March 24, 1953 P. R. HEYGEL 2,632,607

WINDING MACHINE

Filed Sept. 9, 1947 2 SHEETS—SHEET 1

Fig. 1.

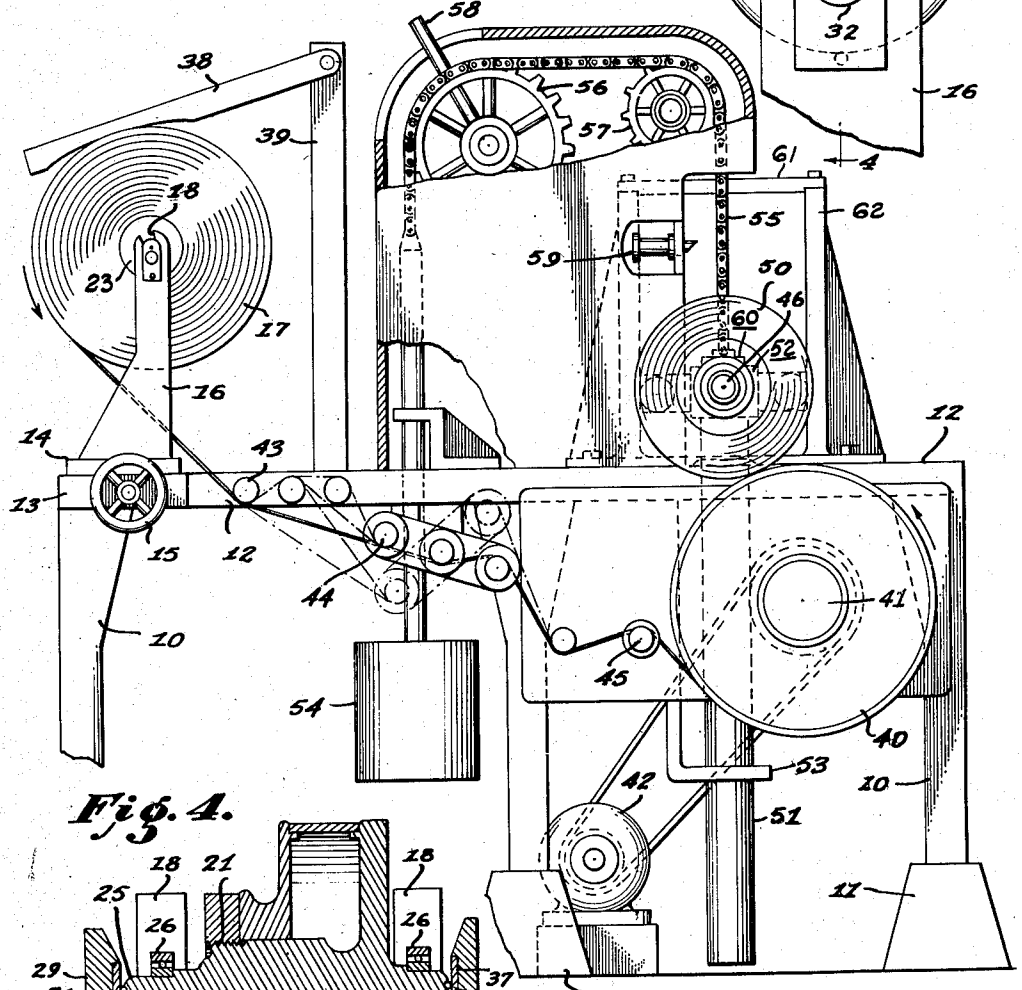


Fig. 3.

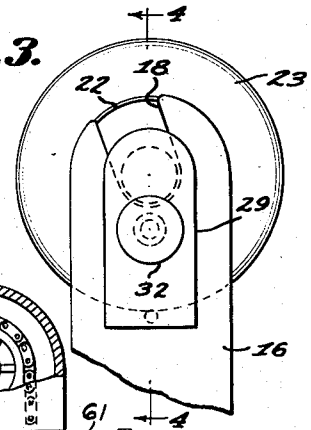
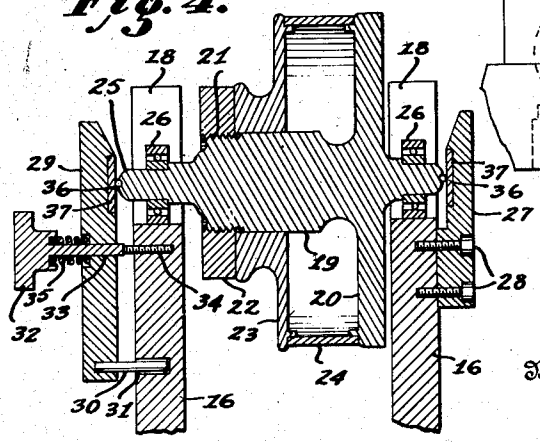


Fig. 4.



