May 23, 1939. W. POOL 2,159,102

WINDING MACHINERY FOR YARNS, THREADS, RIBBONS, AND THE LIKE

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FIG. 3

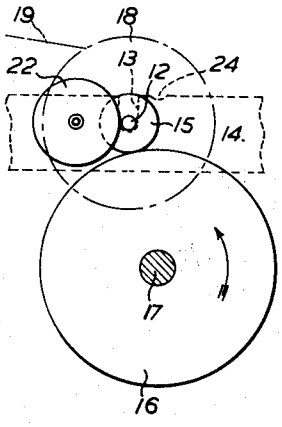


FIG. 1

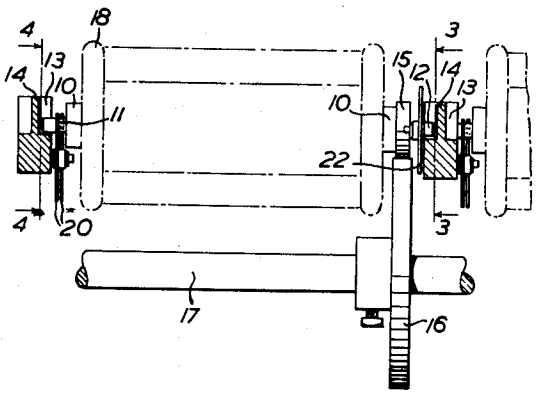


FIG. 2

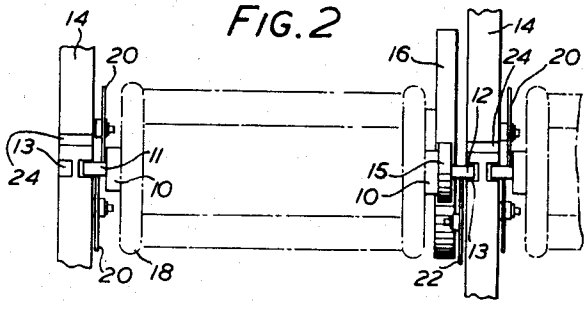
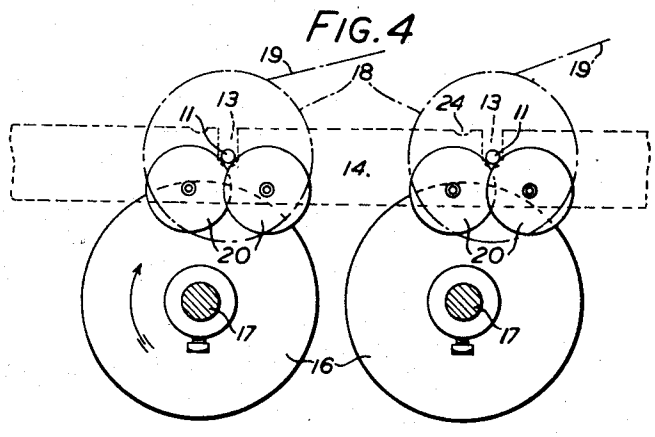


