Sept. 23, 1941. C. W. MAYER 2,256,746

WINDING APPARATUS

Filed Aug. 2, 1940 2 Sheets-Sheet 1

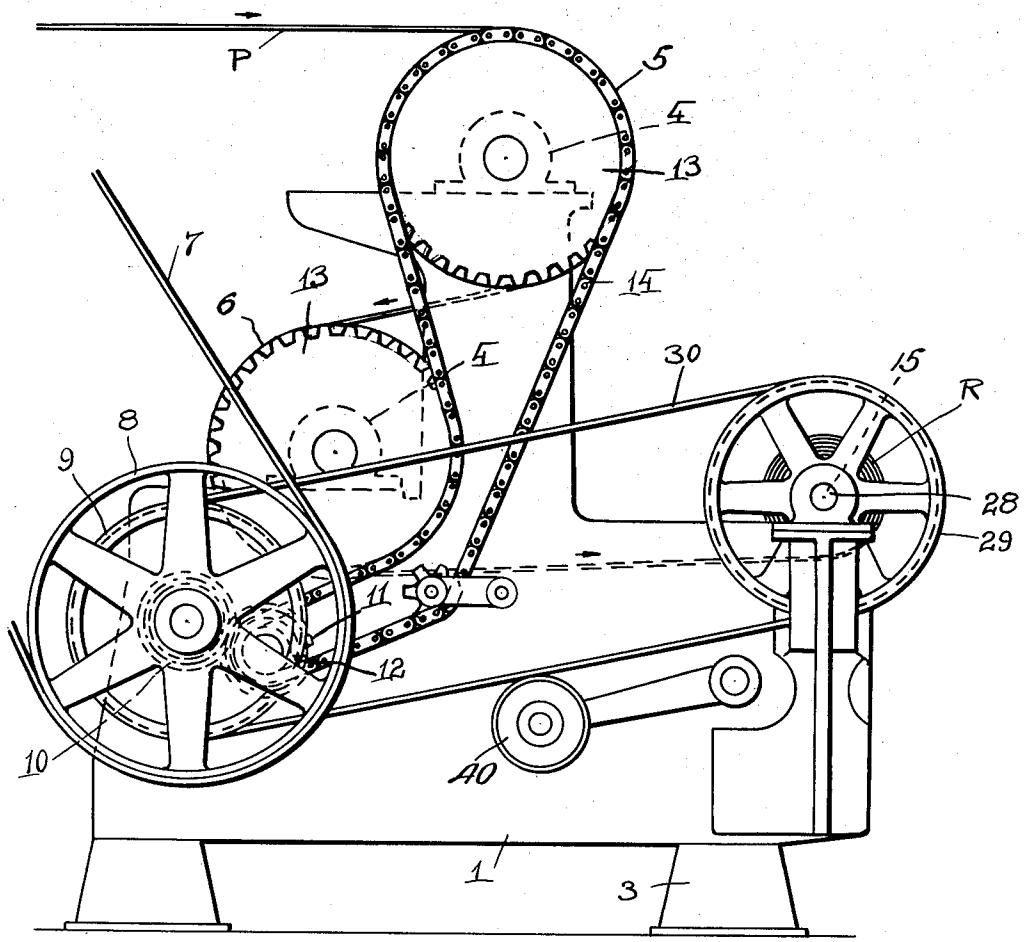


FIG 1

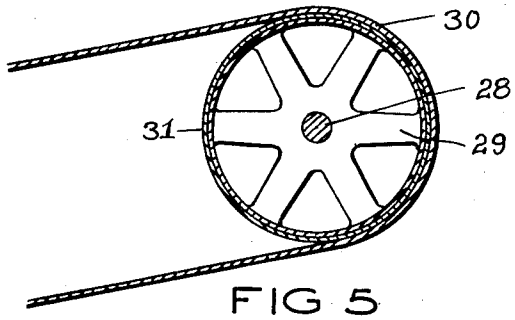


FIG 5

INVENTOR
CHARLES W. MAYER

BY

ATTORNEY

Sept. 23, 1941. C. W. MAYER 2,256,746

WINDING APPARATUS

Filed Aug. 2, 1940 2 Sheets-Sheet 2

