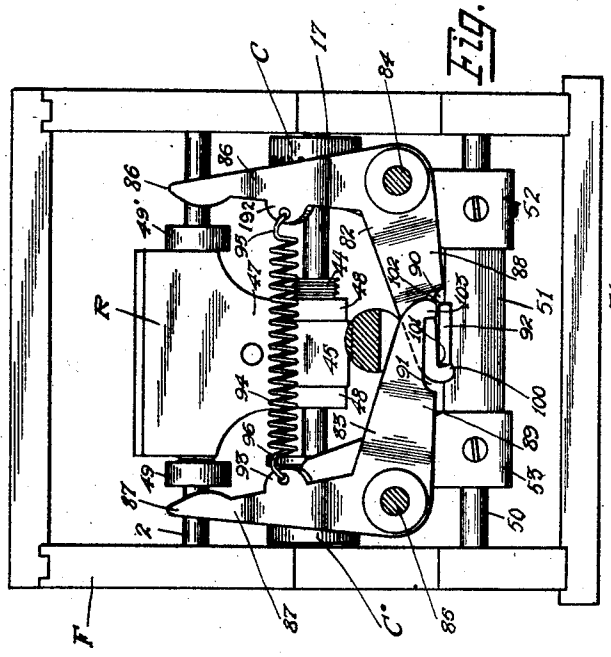

Fig. 4.

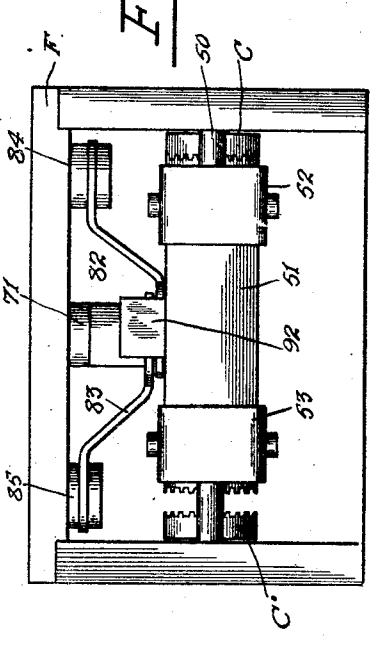

Fig. 5.

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N. E. GIBSON

WINDING MACHINE

Filed May 31, 1923 3 Sheets-Sheet 3

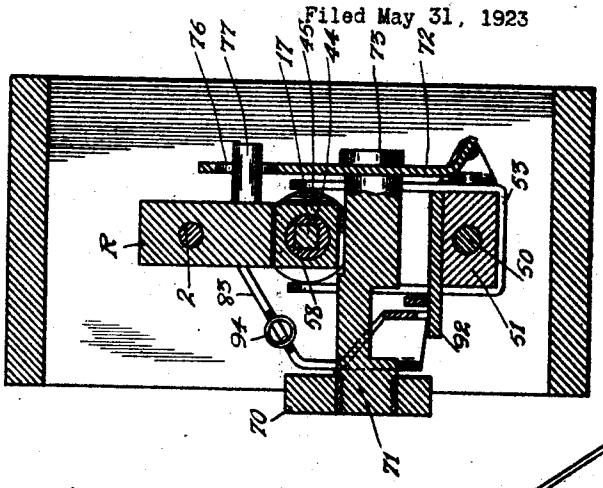

Fig. 8.

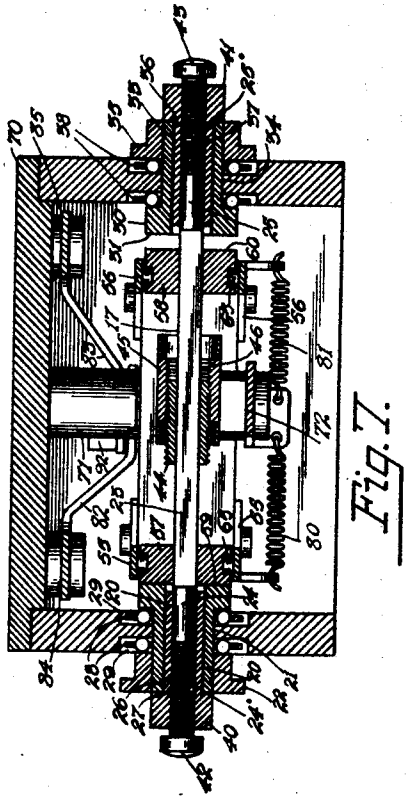

Fig. 7.