FIG. 4



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FIG. 7

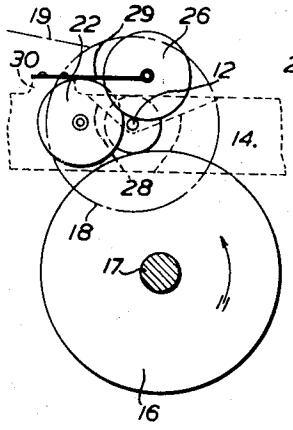


FIG. 5

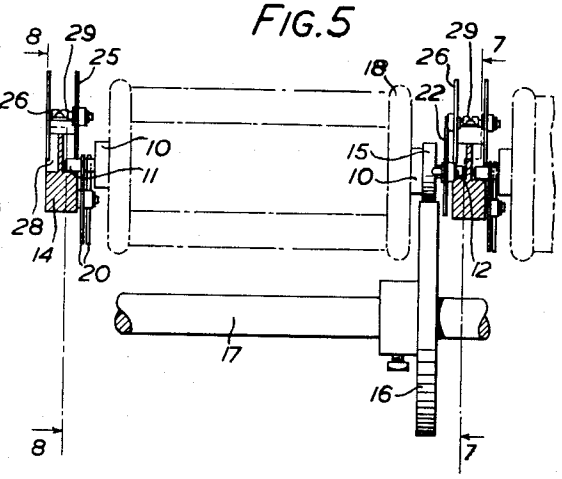


FIG. 6

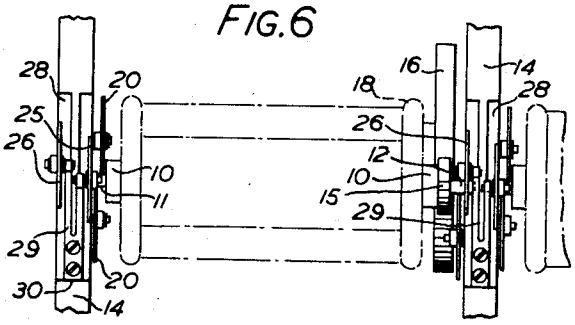
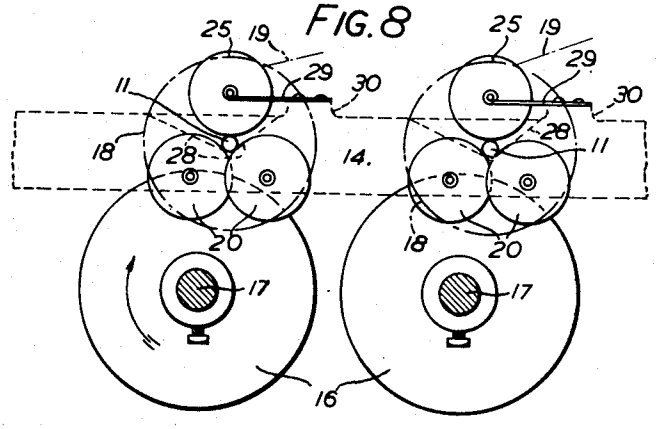


FIG. 8



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UNITED STATES PATENT OFFICE

2,159,102

WINDING MACHINERY FOR YARNS, THREADS, RIBBONS, AND THE LIKE

William Pool, Spondon, near Derby, England, assignor to Celanese Corporation of America, a corporation of Delaware

Application February 12, 1936, Serial No. 63,569
In Great Britain March 1, 1935

7 Claims. (Cl. 242—18)

This invention relates to winding machinery for yarns, threads, ribbons and the like (generally hereinafter referred to as "yarn") and particularly to machinery of the type in which a take-up bobbin is mounted on a spindle provided with a roller at one end for frictional engagement with a driving wheel, the object of the invention being to enable winding to be effected on such machines at a lower and more uniform tension than hitherto.

In accordance with the invention a bobbin winding apparatus comprises a bobbin supporting spindle, a roller fixed on the spindle at the driving end thereof, a driving wheel disposed beneath and in contact with the spindle roller and adapted both to provide support for the driving end of the spindle, and to drive the spindle roller by frictional contact therewith, rolling means adapted to contact with the driving end of the spindle and to oppose the thrust of the driving wheel on the spindle roller, and rolling means adapted to support the end of the spindle opposite to the driving end.

A particularly simple and efficient way of providing the rolling support for the bobbin comprises a freely rotatable disc disposed so as to oppose the driving thrust of the driving wheel at one end of the spindle and a pair of overlapping freely mounted discs forming a notch or depression to receive the other end of the spindle.

The ends of the spindle may lie within guide slots, the spindle, however, being kept free from engagement with the sides of the slots during running of the bobbin. The freely rotatable discs described above may easily be disposed to prevent such contact of the spindle with the sides of the slots, while the slots enable the spindle to be readily positioned in contact with the discs. In order to prevent excessive friction should the spindle by endwise movement come into contact with the ends of the slots, the ends of the spindle are preferably rounded and hardened.

The mounting of the two ends of the spindle with purely rolling support considerably diminishes the effort (driving torque) necessary to rotate the bobbin, a factor that is found advantageous in the use of the winding device to collect yarn or other material delivered at a substantially constant rate and required to be wound under low, steady tension, e. g., in bobbin-to-bobbin sizing, stretching, saponifying and similar operations, and in the winding of thin ribbons of artificial foil continuously with their production from a wider sheet or strip of foil. With the material delivered at a steady rate, the tension in the material is, of course, called on to overcome the tendency for the winding rate to increase as the diameter of the material on the bobbin becomes greater.

