Nov. 16, 1926. 1,607,242

C. F. DE BOLD

WINDING MACHINE

Filed May 19, 1925 2 Sheets-Sheet 1

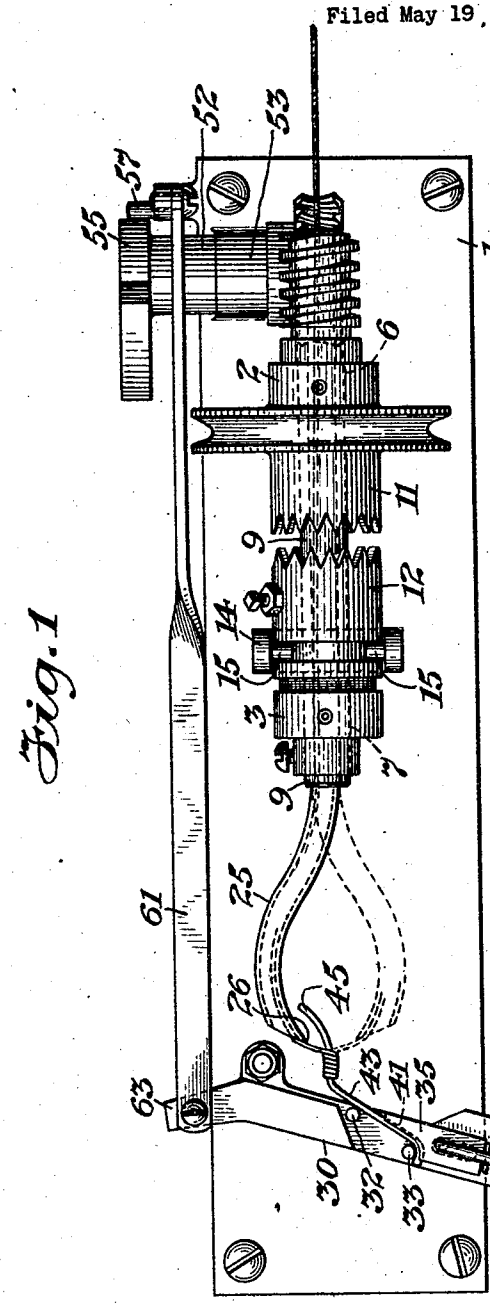


Fig. 1



Fig. 4

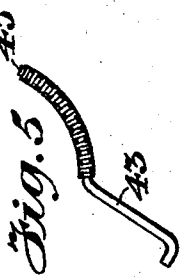


Fig. 5

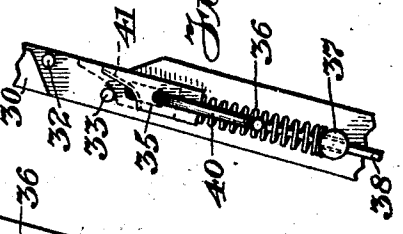


Fig. 3

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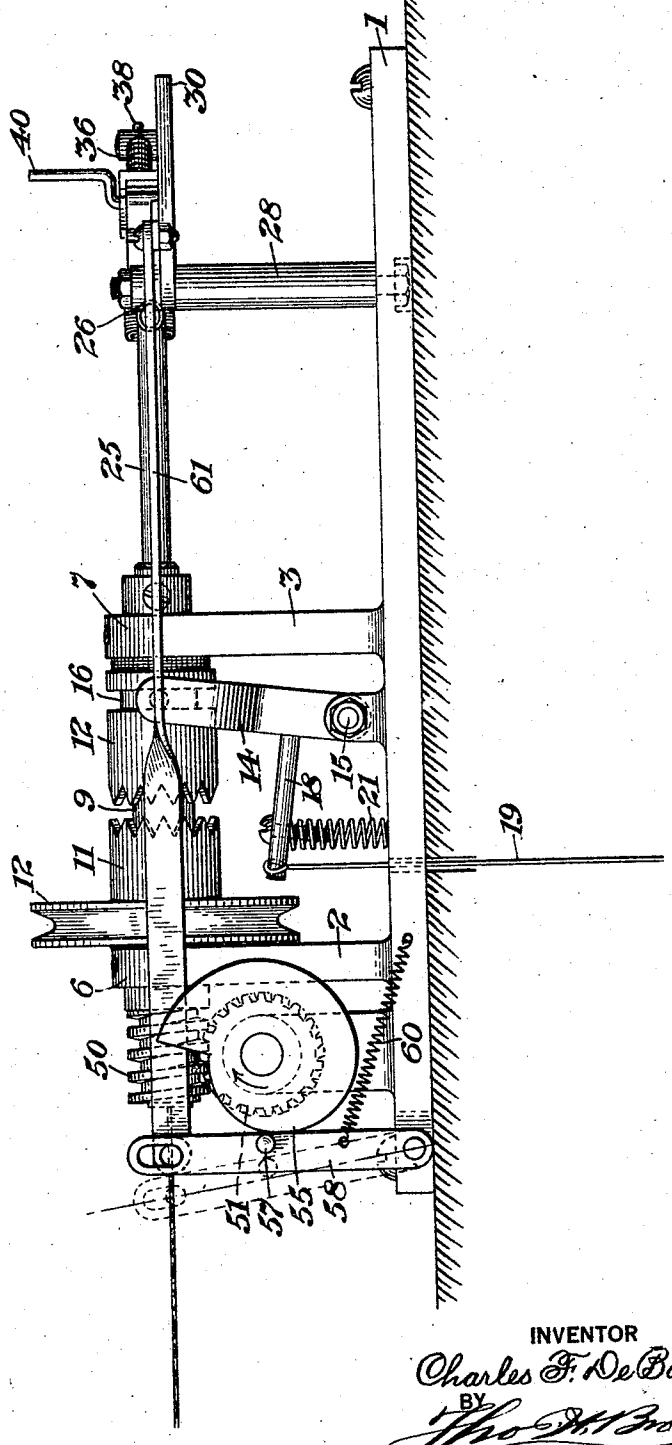
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Fig. 2



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Patented Nov. 16, 1926. 1,607,242

UNITED STATES PATENT OFFICE.

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WINDING MACHINE.

Application filed May 19, 1925. Serial No. 31,279.

My present invention relates to machines for winding tape, thread and the like about objects having irregular or bent shapes. It relates further to such a machine in which is incorporated means for holding the article to be wound, for feeding tape to the article being wound, for rotating the said means with respect to the article for the winding operation, and for automatically keeping uniform distance from the point of feed of said feeding means to the point of application of the material being wound on the article. This machine is adapted for winding tape uniformly along the length of a section of a bent rectilinear rod but is useful in the arts generally.

In the embodiment of my invention shown in the drawings and hereinafter fully described there is provided for rotating winding means and a work holding member which is moved through a cam operated by the means to move the length of the member being wound longitudinally through a point which is equally distant from extreme positions of the point of feed of said winding means as it is rotated whereby the material wound on to the wound member is led eventually and accurately and at a predetermined uniform tension. In the embodiment shown the cam between the driving means and work holding means is designed to permit the movement of the work holder to a predetermined starting position at the end of each winding operation through the action of a spring against which the cam operates during its movement of the work holder during the winding operation.

In the drawings, Fig. 1 is a plan view of the machine of my invention showing a bent piece of work to be wound, a work holding member pivoted for movement of the work in relation to a winding member having a feed head in the form of a tube curved to allow movement of the work with respect thereto, and a cam action for regulating the movement of the work holding means and work so that the point of winding of the work is kept at a substantially equal distance from the point of feed of the feeding member during the winding operation.

Fig. 2 is a rear view in elevation of the machine of Fig. 1 and showing details of the cam and its connection to the work holding means.

Fig. 3 is a plan view of a part of the work holding means showing a clamp which is part thereof as being in an open position.

Fig. 4 is a sectional view through a part of a tube for feeding the tape or filament to the work.

Fig. 5 is a plan view of a sample of the work wound as it is held in the winding position, and shows a curved portion of it as being wound with a tape.