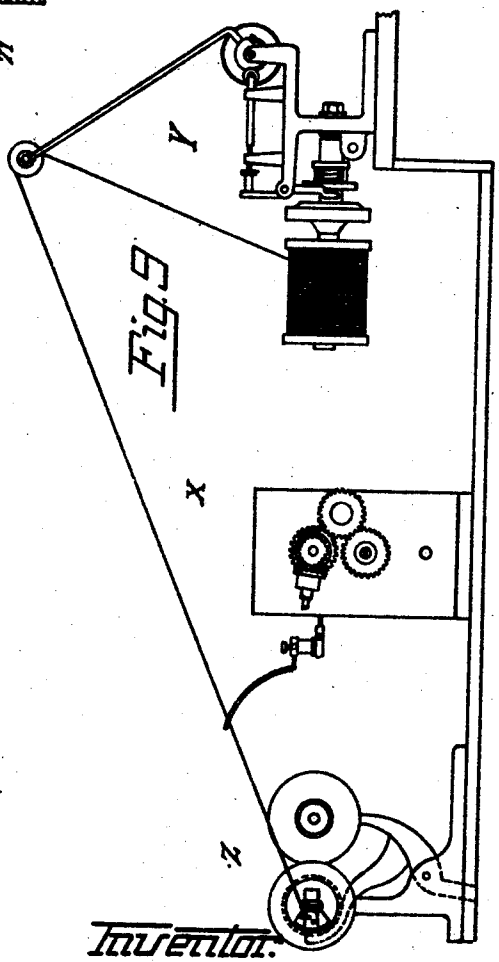

Fig. 9

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Patented Apr. 6, 1926. 1,579,923

UNITED STATES PATENT OFFICE.

NICHOLAS E. GIBSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

WINDING MACHINE.

Application filed May 31, 1923. Serial No. 642,687.

To all whom it may concern:

Be it known that I, NICHOLAS E. GIBSON, a citizen of the United States of America, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Winding Machines, of which the following is a specification.

My invention relates in general to winding machines, such as are used for winding bobbins or coils, and most particularly to that class of winding machines for winding small electromagnet coils used in connection with telephone receivers and the like. An object of my invention is the provision of an improved winding device which is automatic in its reciprocatory movement, simple in construction and positive in its operation.

Electromagnet coils of the type used in receivers and for various other purposes are small and are usually wound of fine gauge wire so that a maximum number of turns of wire may be placed in a minimum space. More or less trouble is experienced in winding coils of this type for the reason that when the wire reaches the end of the spool, that is, upon the completion of a layer of turns, the wire piles up at the start of each new layer at the ends of the spool, due to the fact that most of the coils of this type are wound by hand and the dwell at the start of each new layer is prolonged, permitting the wire to pile up before the natural rate of feeding takes place across the spool. This piling up of the convolutions at each end of the spool produces a pronounced bulge or lump which makes the threading of the outer terminal of the winding through the spool head difficult, due to the bulge which at times completely covers this opening.

To overcome this objectionable feature, I have designed a winding machine which eliminates this through the provision of a reciprocating member which travels to and fro, and a feature of my invention is the provision of a tripping mechanism in which the instant that a layer of the coil being wound is completed, the movement of the reciprocating member is reversed to permit the travel of the reciprocating feeding member to start back in its reverse direction. The tripping means for instantly reversing the direction of travel of the reciprocating member prevents the wire at the beginning of a new layer piling up, thus producing a smooth coil.

Another feature of my invention is the provision of a novel clutch mechanism in operative relation with the reciprocating member just described to bring about the automatic reversal of travel of the reciprocating member.

Still another feature of my invention is the provision of novel supporting means for a shaft which I will term a floating shaft and its adjustment in relation with the reciprocating member so that the said member may be adjusted to trip at the desired instant.