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Fig. 5.

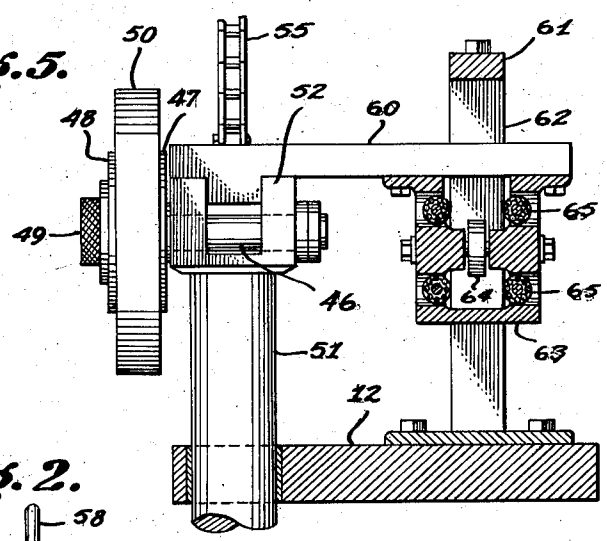


Fig. 2.

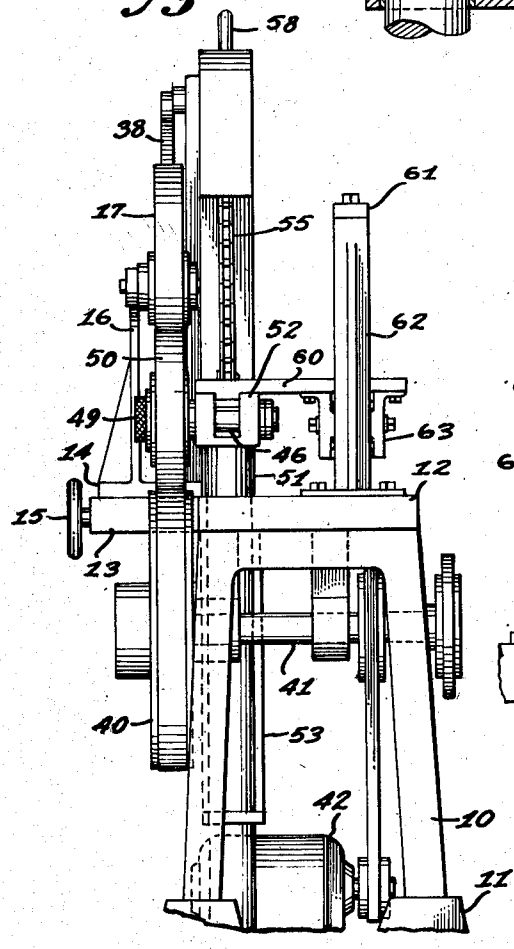
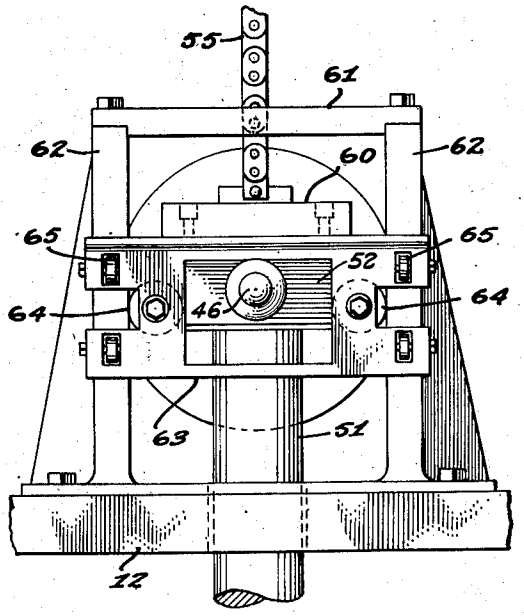


Fig. 6.