In the drawings the bed plate 1 carries the standards 2 and 3 which have at their upper ends the axially aligned bearings 6 and 7 respectively through which extends the hollow shaft 9 which carries between the bearings 6 and 7 the tooth clutch member 11 and the pulley 12 which are fixed together and slidable on shaft 9. Slidably mounted longitudinally on and splined for rotation with said shaft 9 is the tooth clutch member 12 which is movable for engagement and disengagement with said corresponding clutch member 11. A yoke member 14 pivoted at 15 to said plate 1 and carrying the pins 15, 15 which engage in the annular groove 16 formed in said member 12 serves through arm 18, rod 19 and a foot pedal not shown for moving said clutch member 12 into engagement with said clutch member 11. The compression spring 21 positioned between the said plate 1 and said arm 18 tends to move said clutch member 12 into a dis-engaged position. Suitable driving means not shown is belted to said pulley 12.

At one end said hollow shaft 9 carries the hollow feeding member 25 which is bowed and which terminates in a feeding edge 26 at a point at some distance from the prolongation of the axis of said shaft 9. Near said feed member 25 is mounted the vertical post 28 which carries pivoted thereon for movement in a horizontal plane the bar member 30, the center of rotation of said pivotally mounted bar being made at a given distance from the center of rotation of the feeding edge 26 of said member 25 in a manner and for a purpose hereinafter fully described. On said bar member 30 is mounted a clamping means comprising the posts 32, 33 and the jaw member 35 which has pressing thereagainst the spring 36 which tends to move on toward said posts 32, 33 said spring 36 pressing at its opposite end against the post 37 mounted on bar member 30 and having extending therethrough and through said post 37 the guiding and holding rod 38 mounted

to the rear of said jaw member 35 a handle member 30 on jaw member 35 serves for opening the clamp against the compression of said spring 36. In its clamping position said jaw member 35 serves to rigidly hold the rectilinear bar 43 in a clamped position between member 35 and posts 32 and 33, the jaw member being curved at its lower corner to accommodate a bend in the end of said bar 43 which is positioned against said post 33. Said bar 43 which is the member to be wound is continued inwardly toward said member 25 in a portion 45 which is curved along the arc of a circle. In its position on said bar member 30 said member 43 is arranged and held so that the center of curvature of the arc portion of 45 coincides with the center of the pivotal mounting of the bar member to said posts 28. Further the member 43 is held in such position that the arc member 45 will intersect the extension of the axis of said hollow shaft 9 at a point or close to a plane in which said feeding lip 26 moves in its rotation with said shaft 9. By this arrangement it can be seen that in the winding of tape for example from feeding member 25 to said member 45 there is secured a constant tension of the material being fed onto member 45 during movement of said member 45 in the winding operation.

For securing uniform spacing or lapping of the tape on the member being wound there is provided the following feeding or movement mechanism for said member 45. On the end of said shaft 9 opposite member 25 there is mounted the worm 50 which engages the pinion 51 mounted on a horizontal shaft 52 at right angles to said shaft 9, which shaft 52 operates in the bearing 53 and carries at its opposite end the cam 55. Contacting with the cam surface 55 is the pin 57 mounted on the pivot arm 59, said pin 57 being held in such engagement with the cam 55 by means of the tension spring 60 mounted between said plate 1 and said arm 58. Connecting rod 61 pivoted at one end to said arm 58 and at its other end to said extension 63 of bar member 30 serves to transmit movement through said cam to said member 45, the shape of the cam being such as to move arc member 45 at a uniform rate across the axis of shaft 9 when the cam is driven at a uniform rate of speed.

In said cam 55 between the beginning of the cam surface which controls the movement of the part being wound and the end of said surface there is pivoted a step 56 which permits the movement of said pin 57 from the end to the beginning of said surface by actuation through said spring 60 whereby the work holding bar member 30 is moved quickly into the winding commencing position immediately upon the finishing of the winding movement.