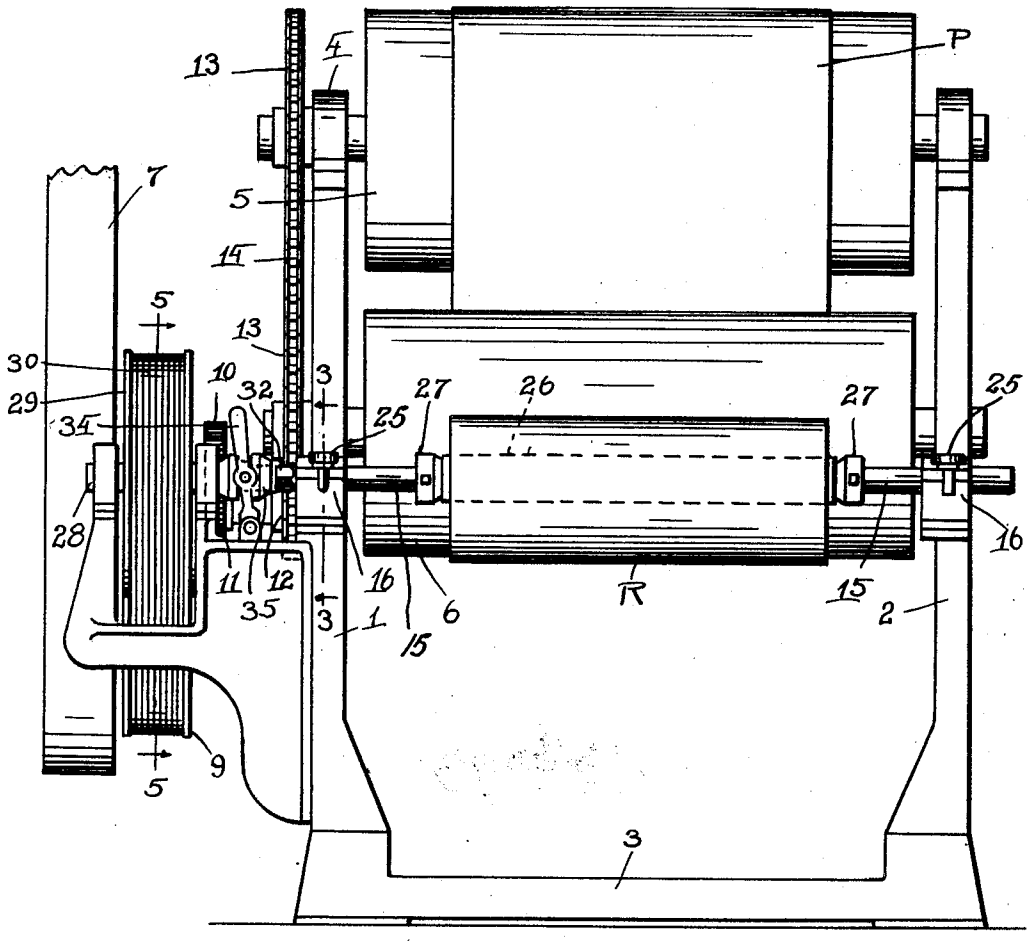


FIG 2

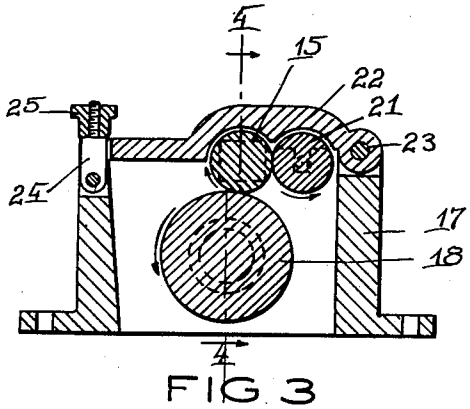


FIG 3

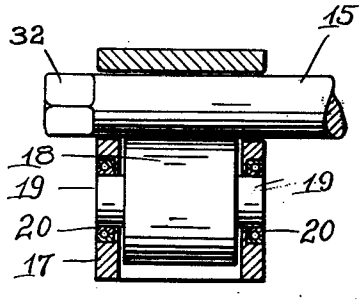


FIG 4

INVENTOR
CHARLES W. MAYER

BY

ATTORNEY

Patented Sept. 23, 1941 2,256,746

UNITED STATES PATENT OFFICE

2,256,746

WINDING APPARATUS

Charles W. Mayer, Rochester, N. Y.