The above features, as well as others, will be more fully described in the ensuing specification.

For a more complete understanding of my invention, reference may be had to the accompanying drawings in which like reference characters in the several views denote like parts, and in which:

Fig. 1 is a front elevation of the winding machine of my invention;

Fig. 2 is a plan view of Fig. 1 with the top plate removed to clearly illustrate the mechanism;

Fig. 3 is a right end view of Fig. 1 with portions in section to more clearly illustrate the winding machine;

Fig. 4 is a rear view of Fig. 1;

Fig. 5 is a bottom view of Fig. 4;

Fig. 6 is a right end view of Fig. 4;

Fig. 7 is a sectional view along the line 7—7 of Fig. 1;

Fig. 8 is a sectional view along the line 8—8 of Fig. 1;

Fig. 9 illustrates my device X associated with a tension device Y and a winding spindle device Z.

Referring now more in detail to my invention as illustrated in the accompanying drawings, the winding machine of my invention comprises a suitable rectangular supporting frame F for supporting the winding mechanism. A shaft 2 supported in suitable bearings in the sides 3 and 3′ of the frame F is provided and its end 4 extends laterally from the side of the frame F and is supported in an additional bearing in an L-shaped member 5 suitably supported upon the frame F by means of a bracket 6. A bevel gear 7 is keyed to the end 4 of the shaft 3

which meshes with a bevel gear 8 which is keyed to a shaft 9. The shaft 9 is supported in a suitable bearing in the L-shaped member 5 and may be termed the driving shaft, as this shaft 9 being connected to suitable power, and through the agency of the bevel gears 7 and 8, transmits motion to the shaft 2. The shaft 2 has also secured to it a gear wheel 10 by means of a suitable set screw 11 and meshes with a gear wheel 12 which is secured to a shaft 13 supported in the side 3 of the frame F. The end 14 of the shaft 2 which extends through the bearing in the side 3' of the frame F supports a gear wheel 15 which is secured thereto by means of a set screw 16. A shaft 17 is located directly below the shaft 2, and in alignment therewith is provided what may be termed a floating shaft for purposes as will presently be described.

Associated with the shaft 17 are a pair of clutches C and C'. The clutch C comprises a disk 18 whose face 19 is provided with teeth 19' cut in on the said face 19. A sleeve extension 20 of the clutch disk 18 extends through a suitable opening 21 in the side 3 of the frame F and has secured to this extending sleeve end 20 a gear 22 by means of a key or similar means. The intermediate portion 23 of the shaft 17 is square while its end portions 24 and 25 are cylindrical with its extreme end portions 24' and 25' threaded. An aligning bearing 26 of a size to permit its entrance into the sleeve portion 20 of the disk 18 is provided, and a central orifice 27 extending its length is threaded a portion of its length so as to permit the threaded portion of the orifice 27 to have screw-threaded engagement with the threaded end 24' of the shaft 17. A pair of thrust bearings 28 resting in depressions 29 in the outer and inner face of the side wall 3 of the frame F cooperate with the gear wheel 22 and disk 18 and are for the usual purposes. The clutch C' also comprises a clutch disk 30 whose face 31 is provided with teeth 32 cut in the said face 31 and its sleeve extension 33 which extends through a suitable orifice 34 in the side wall 3' of the frame F, and has secured to it in any suitable manner a gear 35 which meshes with the gear 15 secured to the shaft 2. An aligning bearing 36 of a size to permit its entrance into the sleeve portion 33 of the disk 30 is provided, and its central orifice 37 which extends its length has a portion of its length threaded so as to permit this threaded portion of the orifice 37 to have screw-threaded engagement with the threaded end 25' of the shaft 17. A pair of thrust bearings 38 cooperates with the gear 35 and disk 30 and are for the usual purposes. The aligning bearings 26 and 36 are provided with enlarged ends or heads 40 and 41, which are slotted for the entrance of a suitable tool so that the said bearings 26 and 36 may be threaded upon the threaded portions 24' and 25' of the shaft 17, the said heads 40 and 41 forming shoulders to limit the entrance of the said aligning bearings 26 and 36 into the sleeve extensions 20 and 33 of the disks 18 and 30. A pair of lock screws 42 and 43 are provided which have screw-threaded engagement with the threaded portions of the orifice 27 and 37 in the aligning bearings 26 and 36 for engagement with the ends 24' and 25' of the shaft 17 to prevent longitudinal movement of the said floating shaft 17. The lock screws 42 and 43 and aligning bearings 26 and 36 are also for adjusting purposes in association with the shaft 17 as will presently be described.

