Feb. 8, 1949. R. OPPENHEIM 2,461,231

WINDING MACHINE

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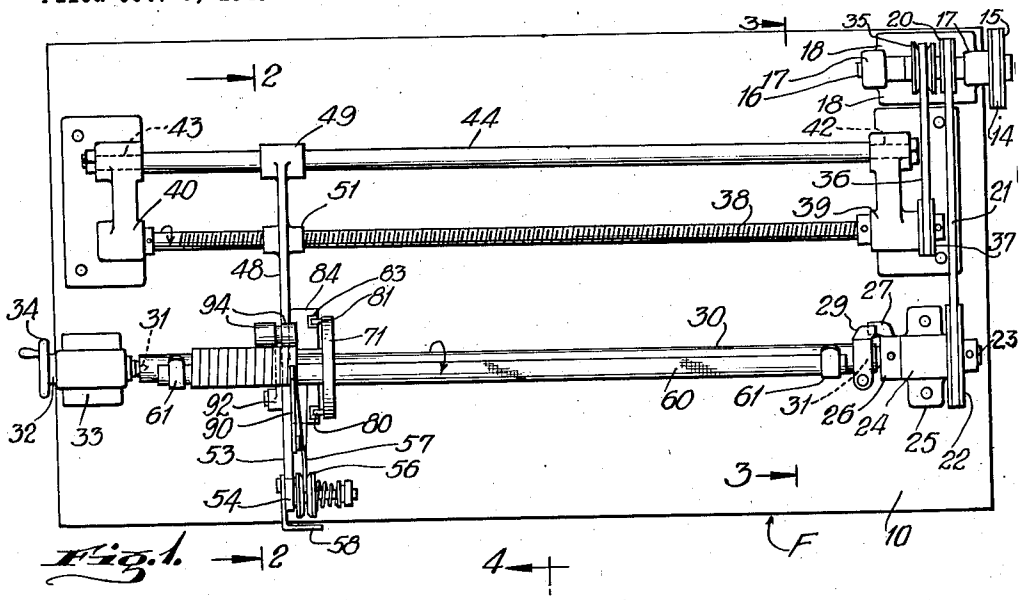


Fig. 1.

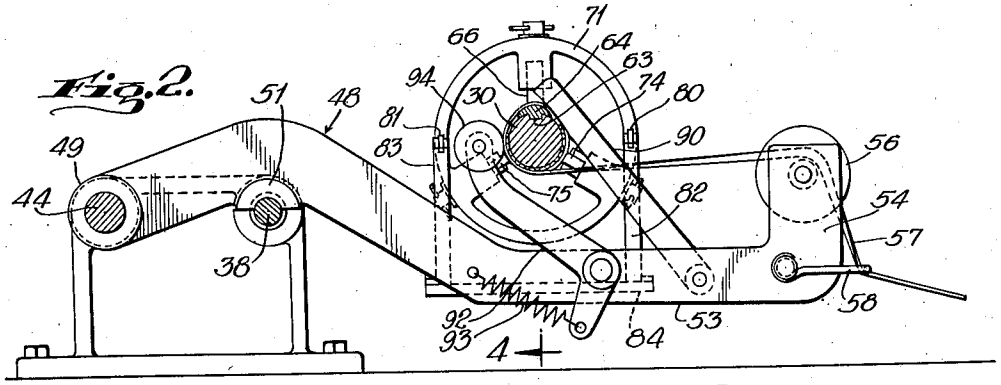


Fig. 2.