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UNITED STATES PATENT OFFICE

2,632,607

WINDING MACHINE

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Application September 9, 1947, Serial No. 773,000

5 Claims. (Cl. 242—65)

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This invention relates to winding machines, and more particularly to a machine adapted for rewinding paper disposed in the form of bobbins of relatively narrow width.

In the manufacture of cigarette paper the continuous web of paper as it comes off of the paper machine is wound up to form a relatively wide roll, such as for example 100 inches or more. This wide roll of paper is commonly slit into two or more rolls of narrower widths, and these narrower rolls are then further slit into a plurality of bobbins or rolls of relatively narrow widths to provide cigarette wrappers. It is conventional practice to form the bobbins in this last slitting operation in a width corresponding substantially to the circumference of the cigarettes to be formed, so that the bobbins may be used on cigarette making machines.

In this last slitting operation, some of the bobbins obtained are apt to be defective because of imperfections in the paper, or due to uneven winding, or for other reasons. The slitting machine operator marks these bobbins, usually by small paper tabs or "flags" which are inserted in the bobbin between the convolutions of the paper at the defective portion, during the slitting operation. When the slitting and winding of the bobbins has been completed, the bobbins are removed and the imperfect ones, marked as mentioned above, are separated for rewinding to remove the defective portions of the paper.

This rewinding operation involves considerable difficulty because of the narrow width of the paper in bobbin form, and because of the thin tissue like character of the paper. The narrow width of the paper makes it difficult to rewind the bobbin without overlapping or uneven edges. And the thinness of the paper makes it susceptible to easy breakage during rewinding. These factors have heretofore seriously restricted the speed at which the rewinding operation may be carried out.

In accordance with the present invention I have developed a rewinding machine that operates with a high degree of accuracy and uniformity so that the rewound bobbins are fully comparable with the perfect bobbins obtained on the slitter, and are free of overlapping or uneven edges and wound tightly and uniformly. Furthermore, the winding machine of the present invention is characterized by a markedly high paper rewinding speed on the order of 1000 to 1500 meters of paper per minute, which is more than three times the speed of rewinding machines heretofore in use. This machine is arranged with a rewinding spindle so that operation may be carried on efficiently from an open side. Also, the machine is constructed with a low center of gravity and incorporates a unique arrangement for mounting and counterbalancing the rewinding spindle so that vibration at the high operating speeds is avoided.

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An embodiment of the winding machine of the present invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a view in side elevation, partly cut away, of a complete machine embodying the invention;

Fig. 2 is a corresponding right end view;

Fig. 3 is an enlarged detail of the mounting for the bobbins to be rewound;

Fig. 4 is a corresponding sectional detail taken on the line 4—4 in Fig. 3;

Fig. 5 is a detail showing the arrangement of the spindle member for receiving the rewound bobbin; and,

Fig. 6 is a further detail of the guideway for the spindle member.

As illustrated in the drawing, the numeral 10 designates a frame structure which may be secured to a floor or other suitable supporting base as indicated at 11. The frame structure 10 comprises a table portion 12 adapted to support the various operating elements of the machine.

This table portion 12 has a right angular extension 13 at one end of which is mounted a bobbin supporting frame comprising a base portion 14 which is slidably arranged in any conventional manner, such as by an undercut rib-and-groove arrangement (not shown), on the extension 13 so that it may be shifted transversely as by an adjusting wheel 15.

The bobbin supporting frame also includes a pair of standards 16 extending upwardly to support a bobbin of paper to be rewound as at 17. The standards 16 are bifurcated by vertical slots 18 at their extending ends to provide supporting journals for the bobbin 17 as described further below, the slots 18 preferably being inclined somewhat from the vertical (see Fig. 3) in accordance with the direction of withdrawal from bobbin 17.

The bobbin 17 is mounted in the standards 16 on a carrier 19 having an integral flange portion 20 and a threaded portion 21 adapted to receive a threaded collar 22 for holding a complementary flange member 23 in place. According to usual practice the bobbins 17 are wound on a core 24, and this core 24 may be clamped between the integral flange portion 20 and complementary flange 23, as shown in Fig. 4, to secure the bobbins on carrier 19.

The carrier 19 is further formed with reduced end portions 25, each of which is fitted with a bearing member 26 spaced for disposition in the slots 18 of standards 16. Carrier 19 is located transversely in the slots 18 by a stationary positioning element 27 fastened on one standard 16 by screws 28 or the like, and a yieldable positioning element 29 assembled on the other standard 16. This assembly is effected by a dowel pin 30 pressed into positioning element 29 and loosely fitting an aperture 31 in standard 16, and a retaining pin 32 having a shank 33 extending through the positioning element 29 and terminating in a threaded portion 34 engaging the standard 16. The shank 33 of retaining pin 32 carries a spring as indicated at 35 in Fig. 4 so that the positioning element 29 is yieldably biased toward the standard 16.