To provide for the slippage between the roller on the bobbin spindle and the wheel driving the roller as the rate of rotation of the bobbin decreases, the roller is advantageously made of hardened and polished steel and the wheel of cast iron. In the case of the material to be wound being particularly delicate, the wheel may also be made of hardened and polished steel and alternatively or in addition the driving surfaces may be lubricated.

In order to maintain conditions of sliding friction substantially throughout the winding operation, the peripheral speed of the wheel should at the commencement of the operation be such as to tend to overdrive the bobbin.

If there is any tendency for the spindle to jump on its support, as may occur at high speeds of operation, the spindle may be held in position by suitable means, e. g., a freely rotatable disc disposed above each end of the spindle.

By way of example some forms of apparatus according to the invention will now be described in greater detail with reference to the accompanying drawings in which:

Fig. 1 is a front elevation, partly in cross-section, of a winding device according to the invention, the figure showing the ends of associated winding devices adjacent thereto;

Fig. 2 is a plan of Fig. 1;

Fig. 3 is an end elevation of Fig. 1 viewed along the line 3—3 of Fig. 1;

Fig. 4 is an end elevation of two adjacent devices of the type shown in Fig. 1, viewed along the line 4—4 of Fig. 1;

Fig. 5 is a front elevation, partly in cross-section, of a modified form of winding device of the type shown in Fig. 1;

Fig. 6 is a plan of Fig. 5;

Fig. 7 is an end elevation of Fig. 5 viewed along the line 7—7 of Fig. 5; and

Fig. 8 is an end elevation of two adjacent devices of the type shown in Fig. 5 viewed along the line 8—8 of Fig. 5.

Referring to Figs. 1 and 2, a bobbin spindle 10 whose ends 11, 12 extend into slots 13 formed in brackets 14 is provided with a roller 15 which is fixed to the spindle at a point near the end 12 thereof. The slots 13 are wider than the diameter of the spindle ends 11 and 12 so as to allow the ends considerable sideways movement. The

roller 15 is driven by frictional contact of its periphery with the periphery of a driving wheel 16 which is fixed on a driving shaft 17 disposed below the brackets 14. The rotation of the roller 15 drives the spindle 10 and consequently the bobbin 18 secured thereto, and winds yarn 19 on the bobbin.

Mounted on fixed pivots on the bracket 14 near the end 11 of the spindle 10 and facing the bobbin 18 are a pair of freely rotatable discs 20, the discs being arranged in overlapping relation on either side of the slot 13 in such a manner as to support the end 11 of the spindle 10 in the depression or notch formed by their peripheries, as shown in Fig. 4. The disposition of the discs 20 is such that the end 11 of the spindle 10 is held clear of the sides and the bottom of the slot 13 during normal running of the spindle, the discs providing a purely rolling support for the end of the spindle.

The end 12 of the spindle 10 is supported by the driving wheel 16 and roller 15 at such a height as to be clear of the bottom of the corresponding slot 13, and a freely rotatable disc 22 (see Fig. 3), rotatably mounted on the bracket 14 in such a manner as to bear with its periphery against the side of the spindle when the spindle is in the middle of the slot 13, opposes the tendency for the thrust of the driving wheel 16 on the roller 15, and the tension in the yarn 19, to carry the end 12 of the spindle into contact with the left-hand side of the slot 13.

During normal running of the spindle 10 there is no tendency for the spindle to bear against the right-hand side of the slot and the spindle is thus supported at both ends in a substantially "frictionless" manner during the whole of the winding operation. In order to prevent excessive friction should the spindle 10 by endwise movement come into contact with the ends of the slots 13, the ends of the spindle are rounded as shown by the drawings, and preferably are hardened.

As will be apparent from the drawings (e. g., Figs. 2 and 4) each bracket 14 may be continued indefinitely to provide for the end support of any number of spindles 10, the spindles being held in spaced rows as shown in Fig. 4, and each row being driven by separate driving shafts 17. Again, since each bracket 14 is adapted by slots 13 for the support of opposite ends of adjacent spindles (see Figs. 1 and 2) any number of winding units may be arranged side by side.

