Nov. 5, 1935. R. W. MONCRIEFF ET AL 2,019,623

DRUM WINDING APPARATUS FOR THREADS

Filed Jan. 9, 1934

FIG. 1.

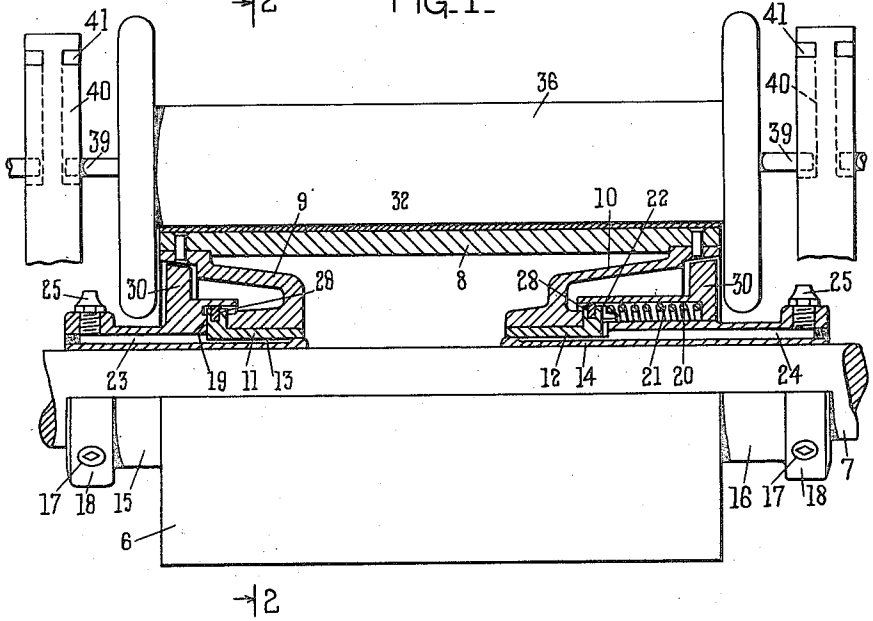


FIG. 2.

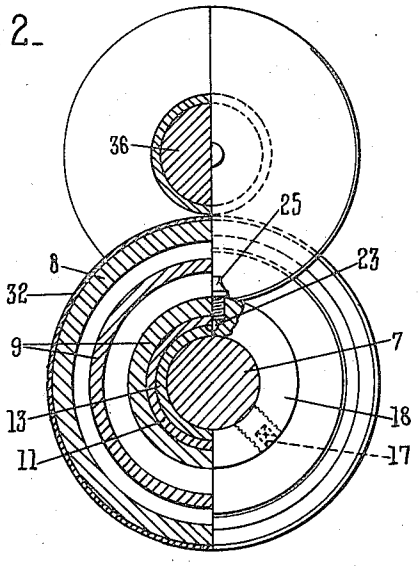


FIG. 3.

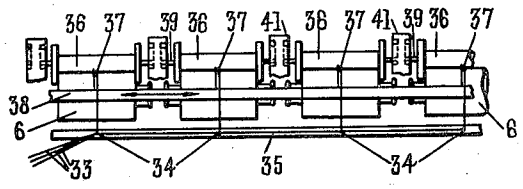
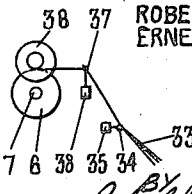


FIG. 4.



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DRUM WINDING APPARATUS FOR THREADS

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2 Claims. (Cl. 242—18)

This invention relates to thread winding mechanisms and more particularly to drum winding apparatus for bobbins or like packages in which a thread or a number of threads are taken from a package or from a number of packages or other source of supply and are wound on to a bobbin or similar supporting medium driven by contact with the surface of the drum. This type of winding apparatus has the great advantage that the winding speed, being determined by the peripheral speed of the drum, can be made independent of the size of the package, and, where the package is cylindrical, can be quite uniform throughout the winding of the package. To wind successfully, however, it has hitherto been essential that the thread or threads proceeding to the winding apparatus should be quite free to proceed thereto, since if the thread is held or retarded even momentarily, the continued rotation of the package by the drum strains or breaks the thread. This, however, represents a serious limitation in the applicability of this type of winding apparatus in textile operations, where it is frequently required to wind thread which is continuously delivered independently of the winding operation. In view of the difficulty of synchronizing the rates of delivery and take-up, the thread is liable to be wound either under excessive and increasing tension, which may strain or eventually break it, or under too little tension when slack winding results.