The upper edge of the positioning elements 27 and 29 are beveled as shown so that the carrier 19 may be fitted easily in the slots 18 between the positioning elements 27 and 29. And as the yieldable positioning element 29 is biased toward the standard 16, it will locate and maintain the carrier 19 against the stationary positioning element 27 which may be adjusted to the proper transverse alignment of bobbin 17 in the machine by means of the previously mentioned adjusting wheel 15.

Contact between the carrier 19 and the positioning elements 27 and 29 is made through hardened balls 36 pressed in the ends of carrier 19 and inserts 37 of fiber or the like fitted in the faces of the positioning elements which reduces the wear so that it is negligible at this point. Adequate drag on the bobbin 17, so that it will unwind evenly during operation of the machine, is provided by a brake arm 38 pivoted from an upright 39 to ride bobbin 17. This brake arm 38 may also be manipulated by hand to stop the bobbin 17 and prevent it from overrunning whenever it is desired to interrupt operation of the machine.

Paper is withdrawn from the bobbins 17 mounted in standards 16 by a winder drum 40, which is carried on a shaft 41 journaled on frame structure 10 (see Fig. 2), and driven from a motor 42 through a suitable belt drive. The paper withdrawn from bobbin 17 is led to the winding drum 40 in selective flights over guide elements mounted on frame structure 10 to prevent any sagging or slack in the paper. As illustrated in Fig. 1, a series of stationary guide elements 43 are mounted on the table portion 12 of frame structure 10, a second series of guide elements 44 are arranged on a pivoted mounting for angular adjustment, and further guide elements 45 are located adjacent the winding drum 40. This arrangement allows the paper to be trained according to a variety of patterns through the guide elements as illustrated by dotted lines in Fig. 1, so that an even and steady travel can be obtained with the particular paper being handled.

The paper delivered by the winding drum 40 is taken up on a spindle member 46 which is arranged similarly to carrier 19 with an integral flange portion 47 and a complementary flange 48 and retaining collar 49 to receive the rewound bobbin 50. This spindle member 46 is disposed to position the rewound bobbin 50 in peripheral contact with the winding drum 40 and is mounted for displacement to accommodate the increase in size of the rewound bobbin 50 during the rewinding operation.

The disposition of spindle member 46 in this manner is provided through a mounting on a movable support column 51. The spindle member 46 is carried in a bearing block 52 at the head of this column 51 which is free for vertical movement in aligned apertures in the table portion 12 of frame structure 10 and a bracket 53 extending below the table portion 12. The movable support column is formed in massive proportions and weight with respect to the spindle member 46 so that a low center of gravity is provided which stabilizes the spindle member 46 at high operating speeds and maintains the rewound bobbin 50 in contact with the winding drum 40. This movable column 51 is counterbalanced by a weight 54 of similarly massive proportions suspended by a sprocket chain 55 trained over sprocket wheels 56 and 57 from the column 51. The counterweight 54 is adjusted in relation to the column 51 so that the spindle member 46 may be easily displaced to accommodate the increase in size of the rewound bobbin 50 while maintaining effective contact with the winding drum 40 during the rewinding operation. The sprocket wheel 56 is fitted with a lever 58 for raising the spindle member 46 from the winding drum 40 when desired, and a latch 59 is disposed as shown in Fig. 1 to engage the bearing block 52 and retain the movable column 51 in raised position while the rewound bobbins 50 are removed.

To maintain the axis of spindle member 46 in alignment with the axis of shaft 41 carrying winding drum 40, an arm 60 is also mounted at the head of movable column 51 to extend to guide structure 61. This guide structure 61 is supported on the table portion 12 of frame structure 10 and comprises two vertical guideways 62. The arm 60 extends between these guideways 62, and carries a bracket 63 adapted for mounting roller bearings in contact with the inside faces of the guideways 62 as at 64 and with both edges of the guideways 62 as at 65. By this arrangement the spindle member 46 is supported in aligned position at a point spaced from the movable column 51 so that an adequate leverage can be obtained to overcome the turning movement imposed on spindle 46 at the high speeds employed according to the present invention. As a result the spindle member 46 is maintained in accurate winding alignment so that the rewound bobbins 50 are built evenly and true.