In this manner a winding machine according to the invention may be formed as a compact creel of winding units supported in a framework of brackets 14, the framework being horizontally or vertically disposed, or inclined as desired (the slots 13, of course, always being vertical). A large number of winding units can thus be accommodated in a given floor space.

The brackets 14 are formed with grooves 24 across their width near each slot 13 (Figs. 2 and 4) to house the ends of the spindles 10 when the spindles are lifted from the slots 13 on completion of the winding of a bobbin.

In the modification shown in Figs. 5–8, further freely rotatable discs 25, 26 are disposed above and in contact with the ends 11, 12 of the spindles 10 to prevent jumping of the spindles in their supports, especially during high speed winding.

It will be observed in Fig. 8 that the discs 25 disposed above the ends 11 of the spindles are held with their axes in the same vertical planes as the axes of the spindles and consequently tend to hold the ends 11 of the spindles always in equal contact with both discs 20.

The discs 26, however, in contact with the ends 12 of the spindles 10 (see Fig. 7) are held in such a manner that their axes lie in vertical planes slightly to the right of the vertical planes occupied by the axes of the spindles, the lowest point of the periphery of each disc being lower than the highest point of the periphery of the corresponding spindle so that the end 12 of each spindle is always urged into contact with the corresponding disc 22.

In order to allow of the quick removal and replacement of the bobbins and spindles each slot 13 is widened considerably and formed with inclined sides as shown at 28 (Figs. 6, 7 and 8) and each disc 25, 26 is pivoted at the end of a cantilever spring 29 which is supported at its other end on a raised portion 30 of the bracket 14. On removal of a bobbin 18 the ends of the spindles are drawn upwardly along the inclines 28, the cantilever springs 29 yielding upwardly to allow of the discs 25, 26 being lifted sufficiently to permit of the passage of the ends 11 of the spindles between the edges of the discs 20 and 25, and the ends 12 of the spindles between the edge of the disc 26 and the incline 28. Advantageously, the discs 20, 22, 25 and 26 are furnished with self-lubricating bushes 31 to provide for free running on their pivots 32.

Having described my invention what I desire to secure by Letters Patent is:

1. In a bobbin winding apparatus for yarn or like material, a bobbin-supporting spindle, a roller fixed on said spindle at the driving end thereof, a driving wheel disposed beneath and in contact with said spindle roller and adapted both to provide support for the driving end of the spindle and to drive said roller by frictional contact therewith, rolling means adapted to contact with the driving end of the spindle at a point on its periphery so as to maintain said spindle in predetermined position in opposition to the thrust exerted on the spindle roller by the driving wheel, and rolling means adapted to support the end of the spindle opposite to said driving end, each end of said spindle being free to take up the position predetermined by said driving wheel and rolling means.

2. In a bobbin winding apparatus for yarn or like material, a bobbin-supporting spindle, a roller fixed on said spindle at the driving end thereof, a driving wheel disposed beneath and in contact with said spindle roller and adapted both to provide support for the driving end of the spindle and to drive said roller by frictional contact therewith, a freely rotatable disc adapted to contact with the driving end of the spindle at a point on its periphery so as to maintain said spindle in predetermined position in opposition to the thrust exerted on the spindle roller by the driving wheel, and a pair of freely rotatable discs disposed in overlapping relation and adapted to provide rolling support for the end of the spindle opposite to said driving end, each end of said spindle being free to take up the position predetermined by said driving wheel and rotatable discs.

3. In a bobbin winding apparatus for yarn or like material, a bobbin-supporting spindle, a roller fixed on said spindle at the driving end thereof, a bracket having a slot adapted to accommodate the driving end of said spindle, said slot being wider than the said driving end, a driving wheel disposed beneath and in contact with said spin-

dle roller and adapted both to support said driving end of the spindle clear of the bottom of said slot and to drive said roller by frictional contact therewith, the rotation of said driving wheel urging said driving end of the spindle away from one wall of said slot, a freely rotatable disc mounted on said slotted bracket and adapted to contact with the driving end of the spindle at a point on its periphery so as to maintain said spindle in predetermined position, clear of the other wall of said slot, in opposition to the thrust exerted on the spindle roller by the driving wheel, and a pair of freely rotatable discs disposed in overlapping relation and adapted to provide rolling support for the end of the spindle opposite to said driving end, each end of said spindle being free to take up the position predetermined by said driving wheel and rotatable discs.