The shaft 17 supports a screw-threaded member 44 which is secured to the square portion 23 of the shaft 17 in any suitable manner, as by means of a force fit, and a block 45 having a threaded orifice 46 has screw-threaded engagement with the member 44. A T-shaped reciprocating member R is slidably supported on the shaft 2, and its leg 47 is bifurcated to permit this bifurcated leg 47 to span the block 45, which has screw-threaded engagement with the member 44 on the shaft 17. The legs 48 of the bifurcated portion of the member R are also bifurcated and span the threaded member 44 on the shaft 17. Adjustable members 49 having screw-threaded engagement with suitable tapped orifices in the member R are provided and are for limiting the reciprocating motion of the member R for purposes as will presently be described.

A rod 50 suitably supported by the walls 3 and 3' of the frame F is provided and slidably supports a rectangularly shaped member 51 and cooperates with the clutches C and C' as will now be described. A pair of U-shaped members 52 and 53 are secured to the member 51 by means of the screws 54 and the legs 55 and 56 extend upward in proximity to the clutches C and C'. Slidably supported on the square portion 23 of the shaft 17 are a pair of disks 57 and 58 whose faces 59 and 60 are provided with teeth 61 and 62 which cooperate with the teeth 20 and 32 of the clutch disks 18 and 30. The disks 57 and 58 are provided with annular grooves 63 and 64, and the upwardly extending legs 55 and 56 of the members 52 and 53 span these disks 57 and 58, and pins 65 secured to the legs 55 and 56 of the members 52 and 53 rest in these annular grooves 63 and 64 in the disks 57 and 58 for purposes as will presently be described. A plate 70 secured to the frame F is provided which supports a stud 71 to which is pivotally secured a link 72 by means of a pivot screw 73. The link 72 is pivoted intermediate of its ends 74 and 75, its

end 74 is provided with a slot 76 of a size to receive a pin 77 which is secured to the member R. The U-shaped member 52 and 53 are provided with ears 78 and 79 to which are secured spiral springs 80 and 81, the other ends of the spiral springs 80 and 81 being secured to the angularly extending end 75 of the link 72. This link 72 forms a connection between the reciprocating member R and the slidable member 51 on the rod 50 for purposes as will presently be described.

A pair of L-shaped members 82 and 83 are pivotally secured to the plate 70 by means of the pivot screws 84 and 85 and are operatively associated with the reciprocating member R. The legs 86 and 87 of the members 82 and 83 extend upward and lie in the plane of travel of the reciprocating member R and the legs 88 and 89 of the members 82 and 83 have notches 90 and 91 which cooperate with a plate 92 secured to the slidable member 51 supported by the rod 50. The legs 88 and 89 of the members 82 and 83 are provided with ears 192 and 93 and a coil spring 94 is provided having its one end 95 secured to the ear 192 of the member 82 and its other end 96 secured to the ear 93 of the member 83, the tension of the spring 94 being such as to keep the legs 88 and 89 in engagement with the plate 92 for purposes as will presently be described.

Having described the apparatus which comprises the winding machine of my invention, I will now describe in detail its operation and its adjustable means provided for the mechanism.