Application August 2, 1940, Serial No. 349,736

2 Claims. (Cl. 242—55)

This invention relates to winding machines and more particularly to a winding mechanism for paper. In paper making and continuous paper web treating machines, such as coating machines, employed in coating carbon or wax paper, it is essential that the rewind shaft be rotated at a speed that will produce a uniform winding tension in order to prevent breakage of the paper or loose and telescoping turns in the finished roll. In addition to this it is essential that the winding shaft or reeling center be so mounted in its journal support that it can be readily inserted or withdrawn therefrom to facilitate the removal of the completed roll and the mounting of another shaft for a new roll with an ease and rapidity that will not interfere with the continuous operation of the machine or cause the loss of any great amount of paper during the change.

My present invention has for its principal object to provide a novel driving and winding mechanism which will effect a uniform winding tension on the paper web in its travel to the rewind shaft.

A further object of this invention is to provide the winding mechanism with a novel journal support for the rewind shaft which cooperates with the winding mechanism to provide a uniform winding tension on the windup of the paper web and provides for a quick and easy mounting and removal of the rewind shaft.

These and other objects and attendant advantages of the invention will become more readily apparent from the detailed description thereof which follows, reference being had to the accompanying drawings in which

Figure 1 is a side elevation of the frame and driving mechanism of a winding machine embodying my invention.

Figure 2 is a rear elevation thereof.

Figure 3 is an enlarged sectional view of one of the journal bearings for the rewind shaft, the section being taken on the line 3—3 of Figure 2.

Figure 4 is a vertical sectional view of the journal bearing taken on the line 4—4 in Figure 3.

Figure 5 is a vertical sectional view of a portion of the drive for the rewind shaft, the section being taken on the line 5—5 in Figure 2.

The present application is a continuation in part of application Serial No. 91,930 filed July 22, 1936.

In the machine illustrated in the accompanying drawings which embodies my invention, the winding mechanism is mounted in a frame made up of the sides 1 and 2 which are supported by the base 3. Journal bearings 4, 4 provided on each side of the frame support the feeding rolls 5 and 6, which feed the paper web P from the processing apparatus (not shown) to the finished roll R.

The winding mechanism is driven by the belt 7 which rotates the pulley 8 and with it the pulley 9 and gear 10. The latter meshes with the gear 11 for the rotation of the sprocket 12. Each of the rolls 5 and 6 is adapted to be rotated by a sprocket gear 13, and the sprocket chain 14, which is driven by the sprocket 12, is arranged and held in mesh with the sprocket gears 13 so as to positively rotate the roll 5 in a clockwise direction and the roll 6 in a counterclockwise direction. In this way the paper web P is consecutively drawn over the rolls 5 and 6 in its travel to the finished roll R.

The rewind shaft 15 is journaled in two antifriction bearings 16, 16 of substantially identical construction. Each of these bearings comprises a box 17 which is bolted to the side of the frame and carries in the center thereof a relatively large supporting roller 18 with trunnions 19 at each end mounted to rotate in ball bearings 20 provided in the side walls of the box. Above and forward of this supporting roller and toward the feed roll 6, is a thrust roller 21 which is similarly mounted to rotate in the side walls of the box. The ends of the rewind shaft 15 are adapted to extend thru openings in the side walls of the boxes 17 to permit the shaft to be freely supported on the rollers 18 and 21.

The box is normally closed at the top with a cover 22 in order to confine the shaft within the box and hold it locked therein without, however, any bearing contact with the cover. The cover is hinged to the box at 23 and is fastened in place by a swinging bolt 24 and nut 25 with which the cover may be quickly held in place over the box or released thereon so that it can be thrown back to open the bearing when it is desired to insert or remove the rewind shaft 15.

The relative diameters of the main supporting roller 18 and thrust roller 21 taken with the diameter of the rewind shaft are such that the latter, rotating in a clockwise direction in Figure 3, will have a line of tangency lying just over the crest of the supporting roller and its axis is just forwardly of the axis of the latter. Thus, as the rewind shaft 15 is driven in this direction, it will tend to climb against the thrust roller 21 in a direction with the line connecting the axis of the roller 21 with the axis of the re-

wind shaft. Therefore, while the large supporting roller 18 is supporting practically all of the weight, the smaller thrust roller provides sufficient antifriction support to cause the rewind shaft 15 to freely rotate between them and at the same time have the roller 21 take the lateral thrust of the shaft 15 produced by the tension of the paper web as it is drawn by the force of the winding operation. Consequently the resultant of the mechanical and gravitational forces acting on the shaft lies between the rollers 18 and 21 so that the two rollers provide an antifriction bearing of minimum resistance for the support of the rewind shaft. The rewind shaft 15 journaled in this manner and carrying a ton of paper may thus be rotated with but a slight pressure of the finger.

