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O. H. FOLSOM

WINDING MACHINE

Filed Feb. 27, 1925

Fig. 1.

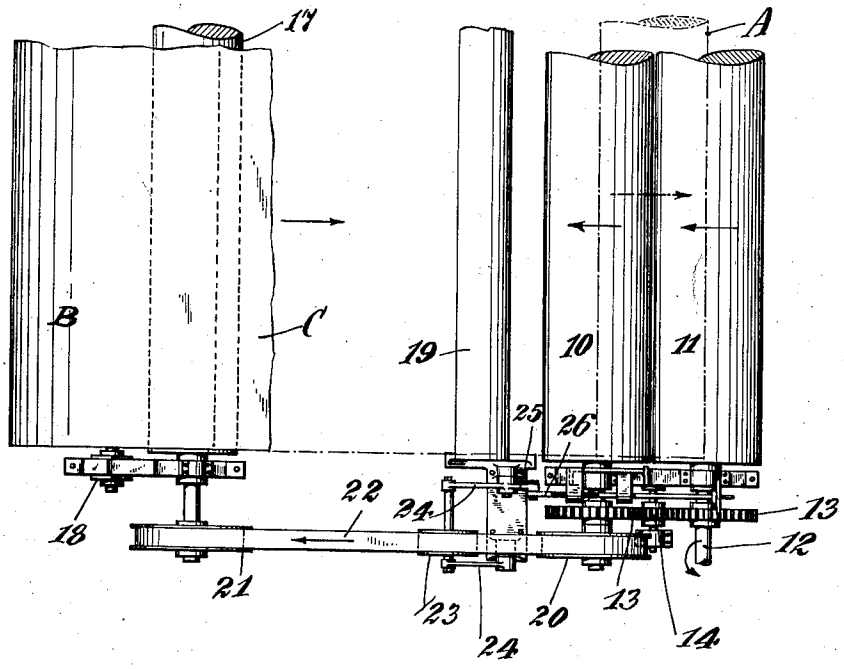
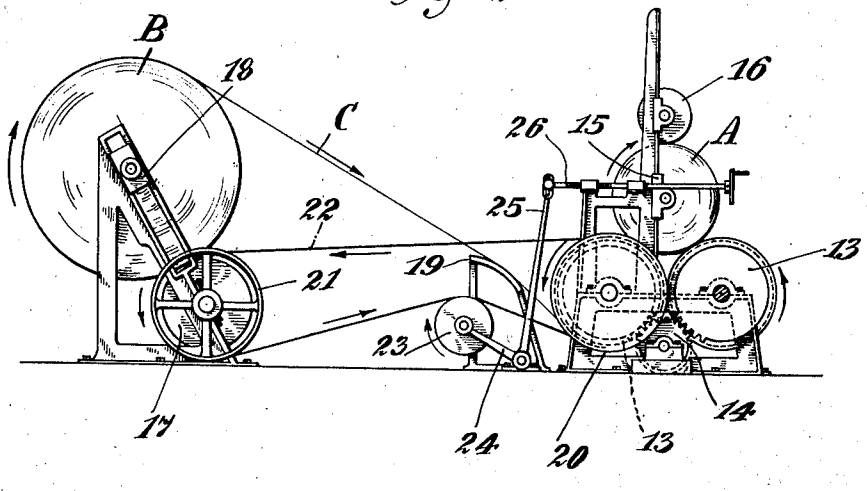


Fig. 2.



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UNITED STATES PATENT OFFICE.

OTIS H. FOLSOM, OF PEORIA, ILLINOIS, ASSIGNOR TO SAMUEL M. LANGSTON COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

WINDING MACHINE.

Application filed February 27, 1925. Serial No. 11,940.

To all whom it may concern:

Be it known that I, OTIS H. FOLSOM, a citizen of the United States, and resident of Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Winding Machines, of which the following is a specification.

This invention is an improvement in winders for sheet material, and more particularly for paper to be wound into large, hard, true rolls, or into counter rolls where speed of operation is important.

One of the main objects of my invention is to put the paper under the proper tension between the supply and rewinding rolls, in such a way that the energy employed in holding back or retarding the unwinding of the supply roll, acts in part to apply power to the rewinding roll. Thus the desired frictional resistance is secured without the use of as much power to drive the rewinder as is now required.

A further object is to provide a simple and efficient attachment which may be readily applied to various types of winders, and which is easily adjusted to give any desired tension to the paper.

