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2,527,663

WOUND PACKAGE TREATING APPARATUS

Filed Oct. 4, 1944

3 Sheets-Sheet 1

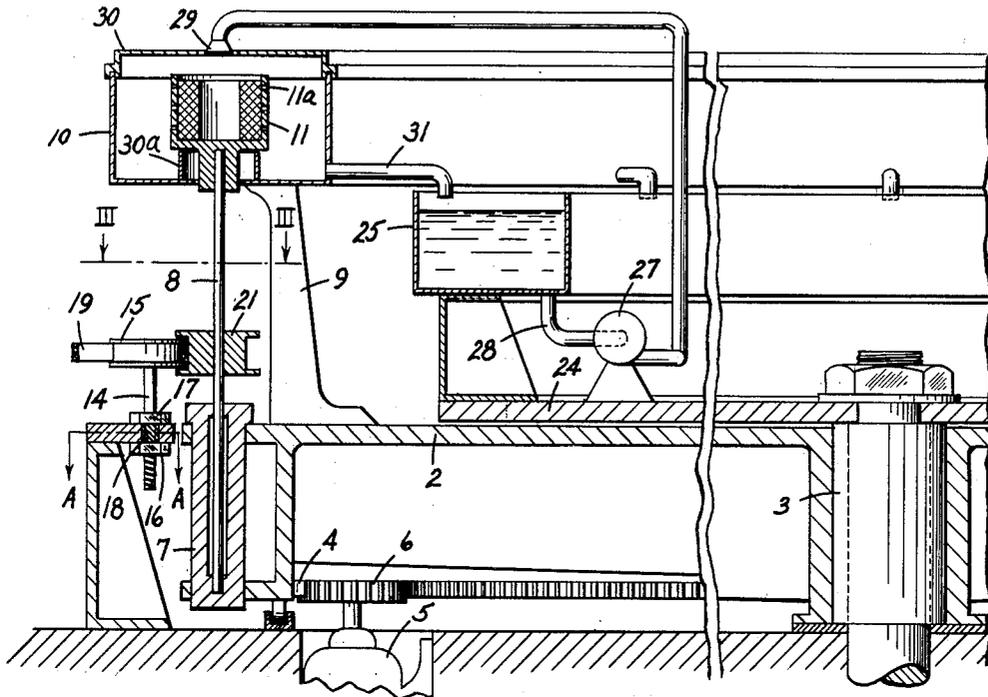


FIG. 1