I claim:

1. A winding machine adapted for rewinding sheet material, such as paper, disposed in the form of bobbins of relatively narrow width comprising a frame, a winder drum carried on said frame and rotated about a horizontal axis for rewinding a bobbin of said paper, a spindle member wholly supported at one end and disposed with a horizontal axis of rotation to receive the rewound bobbin, guide means associated with the fixed end of said spindle member for maintaining proper winding alignment and means for mounting a bobbin of said paper to be rewound on said frame for rotation on a horizontal axis, said bobbin mounting means comprising a carrier for said bobbin, supporting arms extending from said frame and having bifurcated ends forming journals for said carrier, and positioning elements associated with said supporting arms and thereby maintain said bobbin in proper alignment with said winder drum and said spindle member, at least one of said positioning elements being yieldably mounted to allow free insertion of said bobbin in and removal from said jour-

nals, and said bobbin carrier being formed with hardened ball inserts at its ends for contact with said positioning elements.

2. A winding machine adapted for rewinding sheet material, such as paper, disposed in the form of bobbins of relatively narrow width comprising means for mounting a bobbin of said paper to be rewound, a winder drum for rewinding said bobbin, a spindle member adapted to receive the rewound bobbin, said spindle member being disposed to position the rewound bobbin in peripheral contact with said winder drum during the rewinding operation and being mounted wholly at one end for displacement to accommodate the increase in size of the rewound bobbin during the rewinding operation, and guide means associated with said spindle member for maintaining it in accurate winding alignment, said guide means comprising a positioning arm structure also mounted at one end adjacent said spindle member and extending oppositely with respect thereto, a fixed guideway disposed adjacent the extending end of said positioning arm structure and arranged in spaced parallel relation to the path of displacement of said spindle member, and means carried on the extending end of said positioning arm structure for engaging said fixed guideway shiftably in the direction of the path of displacement of said spindle member.

3. A winding machine adapted for rewinding sheet material, such as paper, disposed in the form of bobbins of relatively narrow width comprising means for mounting a bobbin of said paper to be rewound, a winder drum for rewinding said bobbin, a spindle member wholly supported at one end and adapted to receive the rewound bobbin, and guide means associated with the fixed end of said spindle member for maintaining proper winding alignment, said bobbin mounting means comprising supporting journals for said bobbin, and a yieldable positioning element for maintaining proper transverse alignment of said bobbin in said journals and allowing free insertion of said bobbin in and removal from said journals.

4. A winding machine adapted for rewinding sheet material, such as paper, disposed in the form of bobbins of relatively narrow width comprising a frame, means for mounting a bobbin of said paper to be rewound on said frame, a winder drum carried by said frame for rewinding the bobbin, a spindle member wholly supported at one end and adapted to receive the rewound bobbin, and guide means associated with the fixed end of said spindle member for maintaining proper winding alignment, said bobbin mounting means comprising supporting arms extending from said frame and having bifurcated ends forming journals for said bobbin, and a yieldable positioning element associated with said supporting arms for maintaining proper transverse alignment of said bobbin and allowing free insertion of said bobbin in and removal from said mounting means.

5. A winding machine adapted for rewinding sheet material, such as paper, disposed in the form of bobbins of relatively narrow width comprising a frame, means for mounting a bobbin of said paper on said frame to be rewound, a winder drum carried by said frame for rewinding said bobbin, a spindle member adapted to receive the rewound bobbin, said spindle member being disposed to position the rewound bobbin in peripheral contact with said winder drum during the rewinding operation and being mounted wholly at one end for displacement to accommodate the increase in size of the rewound bobbin during the rewinding operation, said spindle member mounting means incorporating a supporting column slidably journaled on said frame and formed in massive proportions with respect to said spindle member whereby a low center of gravity is provided for stabilizing said spindle member at high operating speeds and for maintaining the bobbin being rewound in contact with said winder drum, and guide means associated with said mounting means supporting column for maintaining said spindle member in accurate winding alignment, said guide means comprising a positioning arm structure also mounted on said supporting column at one end adjacent said spindle member and extending oppositely with respect thereto, a fixed guideway disposed adjacent the extending end of said positioning arm structure and arranged in spaced parallel relation to the path of displacement of said spindle member, and means carried on the extending end of said positioning arm structure for engaging said fixed guideway shiftably in the direction of the path of displacement of said spindle member.

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