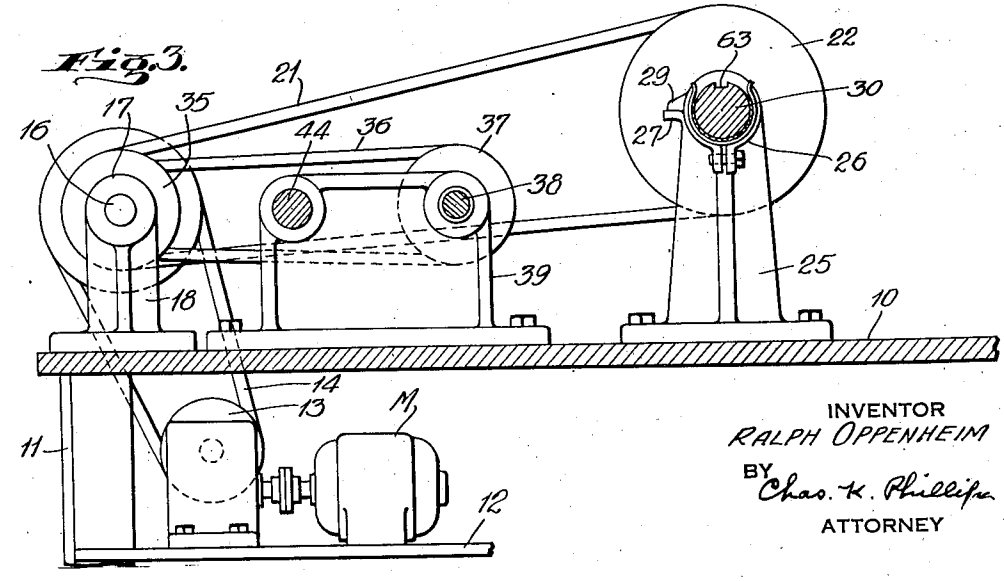


Fig. 3.

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Fig. 4.

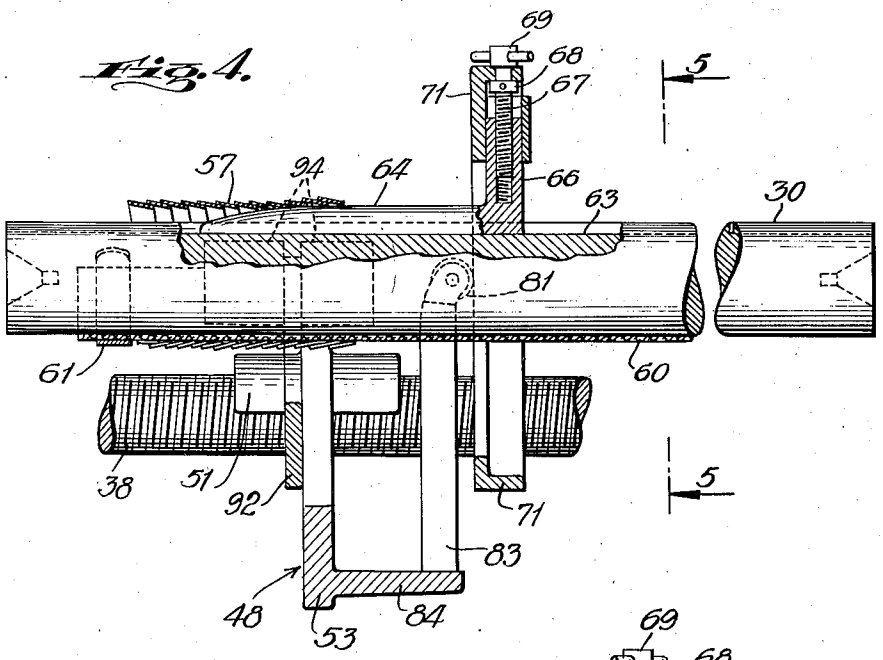


Fig. 5.

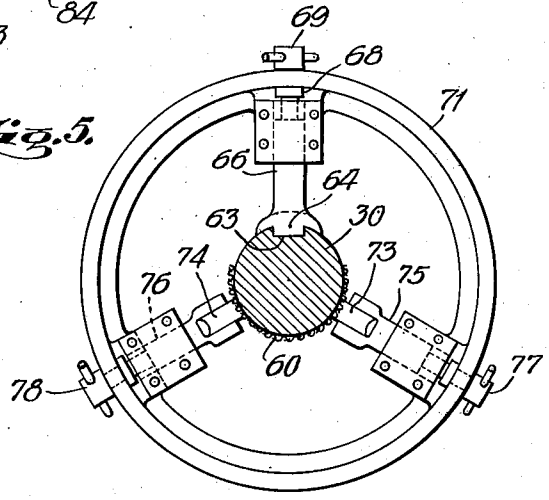


Fig. 6.

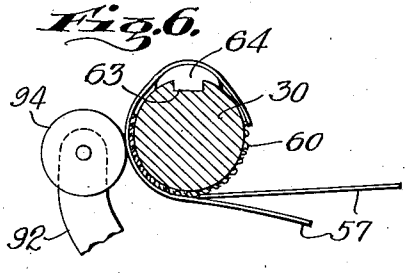
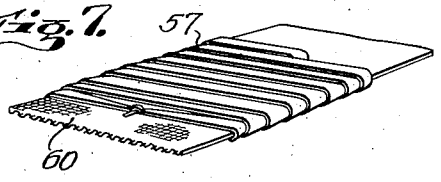


Fig. 7.