Referring now to Fig. 1, I show the reciprocating member R in the extreme position of travel to the right, and ready to start on its travel to the left, and assuming that the driving shaft 9 is rotating in the direction of the arrow, the shaft 2 will travel in the direction of the arrow through the agency of the bevel gears 7 and 8. The gear 10 upon the shaft 2 meshes with the gear 12 supported on the shaft 13, and this gear 13 in turn meshes with the gear 22 secured to the sleeve extension 20, of the clutch disk 18 of the clutch C causing this clutch disk 18 and gear 22 to rotate in the direction of the arrows indicated thereon. The gear 15 on the shaft 2 travels in the direction indicated thereon and meshes with the gear 35 secured to the sleeve extension 33 of the clutch disk 30 of the clutch C′ causing the gear 35 and clutch disk 30 to rotate in the direction indicated thereon. From the drawings and the description, it may be seen that through the agency of the gears 10, 12 and 22, the clutch disk 18 of the clutch C rotates in the direction as indicated thereon, and that through the agency of the gears 15 and 35 the clutch disk 30 of the clutch C′ rotates in a direction opposite to the direction of the rotation of the disk 18 of the clutch C. With reference to Fig. 1, the disk 57 of the clutch C is in mesh with the clutch disk 18 and rotates with the clutch disk 18, and due to the fact that the disk 57 of the clutch C is slidably supported on the square portion 23 of the shaft 17, motion is transmitted to the shaft 17. The shaft 17 rotates in the same direction as the clutch disk 18 of the clutch C, and as the member 44 is secured to the shaft 17 it also rotates.

The clutch disk 30 of the clutch C′ rotates in a direction opposite that of the shaft 17, as already described, and the clutch disk 30 and the gear 35 secured to its sleeve extension 33 rotate about the aligning bearings 36 which rotates in the same direction as the shaft 17, due to the threaded connection between the threaded end 25′ of the shaft 17, and the threaded portion of the orifice 37 of the aligning bearing 36 with no effect at this time. The block 45 which is in threaded engagement with the member 44 now starts travel to the left, due to the threaded connection between members 44 and 45, and due to the bifurcated end of the reciprocating member R straddling the block 45, the member R as a whole travels to the left sliding along the shaft 2. The link connection 72 is now swung about its pivot 73, due to the slot 76 and pin 77 connection between the said link 72 and member R, and its end 74 is thus moved to the left, and its other end 75 will of course swing to the right and as the coil spring 80 has its one end secured to the end 75 of the link 72, and its other end secured to the ear 78 of the member 52 secured to the block 51 supported on the rod 50, the spring will be placed under tension. The block 51 which is slidably supported on the rod 50 is held in its position as clearly illustrated in Figs. 1 and 4, due to the fact that the plate extension 92 of the block 51 rests in the notch 90 of the leg 88 of the member 82, this member 82 being held in this position by means of the coil spring connection 94 between the two members 82 and 83. The connection between the plate 92 and the notch 90 of the member 82 also holds the member 51 and its supported parts in the position illustrated in Fig. 1 with the disk 57 in mesh with the clutch disk 18 until released as will presently be described. As the reciprocating member R continues its travel to the left, its adjustable member 49 will engage the end of the leg 86 of the member 82 and cause it to rock about its pivot 84, thus moving the leg 86 to the left and its leg 88 upward. The continued travel of the member R to the left causes the end 75 of the link 72 to swing to the right to place the spring 80 under tension, and at the same time the adjustable member 49 of the reciprocating member R having engaged

the leg 86 of the member 82, the said member 82 is rocked about its pivot 84 to cause the leg 88 of the member 82 to move upward. The instant that the nose 100 of the notch 90 in the member 82 disengages the edge 101 of the plate extension 92 of the block 51, the tension of the spring 80 pulls the block 51 and its supported parts as a whole to the right along the rod 50, and due to the connection between the disks 57 and 58 and block 51 and its members 52 and 53 secured to the block 51, the disk 57 will also be moved to the right along the square portion 23 of the shaft 17 out of engagement with the clutch disk 18 of the clutch C. The block 51 having moved to the right the plate 92 also moves with it, and when the edge 102 of the plate 92 passes the nose 103 of the notch 91 in the leg 89 of the member 83, the said member 83 is caused to rock about its pivot 85 due to the tension of the coil spring 94, and thus force the leg 89 of member 83 downward to permit the plate 92 of the block 51 to rest in the notch 91 in the leg 89 for purposes as will presently be described.