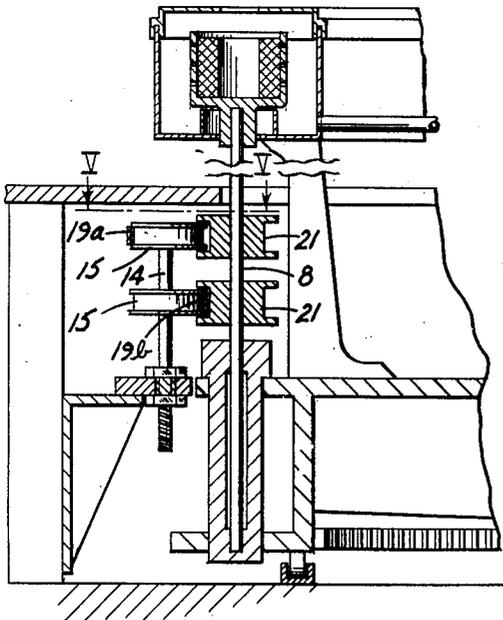


FIG. 4

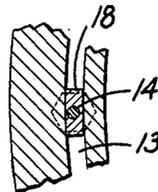


FIG. 3a

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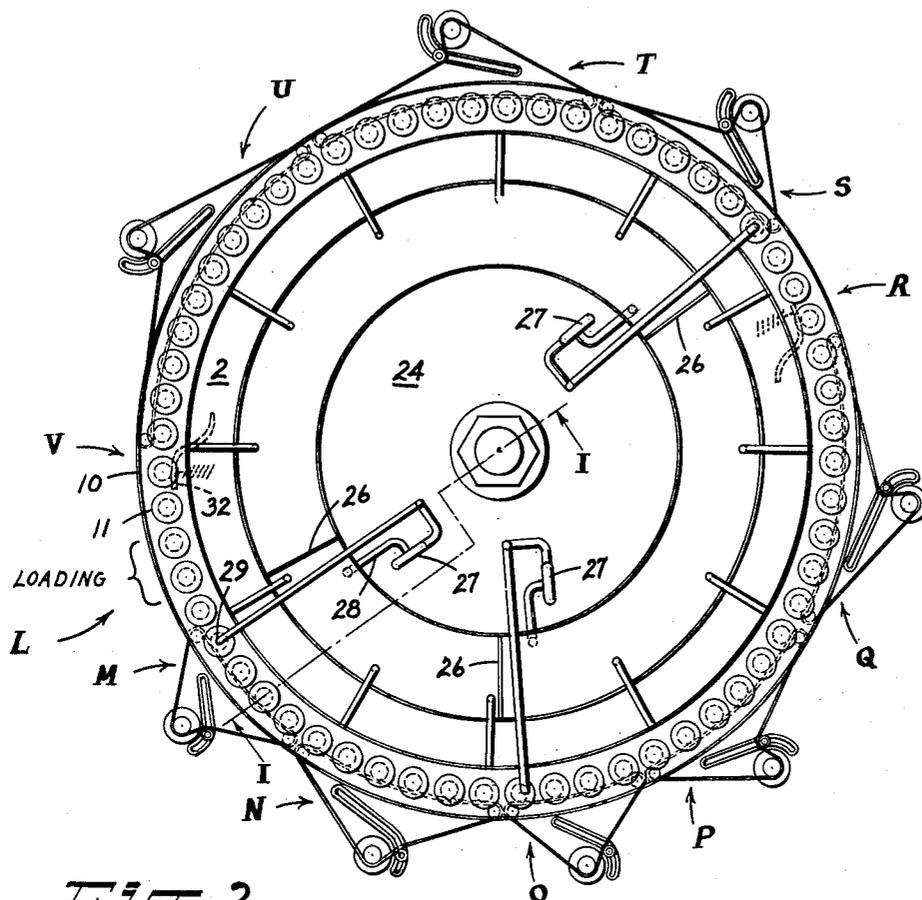