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Patented Feb. 8, 1949

2,461,231

UNITED STATES PATENT OFFICE

2,461,231

WINDING MACHINE

Ralph Oppenheim, Brooklyn, N. Y.

Application October 5, 1945, Serial No. 620,444

13 Claims. (Cl. 242—7)

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This invention relates to a machine for winding strands or bands of raffia or any other material that comes in short or uneven length strands around strips of cloth, paper or belting or any other desirable filling.

The principal object of this invention is to provide a machine to facilitate the wrapping of strands or the like of any suitable material helically around strips of any suitable material and includes the provision of mechanism for tucking in the rear ends of a strand under the forward end of the next succeeding strand; mechanism for facilitating the wrapping of strands of different widths upon strips of different widths, and means for controlling the pitch of the helical wrapping and for controlling the thinness or thickness or amount of overlapping of the wrapping material.

Another object of the invention consists in the provision of means for facilitating the use of winding shafts of different diameters, improved means for holding the strip upon which the material is wound against the winding shaft immediately ahead of the wrapping region and means for holding the last convolutions of the helical wrapping compacted against the shaft.

Other objects of the invention will appear from the following description taken in connection with the drawings in which,

Figure 1 is a top plan view of a preferred embodiment of my invention;

Figure 2 is a transverse vertical view on line 2—2 of Figure 1;

Figure 3 is a transverse vertical view on line 3—3 of Figure 1;

Figure 4 is a vertical longitudinal view on line 4—4 of Figure 2;

Figure 5 is a transverse vertical view on line 5—5 of Figure 4;

Figure 6 shows in detail means for holding the last wound section of the strand compacted on the winding shaft; and

Figure 7 shows a short section of the finished article produced on the machine.

In the preferred construction disclosed in the drawings the machine comprises a frame F which includes a rectangular table 10 on which various elements of the machine are supported. This table is supported on legs 11 at a convenient distance from the floor.

The motive power for the machine is preferably derived from a motor M, Figure 3, mounted on a shelf 12 located below the supporting table 10, and which drives a pulley 13 over which passes a belt 14, see also Figure 1, passing over a pulley 15 mounted on the end of a shaft 16 suitably

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supported in bearings 17 in a bracket 18 on the table 10.

The shaft 16 is the main distributing shaft and is equipped with a pulley 20 over which passes a belt 21 passing over a pulley 22 on a short shaft 23 journalled in a bearing 24 in a bracket 25 supported on the table 10. The end of the short shaft 23 is provided with a collar 26 which is equipped with a driving dog 27 which cooperates with a driving member 29 secured on a winding shaft 30.

The shaft 23 is provided with a conical end 31 which projects into a conical recess in one end of the shaft 30. The other end of the shaft 30 is provided with a conical recess to receive a similar conical end 31 of a bearing 32 threaded in a bracket 33 supported on the table 10 and provided with the usual hand wheel 34 for facilitating mounting and dismounting of the shaft 30 and replacement of the shaft 30 by shafts of different diameters.

Also mounted on the distributing shaft 16, Figures 1 and 3, is a variable pitch pulley 35 over which passes a belt 36 passing over a pulley 37 on a screw shaft 38 journalled at one end in a bearing in a bracket 39 supported on the table 10 and at its other end in a bearing in a bracket 40 supported on the table 10.

Secured in openings 42 and 43 in the brackets 39 and 40 is a carriage supporting and guiding rod 44.

A tension carriage disclosed at 48, Figure 2, is provided with a hub 49 which slides and rocks on the rod 44. It is also provided with a half cylindrical threaded enlargement 51 to cooperate with the screw shaft 38 for moving the carriage lengthwise of the winding shaft 30.

The tension carriage is preferably of the shape disclosed in Figure 2 and includes a horizontal portion 53 and a vertical end section 54 on the upper end of which is mounted a spring pressed tension mechanism 56 of a well-known construction comprising discs spring pressed together to grip the raffia and hold it with the desired tension. The raffia or other strand is shown at 57 as passing between the discs of the tension member and as also passing under an L-shaped hook member 58 pivoted on the tension carriage at the base of the vertical member 54 to hold the strand between the discs of the tension device.

For the purpose of facilitating the removal of the strand wrapped strip from the winding shaft 30, the shaft 30 employed with any width backing strip is preferably of a circumferential dimension which is slightly less than twice the width

of the backing strip 60 which may be held on the shaft by spring clips 61.