In the use and operation of the embodiment of my invention shown in the drawings and described above a filament of thread, wire or the like or a tape fed from a spool or the like and having tension not shown but well known in the art is fed through the hollow shaft 9 and through the feeding tube 25 over the lip 26 and a winding started on the arc member 45 of the piece to be wound which is held in said clamp 35. The clutch member 12 is then moved into engagement with clutch member 11 through said rod 19 and yoke 14 whereupon shaft 9 and feeding member 25 will be rotated and the winding continued which was started on said member 45. During such winding the cam 55 is actuated through worm 50 and pinion 51 whereby through pin 57 and bar 58 the connecting rod 61 is moved to carry the pivoted arm 30 and the clamp 35 together with said member 45 toward the winding member at a rate of speed predetermined by the dimensions of said worm and pinion 50 and 51 and the lengths of connecting members and their distances from their pivotal points so that a smooth winding is placed on member 45 with a spacing or lapping as desired. Said cam 55 is made of such dimensions that when the end of the arc member 45 is reached the end of the cam surface is terminated and the step 56 is reached whereupon through actuation by said spring 60 the pin 57 is moved from the end of the cam surface to the beginning thereof.

While I have shown and described and have pointed out in the annexed claims certain novel features of my invention, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In a machine for winding tape, filaments, and the like onto objects having non-rectilinear forms, in combination, means for feeding the tape to the object, means for rotating the feeding means about the object, and means for keeping the distance from the point of feed on said feeding means to the point of winding on said object substantially constant during said winding.

2. In a machine for winding tape, filaments, and the like onto objects having non-rectilinear forms, in combination, means for feeding the tape to the object, means for rotating the feeding means about the object, and means for moving said feeding means and said object relative to each other to keep the distance from the point of feed of said feeding means to said object substantially constant during the winding.

3. In a machine for winding tape filaments and the like along the surface of ir-

regular or curved objects, a feeding means for said tape or the like, means for holding the object in a position to be wound, means for rotating the feeding means about the object, and means for moving said feeding means and the object relative to each other to keep substantially constant the distance from the point of feed on said feeding means to the point of winding on said object.

4. In a machine for winding tape filaments and the like along the surface of irregular or curved objects, a feeding means for said tape or the like, means for holding the object in a position to be wound, means for rotating the feeding means about the object, and means for moving said holding means and an object thereon to keep the distance from the point of feed on said feeding means to the point of winding on said object substantially constant.

5. In a machine for winding tape, filaments and the like along the surface of irregular or curved objects, a feeding means for said tape or the like, means for holding the object in a position to be wound, means for rotating the object and the feeding means with respect to each other, and means for moving said holding means and an object thereon to keep the distance from the point of feed on said feeding means to the point of winding on said object substantially constant comprising a cam action actuated by said means for rotating the feeding means with respect to said object.

6. In a machine for winding tape, filaments and the like along the surface of objects having curved or irregular axes, a feeding means for said tape or the like, means for holding the object in a position to be wound, means for rotating the object and the feeding means with respect to each other, and means for moving said holding means and an object thereon to keep the distance from the point of feed on said feeding means to the point of winding on said object substantially constant comprising a cam action actuated by said means for rotating the feeding means with respect to said object.

7. In a winding mechanism a feeding member for tape, filaments or the like, comprising a hollow shaft mounted for rotation about its axis and terminating in a feeding end bent from the axis of said shaft to permit the rotation of the feeding member with the shaft, whereby a member to be wound can be moved across the axis of the shaft.

8. In a winding mechanism a feeding member for tape, filaments or the like, comprising a hollow shaft mounted for rotation about its axis and terminating in a feeding member mounted at a point off the axis of said shaft to permit the rotation of the feeding member with the shaft, whereby a member to be wound can be moved across the axis of the shaft.

9. In a winding mechanism a feeding member for tape, filaments, or the like, having a filament supply means comprising a hollow shaft mounted for rotation about its axis, a work holding means, means for rotating said filament supply means, a member for feeding the filaments to the work carried by the supply means and positioned off the center of rotation of said means.

Signed at Hoboken in the county of Hudson and State of New Jersey this 18th day of May A. D. 1925.

CHARLES F. DE BOLD.