The U-shaped member 56 secured to the block member 51 is also moved to the right, and due to its connection with the disk 58, it is also moved to the right into engagement with the clutch disk 30 of the clutch C'.

The disk 58 now being in engagement with the clutch disk 30 of the clutch C', and as the said clutch disk 30 rotates in a direction opposite that of the clutch disk 18 of the clutch C, due to the gearing connections 15 and 35, the shaft 17 is now rotated in a direction opposite that when the member traveled to the left, and due to the connection between the reciprocating member R and the threaded member 44 on the shaft 17, the said member R now travels to the right causing the link 72 to be rocked about its pivot 73 causing its end 74 to move to the right and its end 75 to the left to place the spring 81 connected between the member 56 and the link 72 under tension. The block 51 and its supported parts remain in the position it was moved to as just described by means of the spring 80 due to the plate 92 of the said block 51 resting in the notch 91 in the leg 89 of the member 83. In its travel to the right, the adjustable member 49' of the reciprocating member R engages the leg 87 of the member 83 and causes the said member 83 to be rocked about its pivot 85, moving the said leg 87 to the right and its leg 89 upward. Now when the nose 102 of the notch 91 in the leg 89 of the member 83 disengages the edge 103 of the plate 92 of the block 51 the spring 81 which was placed under tension due to the movement of the end 75 of the link 72 to the left, now pulls the block 51 and its supported parts to the left, causing the disk 58 to disengage the clutch disk 30 of the clutch C' and move the disk 57 of the clutch C into engagement with its clutch disk 18. The member 82 now rocks about its pivot 84 permitting its leg 88 moving downward, permitting the plate 92 to again rest in the notch 90 in the said leg 88 of the member 82, and when the mechanism is in this position, the reciprocating member R is again ready to start on its travel to the left.

The distance of travel of the reciprocating member R from left to right and vice versa is controlled by means of the adjustable thimbles 49 and 49' threaded in the member R. When the thimbles 49 and 49' are turned to bring them closer to the legs 86 and 87 of the members 82 and 83, the distance of travel from left to right and vice versa is shortened, as is readily apparent from the drawings and description. The floating shaft 17 is also adjustable to the left or right so as to place the threaded member 44 secured to the shaft 17 in its correct position so that the travel each way of the reciprocating member R from its center is the same. This adjustment may be accomplished by loosening the lock screws 42 and 43 and turning the aligning bearings 26 and 36 to move the shaft 17 and its supported member to the right or left as the case may be to place the said threaded member 44 in proper position in relation to the reciprocating member R so that the said reciprocating member R travels equal distances to the right or left from its center. When this adjustment of the member R is secured, the lock screws 42 and 43 are again tightened to lock the shaft 17 and the bearings 26 and 36 in their adjusted position.

The reciprocating member R has secured to it by means of suitable screws 110 a plate 111 which carries a post 112 secured to a hinged member 113. An arm 114 adjustably secured to the post 112 is provided with a suitable looped end through which the wire passes from the supply spool to the bobbin or coil that is being wound.

From the detailed description just given, it may be seen that the winding mechanism is provided with a positive trip mechanism which is tripped the instant that a layer of wire is completed to permit the travel of the reciprocating member R in a reverse direction, and this trip also cooperates to the clutch mechanism C and C' so that the instant this trip occurs the direction of travel is reversed. With this positive means of tripping and reversal of travel of the reciprocating member, I am enabled to produce a far superior coil than that produced by means of the hand operated method.

In Figure 9 the device Y is a tensioning device controlling the supply spool of wire, and the device Z is the winding spindle which supports and rotates the bobbin to be

wound. The device X automatically feeds the wire to the bobbin or spool carried by Z.

While I have described a preferred embodiment of my invention, it is to be understood that I do not wish to be limited to the exact structure as shown, as changes and modifications will readily suggest themselves, and I therefore aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

Having described my invention what I claim as new and desire to secure by United States Letters Patent is:

1. In a machine of the class described comprising a power transmitting shaft, a reciprocating member slidably supported on said shaft, a second shaft, gear trains associated with said shafts for rotating said second shaft, clutch means associated with said second shaft and said gear trains for reversing the rotation of said second shaft at predetermined distances of travel of said reciprocating member along said first shaft.