FIG. 2

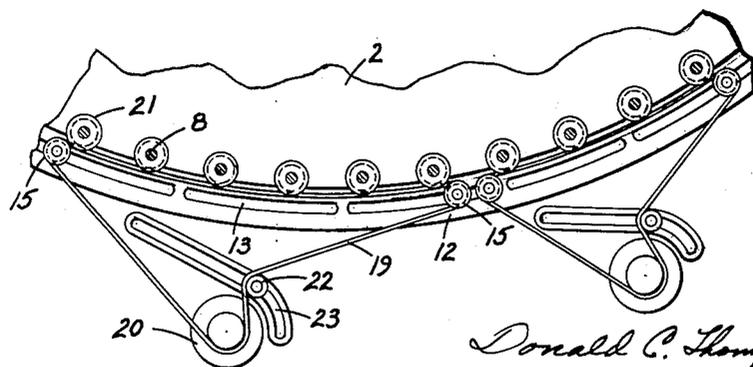


FIG. 3

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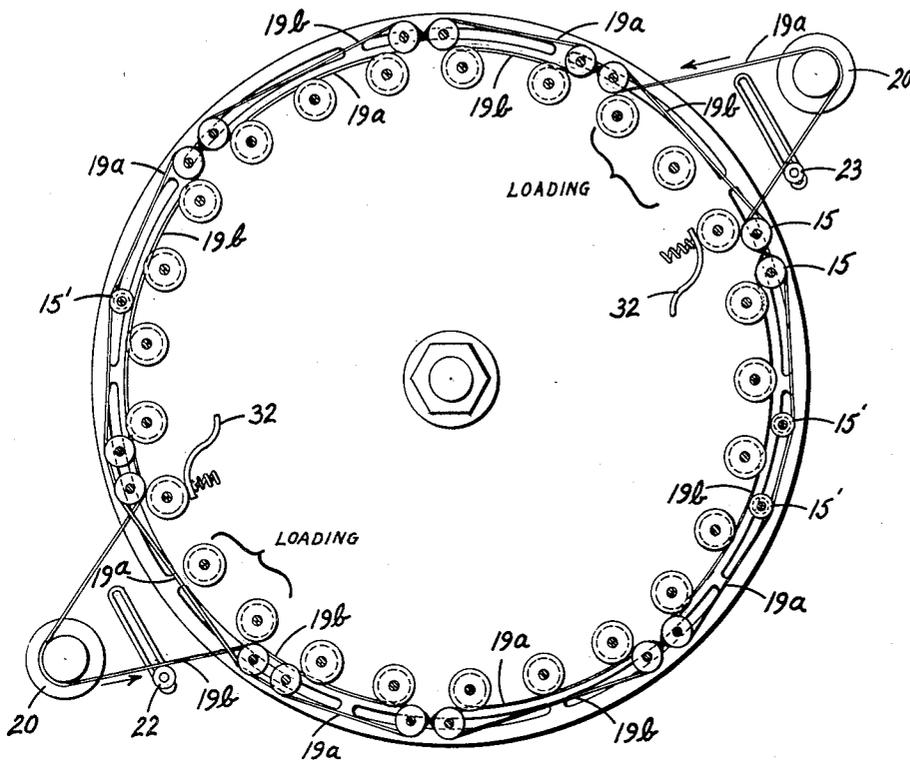


FIG. 5

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UNITED STATES PATENT OFFICE

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WOUND PACKAGE TREATING APPARATUS

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11 Claims. (Cl. 68—150)

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This invention relates to apparatus for applying and removing liquids and fluids with respect to wound packages of filamentary material, and particularly annular "cakes" of rayon or other filamentary material.

It is an object of the present invention to provide an apparatus for progressively moving the cakes or other packages in individual holders through a closed cyclical path, treating the wound packages along selected portions of the cycle, providing other portions of the cycle for loading the apparatus, unloading the apparatus, and if desired, for additional treatments or stages of liquid removal, and providing for selectively rotating the individual packages about their own axes at predetermined speeds along the various portions of the cycle. It is also an object of the invention to provide a form of apparatus which is flexible, in that it may be adjusted to provide any desired length of each treating or liquid removal stage as well as of other stations, such as loading, unloading and the like. Further objects and advantages of the invention will be apparent from the drawing and the descriptions thereof hereinafter.

In the drawing illustrative of the invention—

Figure 1 is an elevation partially broken away, of one embodiment of the invention, sectioned on line I—I of Figure 2;

Figure 2 is a plan view of the invention, with the bucket cover removed;

Figure 3 is a sectional view of a portion of the device taken on line III—III of Figure 1, and having a somewhat enlarged scale as compared to Figure 2;

Figure 3a is a section on line A—A of Figure 1;

Figure 4 is a cross-sectional elevation analogous to that of Figure 1 but showing a modification; and

Figure 5 is a section of the modification taken on line V—V of Figure 4.

As shown in Figures 1 to 3, the machine comprises means for carrying a plurality of spindles and buckets through a cyclical path. This carrying means may be of many forms and constructions, but it is shown as a platform 2 of a turntable rotatably mounted on the pedestal bearing 3 and provided with an internal annular gear rack 4 driven (either continuously or intermittently, but preferably continuously) by a motor 5 through a pinion 6 and is provided with a plurality of bearings 7 which rotatably support the spindles 8. The turntable also has suitable supporting brackets 9 for supporting the annular receptacle 10 within which the centrifugal buckets 11 carried and driven by the spindles 8 are received. The walls of the buckets 11 are preferably perforated as shown at 11a.