The object of the present invention is to provide a drum winding apparatus in which the winding rate is automatically adjusted in accordance with the rate of thread delivery without applying undue strain, when the delivery of the thread is reduced or even stopped.

With this object in view, a drum-winding apparatus according to the invention comprises a package-driving drum which is frictionally driven, the amount of friction being such that the peripheral speed of the drum can automatically adjust itself to the rate at which thread is delivered to the package. The package rests on the drum and so is driven at a corresponding peripheral speed.

With this arrangement, therefore, it is possible to wind even very delicate thread in such a manner that in spite of possible variation in tension or irregularity in the rate of supply, the thread is not broken, strained, or damaged. Should the thread delivery even stop completely, the drum as well as the package is held stationary by the thread, so that danger of the package being spoiled by the drum rubbing over it is avoided.

One form of apparatus according to the invention will now be described in greater detail with reference to the accompanying drawing, in which

Fig. 1 shows in part-sectional front elevation a winding drum and bobbin for winding cylindrical packages;

Fig. 2 is a part-sectional end elevation of the winding drum and bobbin;

Fig. 3 shows diagrammatically in front elevation a plurality of winding devices driven by a common shaft; while

Fig. 4 is a diagrammatic end elevation of the apparatus shown in Fig. 3.

Referring to Fig. 1, a winding drum 6 is mounted on a driving shaft 7 and comprises an external cylinder 8 to which are riveted hubs 9, 10 extending inwardly from the ends of the cylinder. The hubs 9, 10 are bored to a larger diameter than the diameter of the driving shaft 7 to receive bushes 11, 12 respectively, which may be pressed into, or otherwise secured in, the bores. The bushes 11, 12 ride freely on reduced portions 13, 14, respectively, of sleeves 15, 16 surrounding the shaft 7 and fixed thereto by set screws 17, which pierce raised collar-portions 18 formed in the sleeves at their outer extremities. The bush 11 abuts at its left-hand extremity against an annular surface 19 formed in an enlarged portion of the sleeve 15, and is maintained in contact therewith by a compression spring 20, which is housed adjacent the bush 12 in an annular slot 21 formed in an enlarged portion of the sleeve 16, the force in the spring being transmitted to the bush 12 through a flanged sleeve 22, the annular surface of which abuts against the end of the bush.

The body of the drum is thus urged laterally towards the sleeve 15, the surfaces 19, 22 driving the drum by frictional contact with the bushes 11 and 12 respectively. The pressure between the opposing surfaces can simply be adjusted in accordance with the degree of friction desired by moving the sleeve 16 towards or away from the drum, thereby increasing or decreasing the force in the spring 20.

The sleeves 15, 16 are provided with grease conduits 23, 24, respectively, leading from grease-gun nipples 25, screwed into the collar-portions 18, to the outer extremities of the bushes 11, 12, from which the conduits extend as shallow grooves in the surface of the reduced portions 13, 14, almost to the inner extremities of the bushes. Grease contained within the conduits thus serves to lubricate the bushes and so provides for free movement of the drum. Felt washers or pads 28, encircling the outer extremities of the bushes 11, 12 prevent leakage of grease to the outside of the hubs 9, 10. The sleeves 15, 16 are formed with disc-like portions 30, to fit into the ends of the drum. The disc portions serve to keep the drum compact and easy to clean, their edges being shaped so as just to clear the hubs 9, 10, while preventing waste or dirt from entering the interior of the drum.

In order that the drum may have a secure grip upon the package being wound, the drum is covered by fabric 32, or other material, having a high coefficient of friction. This covering reduces any tendency for overrunning or "rubbing" between the drum and the package, thereby preventing fraying and like damaging of the thread, and in addition, serves to distribute the drive evenly along the length of the package. The driving shaft 7 is rotated in such a manner that the drum tends to rotate at a rate somewhat in excess of the normal rate of delivery of the thread to be wound, so that slack thread caused, for example, by piecing-up a new thread, or in starting-up a winding process, is taken up by the package immediately.