2. In a machine of the class described comprising a driven shaft, a reciprocating member slidably supported on said shaft, a second shaft, gear trains associated with said driven shaft and said second shaft for rotating said second shaft, clutch mechanism associated with said gear train and said second shaft for reversing the direction of travel of said reciprocating member supported on said driven shaft.

3. In a machine of the character described comprising a driven shaft, a reciprocating member slidably supported on said shaft, a second shaft, gear trains connecting said driven shaft with said second shaft to rotate said second shaft, feed means on said second shaft and associated with said reciprocating member for transmitting to and fro travel to said reciprocating member on said first shaft.

4. In a machine of the character described comprising a driven shaft, a reciprocating member slidably supported on said shaft, a second shaft, gear trains connecting said driven shaft with said second shaft to transmit rotary motion to the said second shaft, feed means on said second shaft and associated with said reciprocating member, and clutch mechanism for reversing the rotation of said second shaft to cause the reciprocating member slidably mounted on said first shaft to travel to and fro.

5. In a machine of the class described comprising a frame for rotatably supporting a driven shaft, a reciprocating member slidably supported on said shaft, a second shaft, a clutch associated with each end of said second shaft, a rotatable disk member for each of said clutches, sliding disk members slidably supported on said second shaft operatively associated with said rotatable disk members, a gear secured to each of said rotatable disk members, each of said gears being associated with a train of gearing between said driven shaft and said second shaft, means for moving one of said slidable disk members into engagement with one of said rotatable disk members to transmit rotation of said second shaft in one direction to cause the travel of said reciprocating member in one direction.

6. In a machine of the class described comprising a frame for rotatably supporting a driven shaft, a reciprocating member slidably supported on said shaft, a second shaft, a pair of clutches associated with said second shaft, a rotatable disk member for each of said clutches, a gear secured to each of said rotatable disk members, each of said gears being associated with trains of gearing between said driven shaft and said gears on said rotatable disk members to rotate said rotatable disk members in opposite directions, a pair of sliding disk members slidably supported on said second shaft one for each of said rotatable disk members, and means for alternately engaging said sliding disk members with said rotatable disk members to cause to and fro movement of said reciprocating member.

7. In a machine of the class described comprising a frame for rotatably supporting a shaft a reciprocating member slidably supported on said shaft, a pair of clutches, rotatable disk members for each of said clutches, and a gear secured to each of said rotatable disk members, said gear and rotatable disk members supported by said frame, a floating shaft, aligning bearings in said rotatable disk members for supporting said floating shaft, said gears being associated with trains of gearing between said shaft and gears on said rotatable disk members to rotate said rotatable disk members in opposite directions, sliding disk members slidably supported on said floating shaft, and yoke members engaging said sliding disk members secured to a member slidably supported on a rod, and trip mechanism controlled by the movement of said reciprocating member to and fro to cause said sliding disk members to engage and disengage the respective rotatable disk members to bring about the reversal of rotation of said floating shaft.

8. In a machine of the class described comprising a frame for rotatably supporting a shaft, a reciprocating member slidably supported on said shaft, a pair of clutches, rotatable disk members for each of said clutches, and a gear secured to each of said rotatable disk members, said gear and rotatable disk members supported by said frame, a floating shaft, aligning bearings in said rotatable disk members for supporting said floating shaft, said gears being associated with trains of gearing between said shaft

and gears on said rotatable disk members to rotate said rotatable disk members in opposite directions, sliding disk members slidably supported on said floating shaft, a threaded member on said floating shaft engaging said reciprocating member, and means for moving one of said sliding disk members into engagement with its associated rotatable disk member to cause rotation of said floating shaft in one direction to rotate said threaded member to cause movement of said reciprocating member in one direction.

9. In a machine of the class described comprising a driven shaft, a reciprocating member slidably supported on said shaft, a second shaft, gear trains associated with said shaft for rotating said second shaft, clutch mechanism associated with said second shaft and trip mechanism for controlling movement of said clutch mechanism for reversing the rotation of said second shaft at predetermined distances of travel of said reciprocating member.