An annular platform 12 surrounds the turntable and has a plurality of arcuate slots 13

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which are adapted to receive the stub shafts 14 carrying the belt pulleys 15. The shaft has a lower threaded portion extending through and adapted to be clamped at any selected position of the slot 13 in support 12 between locking nuts 16 and 17 respectively. Locking nut 16 may be provided with a lug 18 adapted to slidably fit within the slot 13. A belt 19 driven by the motor 20 passes about a pair of the pulleys 15, which are so arranged with respect to the sheaves 21 for rotating the spindles 8 that the belt drives such sheaves as extend between the pair of pulleys 15. An idler pulley 22 is adjustably mounted in a slot 23 in a suitable portion of the framework, and serves as a tensioning pulley to take up slack in the belt. It will be seen that one or both of the pulleys 15 along a given portion of the turntable may be moved to increase or decrease the number of spindles 8 it drives in any one instance. Thus, a plurality of belts and driving motors may be positioned along selected portions of the turntable, each motor may be driven at a selected speed to impart a predetermined speed of rotation to the centrifugal buckets along its portion of the cycle and the time period during which the bucket is rotated at that speed may be varied merely by adjusting the pulleys 15 and the tension pulley 22 associated with the particular belt and motor along that portion of the cycle.

The apparatus may be provided with liquid treating devices. Thus, as shown in Figures 1 to 3, a stationary support 24 carries an annular liquid receptacle 25. This liquid receptacle may be divided into sections by the partitions 26, as many being provided as desired. A pump 27 may be connected with each section of the liquid container 25 by a conduit 28, and may discharge through a spray head 29 arranged above the receptacle 10 for the centrifugal buckets 11, so that it is in alignment with the path of the center lines of the buckets. The receptacle 10 may be provided with a cover 30 (removed from Figure 2), and this cover may be provided with an annular slit to permit entrance of the spray liquid from the head or heads 29. A guard 30a in the form of a concentric sleeve is disposed about the openings in the receptacle 10 through which the spindles 8 extend and prevents liquids from draining down such spindles. Discharge conduits 31 are secured at intervals to the bottom of the receptacle 10 and discharge into the liquid container or reservoir 25. The outlet of the conduit 31 should not extend downwardly into the receptacle 25 to such a distance as to interfere with the partition 26. At intervals of the cycle a spring-pressed brake strap 32 may be provided to reduce the speed or to completely stop the spinning buckets as they pass these positions. Such brake strap preferably is arranged to oper-

ate against the pulleys 21 as they pass the braking station.

An illustrative cycle is shown in Figure 2 where L refers to a loading station where the centrifugal buckets do not rotate about their axes. M indicates the beginning of one liquid treatment cycle, the spray head 20 preferably being arranged a sufficient distance from the first pulley 15 along that stage to permit the buckets to be brought substantially to full speed by the time it passes under the spray. N refers to a draining stage in which the speed of the buckets may be increased by providing a motor along that portion of the cycle of somewhat higher speed. The letter O refers to the beginning of a second liquid treatment stage. P refers to a drainage stage which may be operated at higher speed than the second liquid treatment. Q refers to a whizzing stage in which the buckets are rotated at high speed by a motor having appropriate speed to throw off the liquid by centrifugal force. R refers to a braking stage where the speed of the buckets is reduced in order to reduce the wear and tear on the belt in the next stage S where a third liquid is applied. T is a drainage stage following the liquid treatment stage S and may be operated at higher speed, and U is a whizzing stage operated at still higher speed than the drainage stage T. V refers to a braking stage to substantially stop the buckets completely, so that they may be loaded at stage L without risk of harm to the operators. As stated previously, each stage of treatment may be operated at its appropriate speed and the appropriate time interval may be provided by adjusting the pulleys 15 and tension pulley 22 of the respective belt driving portion of the cycle. While a cycle involving treatment with three liquids is shown, it is to be understood that this is purely illustrative and that the system may be used entirely without treatment with liquids or with as many liquid treatment stages or gaseous treatment stages, if desired, as may be appropriate for the particular condition of the wound package of material under treatment.

Figures 4 and 5 illustrate a modification in which each bucket-driving spindle 8 is provided with a plurality of sheaves 21 and each of the stub shafts 14 carries a corresponding number of driving pulleys 15 each engaging its respective driving belt 19a or 19b which functions in cooperation with the motors 20 and tension pulleys 22. In this embodiment, each belt goes entirely around the turntable system and is selectively applied to the bucket sheaves along one or more portions about the turntable.