For the purpose of increasing the effective circumference of the winding shaft on which the strand is wound, the shaft is provided with a longitudinal groove 63 to slidably receive an auxiliary or complemental short shaft 64 which is preferably provided with a tapered end as shown in Figure 4, so as to facilitate its withdrawal from the last convolutions of the strands wound on the strip during the wrapping operation.

This auxiliary shaft 64 is provided with an upstanding member 66, Figure 4, which is threaded to receive a screw threaded member 67 supported by means of a collar 68 and a manipulative head 69 in a lateral flange of a ring 71 which encircles the winding shaft and which is moved along the length of the shaft as the winding proceeds.

The ring 71 is provided with a pair of supporting rollers 73 and 74 which bear against the strip to hold the same against the winding and auxiliary shafts at a point in advance of the region in which the winding takes place. These rollers are supported on plungers 75 and 76 which are threaded to recieve threaded adjustable members 77 and 78, the construction in all respects being the same as that of the means for positioning and adjusting the auxiliary shaft 64. The members 67, 77 and 78 are adjusted to position and hold the ring 71 concentric with the winding shaft 30 and to accommodate various diameters of winding shafts for the purpose of wrapping strands on strips of different widths.

For the purpose of advancing the ring 71, the auxiliary shaft 64 and the rollers 73 and 74, the left side face of the ring 71, Figure 4, is arranged in a plane extending normal to the axis of the winding shaft 30 to provide a track against which bear rollers 80 and 81 supported on members 82 and 83 projecting upwardly from a horizontal plate 84 on the right side of the horizontal portion 53 of the carriage 40. As the carriage is advanced toward the right, Figure 1, the rollers 80 and 81 press on the ring 71 and move the auxiliary shaft 64 and rollers 73 and 74 toward the right.

In order to wrap successive strands about the winding shaft 30 without the necessity of securing the ends of the strands together and also for the purpose of controlling the accurate winding of the strands on the shaft 30, a strand guiding member 90, Figures 1 and 2, is provided The guiding member 90 is pivoted on the horizontal portion 53 of the carriage and is inclined toward and rests on the winding shaft as shown more particularly in Figure 2. The construction is such that the guiding member 90 presses against the left edge of the strand being wound and guides the strand onto the cylinder so as to wind and lay it in a true helical path.

Also pivotally supported on the horizontal portion 53 of the carriage is a bell crank 92, Figures 1 and 2, spring pressed clockwise by a spring 93, Figure 2, to urge a roller 94 carried by the upper end of the bell crank toward the rear face of the winding cylinder 30. This roller is of such length and is so positioned as shown in Figure 1, as to engage the last wound and several other adjacent convolutions of the strand to hold the wrapping compact.

In the operation of wrapping when an end of a strand approaches the tensioning device, a new strand is placed between the strand that is being wound and the winding shaft at the point at which the strand being wound approaches the winding shaft, and then after the new strand has been gripped and pressed against the winding shaft by the strand being wound, the new strand is placed in the tensioning device. When the rear end of the first of these strips leaves the tensioning device, the guide bar which presses against the left edge of both strips moves the freed rear end of the first strip toward the right, and the roller 94 presses against it and holds it in that position, and then as the wrapping is continued with the second strip, the second strip buries the end of the first strip underneath it.

I claim:

1. A strand winding machine comprising a rotatable winding shaft and an auxiliary shaft keyed on the periphery of said winding shaft for rotation therewith and for longitudinal sliding movement thereon.

2. A winding shaft comprising complementary members, one of which is constituted by a main winding shaft and the other of which consists of a short complementary shaft keyed on the periphery of said main shaft for longitudinal sliding movement thereon and for rotation therewith, said short shaft being provided with a tapered rear end.

3. A winding shaft comprising a main shaft and a complementary short shaft keyed on the periphery of said main shaft for longitudinal sliding movement thereon and for rotation therewith, means for rotating said shafts and for sliding said complementary shaft longitudinally of said main shaft at a speed proportional to the speed of rotation of said shafts.

4. A winding shaft comprising a main shaft and a complementary short shaft keyed on the periphery of said main shaft for longitudinal sliding movement thereon and for rotation therewith, means for rotating said shafts and for sliding said complementary shaft longitudinally of said main shaft at any one of a plurality of speeds each proportional to the speed of rotation of said shafts.

5. A winding shaft comprising a main shaft and a complementary short shaft keyed on the periphery of said main shaft for longitudinal sliding movement thereon and for rotation therewith, means for rotating said shafts and for sliding said complementary shaft longitudinally of said main shaft at a speed proportional to the speed of rotation of said shafts, and strand guiding means movable with said complementary shaft.