A further object is to so control the tension drum which engages with the supply roll, that there is little or no slippage of the roll in respect to the drum, and therefore there is no loosening or bulging of the outer layers of paper on the roll during the unwinding operation.

In carrying out my invention I may employ any suitable type of rewind mechanism and any suitable type of support for the supply roll, if said mechanism and support each includes a drum engaging with the surface of its corresponding paper roll.

As one important feature of my invention I connect these two drums by a power transmitting mechanism normally tending to drive the drum of the unwinding or supply roll at a slightly lower surface speed than that of the rewind drum, but with slip connections whereby they may run at the same surface speed.

In the accompanying drawings I have illustrated a simple form of mechanism embodying my invention.

In these drawings:

Fig. 1 is a top plan view of a portion of such a mechanism, and

Fig. 2 is an end view.

The rewinding part of the mechanism illustrated is merely one of many forms in connection with which my invention may be employed. This part of the apparatus is illustrated as including a pair of parallel drums 10 and 11 adapted to support the roll A of paper being rewound, and to rotate said roll to effect the rewinding operation. Either of the drums may be driven from any suitable source of power applied for instance to the shaft 12, and the rotation of the two drums at the same speed and in the same direction is effected by a pair of gears 13 connected to the drums, and both meshing with an intermediate gear 14. The roll of paper A may have its axle mounted in a suitable guide 15 and resting upon the upper surface is a drum 16 which may be driven by any suitable mechanism not shown. This pressure or riding drum is also mounted so that it may rise as the roll A increases in diameter. The roll B from which the paper C is unwound and rewound on the roll A is supported with its surface in engagement with a drum 17 which may be of a type similar to the rewinding drums 10 and 11. The axle of the roll B may be supported in a guide 18 so that the weight of the roll is carried by the drum 17 and the axle lowers as the diameter of the roll decreases.

In threading up the apparatus the paper may be conducted from the roll B to the roll A in various different ways, and may pass through various mechanisms which may act on the paper, as for instance to slit it into narrower widths or to trim the edges. As illustrated the paper C is taken from the upper side of the roll B and passes over a tension bar 19 to the lower side of the drum 10 and thence upwardly between the drums to the roll A. Obviously it might be caused to pass around and beneath the drum 17 or might pass over rather than beneath the drum 10. The specific form of the various parts so far referred to is not essential to my invention. These parts are illustrated in a somewhat conventional manner and are subject to wide variation as to detail and relative arrangement.

In carrying out my invention I provide a power transmitting connections between the tension drum 17 and one of the winding drums 10 or 11. This power transmitting connection is so designed that it tends to

operate the tension drum at a slightly lower surface speed than the surface speed of the winding drums.

In the specific form illustrated this power transmitting connection includes a pulley 20 connected to the winding drum 10, a pulley 21 connected to the tension drum 17, a belt 22 passing around these two pulleys, and a belt tightening idler 23 engaging with the belt between the two pulleys. Any suitable means may be provided for operating the belt tightening idler 23. For instance it may be carried by one arm 24 of a bell crank lever, the other arm 25 of which is connected to an operating member 26 by means of which the belt may be tightened to the desired extent. The pulleys 20 and 21 have such diameters in respect to each other and in respect to the diameters of the drums 10 and 17 that the belt tends to drive the tension drum 17 at a slightly slower surface speed than the winding drum 10. For instance, if the two drums 10 and 11 of the winder be of ten inch diameter, and the tension drum 17 be of eight inch diameter, then the two pulleys 20 and 21 may be of the same diameter. Obviously, if the drum 17 be of the same diameter as the drums 10 and 11, then the pulley 21 should be somewhat larger than the pulley 20. I do not wish to be restricted to any special ratio, but I have found from experience that if the parts be so designed that they tend to drive the drum 17 twenty per cent slower than the drum 10, satisfactory results are secured.