Figure 5 illustrates one sort of cycle to which this embodiment is particularly adapted, in which there are provided two loading stations. Immediately after each loading station, the centrifugal buckets are under the influence of the higher speed belt 19b which is herein shown as the lower belt. The purpose of this high speed operation is to remove any moisture which is present in the cakes at the time they are inserted into the machine. Following the preliminary whizzing under the influence of belt 19b, the centrifugal buckets are subjected to the influence of the slower speed belt 19a during which time a liquid may be applied to the cakes or other packages. Following this portion of the cycle, the spinning buckets again come under the influence of the high speed belt 19b and thereby the liquid applied is removed by whizzing. Following this stage, the spinning buckets may be braked just before they approach the loading station. In this embodi-

ment intermediate pulleys 15' may be provided to prevent the outer course of the belt from coming into contact with the inner courses where extensive arcuate portions of the cycle are involved.

The invention is applicable to wound packages of filamentary material of any kind whatsoever, such as rayon obtained from viscose, cuprammonium cellulose, or cellulose acetate, also to protein fibers such as nylon, casein, and to resinous fibers such as polyvinyl chloride, copolymers of vinyl chloride and vinyl acetate, vinylidene chloride and so on. It is applicable as well to wound packages of fibers of natural origin, such as cotton, silk, wool and the like. The apparatus of the invention may be used for applying any fluid treatment whatsoever. Thus it may be used for after-treating rayon cakes obtained from the viscose process, and in this connection it may be used for applying all of the liquid treatment, such as washing, desulfurizing, bleaching and the like, or it may be used for only particular treatments, such as applying finishes, such as oils, fats, soaps or waxes to the wound packages. The reservoir for storing the liquid being applied to the wound packages may be associated with a recovery system for fortifying, purifying or replenishing that solution.

While the invention has been illustrated by specific embodiments, it is to be understood that these are merely illustrative and that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. In apparatus for treating filamentary material, a plurality of centrifugal buckets adapted to receive filamentary materials, spindles for driving said buckets, means for moving said spindles and buckets in a predetermined cyclical path, a plurality of independently operated belts, each of the belts being arranged separately to drive the spindles and buckets as they pass preselected portions of the cyclical path, means arranged along a preselected portion of the path for directing a fluid into the spinning buckets as they pass, a fluid collecting receptacle arranged about the buckets and mounted for movement therewith, a stationary liquid reservoir, means for conducting the liquid from the collecting receptacle to the reservoir, and pump means connected to the reservoir and to the means for directing the fluid into the spinning buckets.

2. In apparatus for treating filamentary material, a turntable, a plurality of spindles carried thereon adjacent its periphery, centrifugal buckets carried by the spindles and adapted to receive the filamentary material, means for rotating the turntable to move the spindles and buckets in a cyclical path, stationary supporting means arranged around the turntable, a plurality of belt means and driving means therefor carried by the stationary supporting means, each of the belts being arranged separately to drive the spindles as they pass preselected portions of the cyclical path, means for driving each belt at a different speed, an annular liquid collecting receptacle carried by the turntable and housing the buckets, a stationary annular reservoir disposed internally with respect to the path of the buckets, means for conducting liquid from the receptacle to the reservoir, and means for forcing liquid from the reservoir into the buckets at a predetermined position of the cyclical path.

3. In an apparatus for treating filamentary material, a plurality of centrifugal buckets adapted to receive filamentary material, spindles

for driving the buckets, means for moving the spindles and buckets in a predetermined cyclical path, means arranged along a preselected portion of the path for directing a liquid into the spinning buckets as they pass, means disposed along the path for rotating the spindles about their own axes at one speed as they pass the liquid-applying means, and a second means beyond the first for rotating the spindles about their own axes at a higher speed.