4. In a bobbin winding apparatus for yarn or like material, a bobbin-supporting spindle, a roller fixed on said spindle at the driving end thereof, a driving wheel disposed beneath and in contact with said spindle roller and adapted both to provide support for the driving end of the spindle and to drive said roller by frictional contact therewith, a freely rotatable disc adapted to contact with the driving end of the spindle at a point on its periphery so as to maintain said spindle in predetermined position in opposition to the thrust exerted on the spindle roller by the driving wheel, a bracket having a slot adapted to accommodate the other end of the spindle, said slot being wider than the diameter of said other end, and a pair of freely rotatable discs mounted on said slotted bracket in overlapping relation adjacent to said slot, said discs being adapted to provide rolling support for said other end of the spindle in such a manner that said end lies not only clear of the bottom of said slot but also clear of the sides thereof, each end of said spindle being free to take up the position predetermined by said driving wheel and rotatable discs.

5. In a bobbin winding apparatus for yarn or like material, a bobbin-supporting spindle, a roller fixed on said spindle at the driving end thereof, a driving wheel disposed beneath and in contact with said spindle roller and adapted both to provide support for the driving end of the spindle and to drive said roller by frictional contact therewith, rolling means adapted to contact with the driving end of the spindle at a point on its periphery so as to maintain said spindle in predetermined position in opposition to the thrust exerted on the spindle roller by the driving wheel, yieldably mounted rolling means for maintaining said driving end of the spindle always in contact with said first-mentioned rolling means during normal operation of the apparatus, further rolling means adapted to support the end of the spindle opposite to said driving end, and yieldably mounted rolling means for maintaining said opposite end of the spindle always in contact with said further rolling means during normal operation of the apparatus, each end of said spindle being free to take up the position predetermined by said driving wheel and rolling means.

6. In a bobbin winding apparatus for yarn or like material, a bobbin-supporting spindle, a roller fixed on said spindle at the driving end thereof, a driving wheel disposed beneath and in contact with said spindle roller and adapted both to provide support for the driving end of the spindle and to drive said roller by frictional contact therewith, a freely rotatable disc adapted to contact with the driving end of the spindle at a point on its periphery so as to maintain said spindle in predetermined position in opposition to the thrust exerted on the spindle roller by the driving wheel, a yieldably mounted freely rotatable disc for maintaining said driving end of the spindle always in contact with said first-mentioned freely rotatable disc during normal operation of the apparatus, a pair of freely rotatable discs disposed in overlapping relation and adapted to provide rolling support for the end of the spindle opposite to said driving end, and a further yieldably mounted freely rotatable disc for maintaining said opposite end of the spindle always in contact with said pair of freely rotatable discs during normal operation of the apparatus, each end of said spindle being free to take up the position predetermined by said driving wheel and rolling means.

7. In a bobbin winding apparatus for yarn or like material, a bobbin-supporting spindle, a roller fixed on said spindle at the driving end thereof, a driving wheel disposed beneath and in contact with said spindle roller and adapted both to provide support for the driving end of the spindle and to drive said roller by frictional contact therewith, a freely rotatable disc adapted to contact with the driving end of the spindle at a point on its periphery so as to maintain said spindle in predetermined position in opposition to the thrust exerted on the spindle roller by the driving wheel, a freely rotatable disc for maintaining said driving end of the spindle always in contact with said first-mentioned freely rotatable disc during normal operation of the apparatus, a cantilever spring for supporting said last-mentioned freely rotatable disc, a pair of freely pivoted discs disposed in overlapping relation and adapted to provide rolling support for the end of the spindle opposite to said driving end, a further freely rotatable disc for maintaining said opposite end of the spindle always in contact with said pair of freely rotatable discs during normal operation of the apparatus, and a cantilever spring for supporting said further freely rotatable disc, each end of said spindle being free to take up the position predetermined by said driving wheel and said discs.

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