In operation the roll of paper B is placed on the tension drum 17 and on the bearings of the support or guide 18 so that as the roll gets smaller it will remain in contact with the drum. The machine is started in operation and the drum 17 is rotated at slower speed than the drum 10. The paper is led to the rewinding shaft, and as the drum 10 rotates faster than the drum 7, there will be a pull on the paper and slipping must occur at some point. The belt is tightened to such a point that the drum 17 may be rotated by the paper and at the same surface speed as the paper, and the belt will slip on either the pulley 20 or the pulley 21, or both. For instance if this slipping be between the belt 20 and the pulley 21, it will be noted that the pulley will be traveling faster than the belt, and that therefore the belt will tend to retard the pulley and resist the rotation of the drum. This friction is so adjusted as to give the desired tension on the paper. At the same time, the rotation of the pulley 21 faster than the belt, or the rotation of the belt with the pulley 21 and faster than the pulley 20, will act to apply power to the drum 10 and tend to rotate the latter at a high speed. In other words, the power which is utilized for holding back the tension drum and putting tension on the paper, is transferred to the other end of the machine and utilized in tending to help rotate the winding drums 10 and 11. The power applied in creating the frictional resistance is thus not wasted, but is in part utilized, and the paper may be held under the desired tension with the application of less power for operating the winder than is now necessary where the tension is created by adjustable brake shoes operating on the drum 21 or some equivalent part. Furthermore the power required to rotate the drum 17 is not solely the power applied through the pulling of the paper, but is primarily the power applied through the belt 22. The latter drives the drum at a speed nearly equal to the desired speed, and the pull on the paper is only such as will drive the drum at the desired slightly higher speed than that at which the belt would drive it. At the same time, all the necessary frictional resistance is secured as the belt may be tightened to such a point that very great tension is required on the paper to give this desired higher speed for the tension drum.

It will be noted that in the form shown the tension drum is connected to the source of power through the slip belt 22, gears 13 and 14, and the shaft 12. It will be evident that the pulley 20 need not be on the shaft of either drum but might be secured to or more directly driven from the prime mover. For instance an electric motor or a line shaft, might have a pair of pulleys one belted to the tension drum 21 and the other to a pulley on the shaft of one of the winding drums 10 or 11. The size of the several pulleys and the tightness of one of the belts should be such as to exert the same forces as in the form shown. The force exerted on the tension drum by the paper would be transmitted to the source of power to thereby reduce the power required for operating the winder.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A winding machine for sheet material including a winding drum for engaging the surface of the winding roll, means for positively driving said drum and rotating said winding roll, a tension drum for engaging the surface of the supply or unwinding roll, and power transmitting connections from one drum to the other, normally tending to drive the tension drum at lower surface speed than the rewinding drum, and including slip connections for permitting them to run at the same surface speed.

2. A winding machine for sheet material including a winding drum for engaging the surface of the winding roll, means for positively driving said drum and rotating said

winding roll, a tension drum for engaging the surface of the supply or unwinding roll, and power transmitting connections from one drum to the other, including a pair of pulleys connected to said drums, a belt connecting said pulleys, and a belt tightener for the belt, the respective diameters of said drums and pulleys being such that the belt normally tends to drive the tension drum from the winding drum at a somewhat slower speed than the rewinding drum.

3. In combination a rewinding drum, means for connecting a source of power to said drum, a tension drum for engagement with the surface of the paper to be rewound, and power transmitting connections between said drums normally tending to drive the tension drum slower than the rewinding drum, but permitting it to operate at the same surface speed.

4. A rewinding machine for sheet material including a pair of parallel drums adapted to support the roll of rewound material and to rotate the latter, means for positively driving said drums, a tension drum, means for supporting a supply roll upon said tension drum, a pair of pulleys one secured to said tension drum and the other secured to one of said first mentioned drums, and a belt connecting said pulleys, the relative diameters of the drums and pulleys being such that the belt tends to drive the tension drum from the rewinding drum at slower surface speed than the surface speed of the rewinding drums, but may slip to permit but frictionally resist the rotation of the tension drum at the same surface speed as the rewinding drums.

5. A rewinding machine for sheet material including a rewinding drum adapted to engage with the surface of the winding roll, a tension drum adapted to engage with the surface of the supply or unwinding roll, and driving means for said tension drum including a pulley connected thereto, a belt, and means for driving said belt and thereby tending to rotate said tension drum with a surface speed 20% slower than the surface speed of the rewinding drum, said means permitting the tension drum to be rotated by the paper at the same surface speed as that of the rewinding drum, but exerting a dragging force resisting such faster rotation of the tension drum, the tension on the paper leading to the rewinding drum being determined by said dragging force.

Signed at Peoria, in the county of Peoria and State of Illinois, this 23rd day of February A. D. 1925.

OTIS H. FOLSOM