4. In apparatus for treating filamentary material, a plurality of centrifugal buckets adapted to receive filamentary materials, spindles for driving said buckets, means for moving said spindles and buckets in a predetermined cyclical path, means arranged along a preselected portion of the path for directing a fluid into the spinning buckets as they pass, means disposed along the path for rotating the spindles about their own axes at one speed as they pass the fluid-applying means, a second means beyond the first for rotating the spindles about their own axes at a higher speed, a fluid-collecting receptacle arranged about the buckets and mounted for movement therewith, a stationary liquid reservoir, means for conducting the liquid from the collecting receptacle to the reservoir, and pump means connected to the reservoir and to the means for directing the fluid into the spinning buckets.

5. In apparatus for treating filamentary material, a turntable, a plurality of spindles carried thereon adjacent its periphery, centrifugal buckets carried by the spindles and adapted to receive the filamentary material, means for rotating the turntable to move the spindles and buckets in a cyclical path, stationary supporting means arranged around the turntable, a plurality of driving means for rotating the spindles about their own axes carried by the stationary supporting means, each of the driving means being arranged separately to drive the spindles as they pass preselected portions of the cyclical path, means for operating each driving means at a different speed, an annular liquid-collecting receptacle carried by the turntable and housing the buckets, a stationary annular reservoir disposed internally with respect to the path of the buckets, means for conducting liquid from the receptacle to the reservoir, and means for forcing liquid from the reservoir into the buckets at a predetermined position of the cyclical path.

6. In apparatus for treating filamentary material comprising a plurality of centrifugal buckets adapted to receive filamentary material, spindles for driving said buckets and means for moving said spindles and buckets in a predetermined cyclical path, the combination of sheaves on the spindles, at least two belts each extending entirely around the spindles as a group and each belt engaging only a portion of the periphery of each sheave of the group of sheaves driven by that belt, and means for selectively disposing portions of the belts independently of each other in operative driving position immediately adjacent the path for engaging the sheaves.

7. Apparatus in accordance with claim 6 comprising a friction element disposed adjacent a portion of the path for engaging the sheaves after they pass the belt to reduce their speed of rotation.

8. Apparatus as in claim 6 comprising independent driving means for each of the belts.

9. In apparatus for treating filamentary material comprising a plurality of centrifugal buckets

adapted to receive filamentary material, spindles for driving the buckets, means for moving the spindles and buckets in a predetermined cyclical path, the combination of sheaves on the spindles, a plurality of belts disposed adjacent the path, each belt being arranged to engage the sheaves separately as they pass preselected portions of the path to effect rotation of the spindles, independent means for driving each of the belts comprising means for driving at least one belt at a low speed and means for driving at least one other belt at a speed higher than that of the low speed belt, and fluid-applying means arranged along one of the portions of the path adjacent which one of the belts drives the sheaves at low speed.

10. In apparatus for treating filamentary material comprising a plurality of centrifugal buckets adapted to receive filamentary material, spindles for driving the buckets, means for moving the spindles and buckets in a predetermined cyclical path, the combination of sheaves on the spindles, a plurality of belts disposed adjacent the path, each belt being arranged to engage the sheaves separately as they pass preselected portions of the path to effect rotation of the spindles, independent means for driving each of the belts comprising means for driving at least one belt at a low speed and means for driving at least one other belt at a speed higher than that of the low speed belt, and fluid-applying means arranged along one of the portions of the path adjacent which one of the belts drives the sheaves at low speed, the higher speed belt being arranged along the path for engaging the sheaves beyond the position of the fluid-applying means.

11. In apparatus for treating filamentary material comprising a plurality of centrifugal buckets adapted to receive filamentary material, spindles for driving the buckets, means for moving the spindles and buckets in a predetermined cyclical path, the combination of sheaves on the spindles, a plurality of belts disposed adjacent the path, each belt being arranged to engage the sheaves separately as they pass preselected portions of the path to effect rotation of the spindles, independent means for driving each of the belts, means arranged along a preselected portion of the path for directing a fluid into the buckets as they pass, a liquid-collecting receptacle arranged about the buckets and mounted for movement therewith, a stationary liquid reservoir containing partitions extending at right angles to the path corresponding to extremities of the preselected portions of the path, a plurality of means for conducting the liquid from the receptacle to the reservoir, and a plurality of pumping means each connected to a separate reservoir section included between the partitions and to the means for directing the fluid into the buckets.

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