Winding takes place at substantially uniform tension throughout the building of the package, whatever the rate of winding, and the danger of strain or breakage of the thread experienced in ordinary drum winding apparatus is considerably lessened. The pressure at the friction surfaces 19, 22 is adjusted in accordance with the amount of tension which may safely be imparted to the thread being wound. Thus, for example, in winding a fragile thread the frictional force will be less than required when winding a stronger thread. The application of a lubricant to the frictional surfaces allows of free movement of the drum 6 about the driving shaft 7 and also enables a much more sensitive control over the frictional drive from the shaft to the drum to be achieved. It is understood, of course, that only a slight driving effort is necessary to rotate the drum and the package, the effort being less than the maximum tension permissible in the thread. Therefore, on cessation or interruption of the thread feed the pull of the thread acting at the periphery of the drum 6 overcomes the driving torque applied frictionally to the bushes 11, 12. In order to make the winding device capable of use with very delicate threads, the drums 6 and hubs 9, 10 may be made of light metal such as aluminium, the inserted bushes 11, 12 being made of suitable bearing metal such as phosphor bronze. In this way, the inertia of the drum can be considerably reduced.

The apparatus according to the invention is suitable for application in a large number of textile operations. For example, it may be used for winding artificial threads continuously with their production, e. g. continuously with the production of cellulose acetate threads or filaments produced by the dry or evaporative method. It is also of great advantage where a plurality of ends of thread are delivered from a common source and are required to be wound on separate packages, and is particularly suitable for use where a plurality of threads of an artificial material have been subjected to mass-treatment, and are wound separately. Thus, as shown in Fig. 4, a plurality of threads 33 proceeding from a common source, (for example, from the stretching apparatus for artificial threads described in U. S. applications S. Nos. 602,844 filed 2nd April, 1932, and 656,514 filed 11th February, 1933, not shown) are led through guides 34 on a fixed rod 35 and proceed upwardly in turn to bobbins 36 contacting with a line of drums 6. Traverse guides 37 fixed to a rod 38 reciprocated by cam or crank means (not shown), engage the threads between the guides 34 and the bobbins 36 and traverse the threads to and fro along the bobbins, the rate of take-up of the thread being uniform along the length of the package. The bobbins 36 are mounted on spindles 39 (see Fig. 1), the extremities of which ride in slots 40 formed in supporting heads 41, the slots being of such depths as to permit of the spindles 39 rising within them as the bobbins fill with thread. When packages of conical formation are being wound the spindles 39 are substituted by conically-formed package-support holders having extremities adapted to fit into the slots 40.

In addition to being suitable for the winding of artificial threads treated in the manner described in U. S. applications S. Nos. 602,844 and 656,514, the apparatus according to the invention is suitable for winding artificial or other threads which have undergone such treatments as sizing, saponification or dyeing treatments in warp form and afterwards require to be wound on to bobbins. The drum-winding apparatus above described enables each thread (or two or more threads together) to be rapidly applied to the bobbin, and any slack formed in transferring a thread from the continually delivered warp sheet is quickly taken up, after which winding proceeds at exactly the rate of delivery of the thread, so that the thread is evenly wound without danger of strain.

What we claim and desire to secure by Letters Patent is:—

1. In a yarn-winding apparatus in which a package is driven by surface contact with a rotatable drum, a rotatable shaft, a freely rotatable drum, having annular surfaces, journalled on said shaft, sleeves fixed on said shaft at each end of said drum, annular surfaces on said sleeves, means making frictional contact between the annular surfaces of said drum and the annular surfaces on said sleeves adapted to transmit from said shaft to said drum a torque which is limited to permit the peripheral speed of the drum to adjust itself to the rate at which yarn is delivered to the package, and means including a passageway in said sleeves for lubricating the journal surfaces and the frictional surfaces so as to allow of free rotation between said journal surfaces and at the same time to permit of sensitive adjustment of the torque applied from said shaft through said friction means to said drum.

2. In a yarn-winding apparatus in which a package is driven by surface contact with a rotatable drum, a rotatable shaft, a freely rotatable drum, having annular surfaces, journalled on said shaft, sleeves fixed on said shaft at each end of said drum, annular surfaces on said sleeves, means making frictional contact between the annular surfaces of said drum and the annular surfaces on said sleeves adapted to transmit from said shaft to said drum a torque which is limited to permit the peripheral speed of the drum to adjust itself to the rate at which yarn is delivered to the package, and means including a passageway extending substantially the full length of said sleeves for lubricating the journal surfaces and the frictional surfaces so as to allow of free rotation between said journal surfaces and at the same time to permit of sensitive adjustment of the torque applied from said shaft through said friction means to said drum.

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