6. A winding shaft comprising a main shaft and a complementary short shaft keyed on the periphery of said main shaft for longitudinal sliding movement thereon and for rotation therewith, means for rotating said shafts, a carriage mounted for movement longitudinally of said shafts, means for moving said carriage longitudinally of said main shaft at a speed proportional to the speed of rotation of said shafts, a strand guide supported on said carriage and means transmitting the movement of said carriage to said complementary shaft.

7. A winding shaft comprising a main shaft a complementary short shaft keyed on the periphery of said main shaft for longitudinal sliding movement thereon and for rotation therewith, means for rotating said shafts, a carriage mounted for movement longitudinally of said shafts, means for moving said carriage longitudinally of said main shaft at a speed proportional to the

speed of rotation of said shafts, a strand guide supported on said carriage, means transmitting the movement of said carriage to said complementary shaft, said means comprising a ring connected to said complementary shaft and arranged concentrically with said shafts and means on said carriage for engaging and moving said ring longitudinally of said shafts.

8. In combination with a winding shaft of an auxiliary short shaft keyed on the exterior of said winding shaft for rotation therewith and for longitudinal sliding movement thereon, a ring surrounding said shafts, radially adjustable means connecting said ring to said short shaft, and means cooperating with said ring for moving said short shaft longitudinally of said winding shaft as said winding shaft is rotated.

9. In combination with a winding shaft, of an auxiliary short shaft keyed on the exterior of said winding shaft for rotation therewith and for longitudinal sliding movement thereon, a ring surrounding said shafts, radially adjustable means connecting said ring to said short shaft, means cooperating with said ring for moving said short shaft longitudinally of said winding shaft as said winding shaft is rotated, and additional radially adjustable means carried by said ring and cooperating with said winding shaft to hold said auxiliary shaft in sliding contact with said winding shaft.

10. In combination with a winding shaft, of an auxiliary short shaft keyed on the exterior of said winding shaft for rotation therewith and for longitudinal sliding movement thereof, a ring surrounding said shafts, radially adjustable means connecting said ring to said short shaft, means cooperating with said ring for moving said short shaft longitudinally of said winding shaft as said winding shaft is rotated, additional radially adjustable means carried by said ring and cooperating with said winding shaft to hold said auxiliary shaft in sliding contact with said winding shaft, means for securing a backing strip to said winding shaft, and rollers on said additional adjustable means adapted to bear on a backing strip attached to said winding shaft.

11. In combination with a winding shaft, of an auxiliary short shaft keyed on the exterior of said winding shaft for rotation therewith and for longitudinal sliding movement thereon, a ring surrounding said shafts, radially adjustable means connecting said ring to said short shaft, means cooperating with said ring for moving said short shaft longitudinally of said winding shaft as said winding shaft is rotated, additional adjustable means carried by said ring and cooperating with said winding shaft to hold said ring concentric with said winding shaft, means for securing a backing strip to said winding shaft, rollers on said additional adjustable means adapted to bear on a backing strip attached to said winding shaft, means adjacent to the rear of said rollers for guiding a strand to wind the same helically on said shafts and roller means adjacent to said guiding means and to the rear thereof adapted to bear against the last wound convolutions of a strand as it is being wound on said strip and shafts for holding said convolutions compact.

12. In combination with a winding shaft, of a carriage movable along the length of said shaft as the shaft is being rotated, strand tensioning means carried by said carriage, and strand guiding means carried by said carriage and bearing against the rear edge of a strand being wound on said shaft and operating as the rear end of the strand leaves said tensioning device to move said end of the strand out of the helical path of the wound portion of the strand.

13. In combination with a winding shaft, of a carriage movable along the length of the shaft as the shaft is being rotated, strand tensioning means carried by said carriage, strand guiding means carried by said carriage and bearing against the rear edge of a strand being wound on said shaft and operating as the rear end of the strand leaves said tensioning device to move said end of the strand out of the helical path of the wound portion of the strand, and roller pressure means bearing upon the wound portion of said strand to hold it compact and to hold the rear end of the strand out of the helical path of the wound portion of the strand, whereby the end of a second strand may be placed between the first strand and the winding shaft before said first strand disengages said tension device and may be wound between said first strand and said winding shaft, and whereby said second-mentioned strand as it is being wound will be wound on and cover the rear end of the first-mentioned strand.

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The following references are of record in the file of this patent:

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