10. In a machine of the class described comprising a driven shaft, a reciprocating member, slidably supported on said shaft, a second shaft, gear trains associated with said shaft for rotating said second shaft, clutch mechanisms associated with said second shaft, feed means on said second shaft and associated with said reciprocating member for transmitting to and fro travel to said reciprocating member and trip mechanism controlled by said reciprocating member for actuating said clutch mechanism to reverse the rotation of said second shaft.

11. In a machine of the class described comprising a driven shaft, a second shaft, clutch mechanism associated with said second shaft, gear trains associated with said first shaft, and said clutch mechanisms for rotating said second shaft, a reciprocating member slidably supported on said first shaft, feed means on said second shaft and associated with said reciprocating member for transmitting to and fro movement to said member, trip mechanism actuated at predetermined distances of travel of said reciprocating member for actuating said clutch mechanism to reverse the rotation of said second shaft.

12. In a machine of the class described comprising a driven shaft, a second shaft and clutch mechanisms associated therewith, gearing trains associated with said driven shaft and said clutch mechanisms for rotating said second shaft, a reciprocating member slidably supported on said driven shaft, feed means on said second shaft operatively associated with said reciprocating member for transmitting to and fro movement of said reciprocating member, trip mechanism comprising a sliding member and a link connection between said reciprocating member and said sliding member and means under the control of said reciprocating member for tripping said sliding member to actuate said clutch mechanisms to reverse the rotation of said second shaft.

13. In a machine of the class described comprising a driven shaft, a second shaft and clutch mechanisms associated therewith, gear trains associated with said driven shaft and said clutch mechanisms for rotating said second shaft, feed means on said second shaft, a reciprocating member slidably supported on said driven shaft and operatively associated with said feed means, a sliding member and link connections on said sliding member for operatively connecting said sliding member with said clutch mechanisms, and means actuated by the reciprocating member in its to and fro travel to release said sliding member to bring about the reversal of rotation of said second shaft.

14. In a machine of the class described comprising a frame for supporting a driven shaft, a second shaft, clutch mechanisms associated with said second shaft, gear trains associated with said driven shaft and said clutch mechanisms for rotating said second shaft, feed means on said second shaft, a reciprocating member slidably supported on said driven shaft, and operatively associated with said feed means, a rod supported by said frame supporting a sliding member, link connections on said sliding member for operatively connecting said sliding member with said clutch mechanisms, trigger members operatively associated with said reciprocating member and said sliding member, said reciprocating member in its to and fro travel through the agency of said feed means actuating said trigger mechanism at predetermined distances of travel of said reciprocating member.

15. In a machine of the class described comprising a frame for supporting a driven shaft, a second shaft, clutch mechanism associated with said second shaft, gear trains associated with said driven shaft and said clutch mechanisms for rotating said second shaft, feed means on said second shaft, a reciprocating member slidably supported on said driven shaft operatively associated with said feed means to cause to and fro travel of said reciprocating member, a rod supported by said frame supporting a sliding member, connection means on said sliding member in engagement with said clutch mechanisms, trigger members pivotally supported by said frame operatively associated with said reciprocating member and said sliding member, spring means for maintaining said trigger members in engagement with said sliding member, said reciprocating member actuating said trigger members

at predetermined distances in its travel to trip said sliding member to actuate said clutch mechanism.

16. In a machine of the class described comprising a frame for supporting a driven shaft, a second shaft, clutch mechanism associated with said second shaft, gear trains associated with said driven shaft and said clutch mechanisms for rotating said second shaft, feed means on said second shaft, a reciprocating member slidably supported on said driven shaft and operatively associated with said feed means to transmit to and fro travel of said reciprocating member, link connections between said sliding member and said clutch mechanisms, trigger members pivotally supported by said frame. spring means for maintaining said trigger members in engagement with said sliding member, said reciprocating member actuating said trigger members at predetermined distances in its travel to release sliding member and spring means for shifting said sliding member to actuate said clutch mechanisms to reverse the rotation of said second shaft.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 25 day of May, 1923.

NICHOLAS E. GIBSON.