The paper web is wound on a hollow core in the form of a sleeve 26 which is telescoped over the rewind shaft and supported thereon by means of a pair of tapered rollers 27, 27. By the removal of one of the tapered collars from the shaft, the finished roll may thus be quickly and easily removed from the rewind shaft and another core for the next roll mounted thereon.

The rewind shaft 15 is driven from the drive shaft 28 which is mounted to one side of the rewind shaft in alinement therewith but slightly spaced therefrom. The drive shaft 28 carries the pulley 29 which is driven by a suitable belt 30 from the pulley 9. A belt tightening roller 40 contacts the belt 30 to increase or decrease the driving tension of the belt. Either one or both of the pulleys 9 and 29 may have a loosely mounted friction sleeve 31 made up of canvas or other suitable material interposed between it and the belt 30 in order to provide a frictional drive that provides for the rotation of the rewind shaft with the proper winding tension on the paper web as will hereinafter be described. The rewind shaft has a squared end 32 adjacent to the drive shaft 28, and a clutch sleeve 35 suitably splined on the drive shaft and provided with a correspondingly squared pocket, is adapted to be moved on the drive shaft by means of the clutch lever 34 to connect or disconnect the rewind shaft and the drive shaft.

From the foregoing it will be apparent that in the operation of the winding apparatus the rolls 5 and 6 are simultaneously and uniformly rotated by the chain drive 14 on the rotation of the pulley 8. This uniform rotation of the rolls causes the paper web P to be drawn over these rolls at a uniform linear speed. The rewind shaft 15 is rotatably supported by rollers to offer but a minimum amount of resistance to its rotation so that when driven, its momentum will cause it to increase its speed over the speed with which it is driven. This is permitted by the friction drive between the pulleys 9 and 29 because the belt 30 transmits its motion thru friction sleeves 31, 31 and thus eliminates direct frictional contact between the belt and the pulleys in order to allow pulley 29 and with it the rewind shaft and roll R carried thereby to rotate at the increased speed built up by the momentum of the rewind shaft and its roll R. This increased speed is retarded by the uniform linear movement of the web as it travels over the rolls 5 and 6 to the roll and a uniform winding tension is thus produced in the paper web on its wind up on the roll R.

In practice the use of this rewind mechanism has eliminated most of the breakage of paper on the wind up thereof. It has also produced smooth and even rolls of paper as no loose turns can occur in the rolls because the rewind shaft is so sensitively supported that it acts instantly with the operation of the machine to draw the paper web to the roll under tension.

From the foregoing it will be apparent that while the frictional drive of the rewind shaft is not positive, the antifriction support of the shaft nevertheless causes the rewind shaft to instantaneously rotate with the positively driven feed rolls so as to immediately tension the paper web between the feed roller 6 and the rewind shaft 15. The uniform peripheral speed of the rolls 5 and 6 furthermore combines with an increased peripheral speed of the roll R caused by its momentum and permitted by its frictional drive and sensitive antifriction support to provide a constant uniform winding tension on the paper web between the roll R and the rolls 5 and 6.

I claim:

1. In a winding apparatus for web material, the combination of a driving member, a feed roll adapted to have the web material travel thereover, a rewind shaft for receiving the web material from said feed roll, a pair of antifriction bearings for supporting said rewind shaft, each of said bearings comprising a pair of rollers angularly arranged to removably support said shaft between them and prevent lateral movement of said shaft toward said feed roll, positive driving means connecting said driving member with said feed roll, and frictional driving means connecting said driving member with said rewind shaft supported in said antifriction bearings.

2. In a winding apparatus for web material, the combination of a driving member, a pair of vertically spaced feed rolls adapted to have the web material consecutively travel thereover, positive driving means connecting said feed rolls with said driving member for positive and simultaneous rotation of said rolls in opposite directions, a rewind shaft for receiving the web material from one of said feed rolls, a pair of antifriction bearings for supporting said rewind shaft horizontally spaced from said feed rolls, a clutch member rotatably supported in line with said rewind shaft, frictional driving means between said driving member and said clutch member, and means for engaging said clutch member with said rewind shaft to permit the rotation of said rewind shaft by said frictional driving means with increased rotative movement over that of the feed rolls.

CHARLES W. MAYER.