C. W. HUBBARD.

APPARATUS FOR WINDING AND TWISTING YARN.

APPLICATION FILED MAR. 31, 1920.

1,433,723. Patented Oct. 31, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

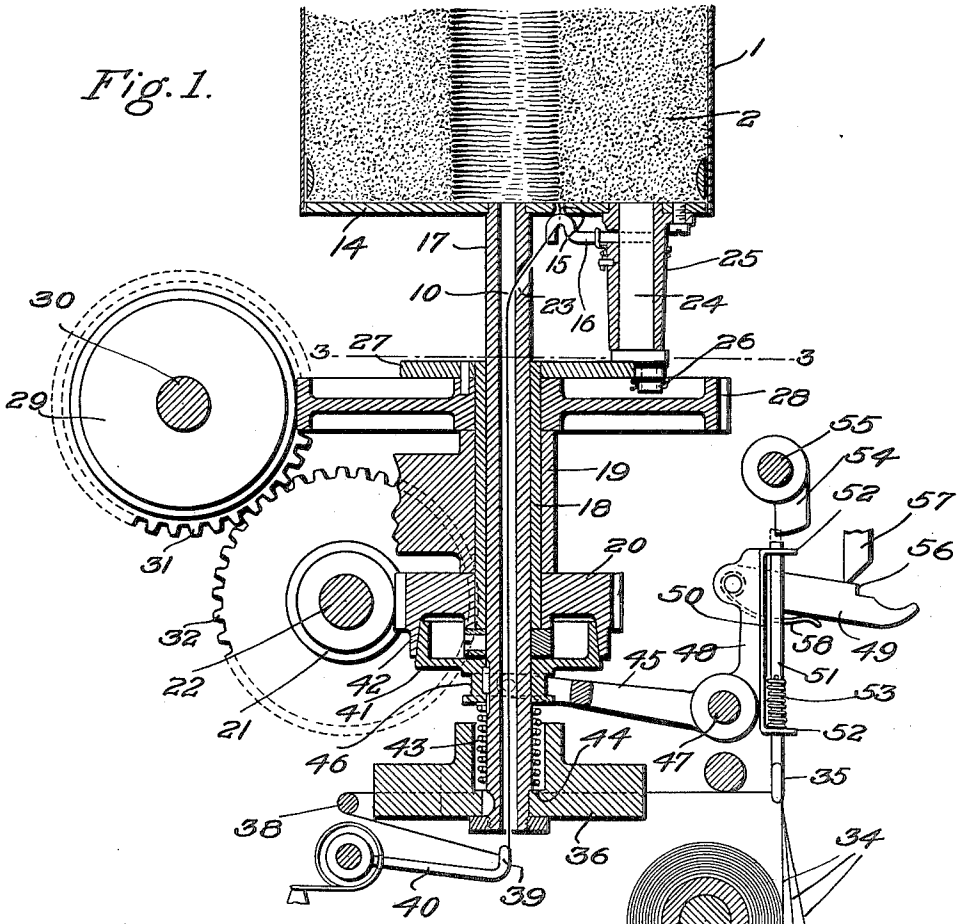
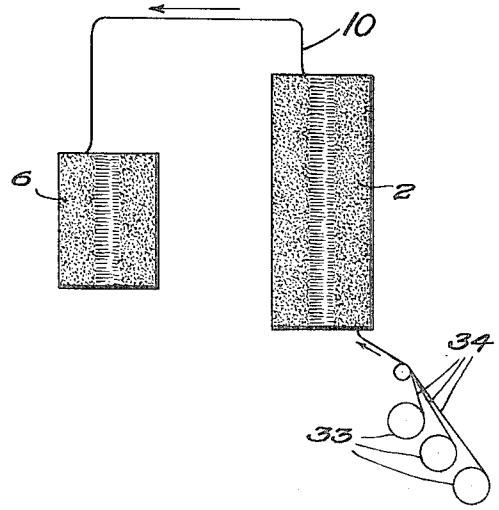
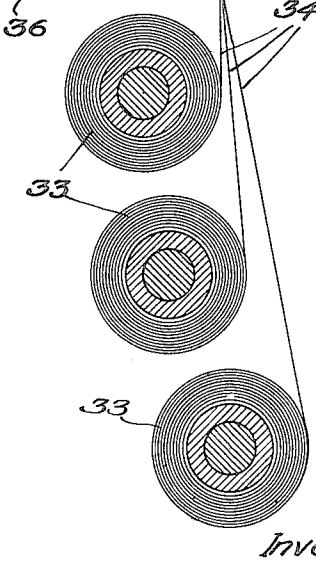


Fig. 2.





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2 SHEETS—SHEET 2.

Fig. 3.

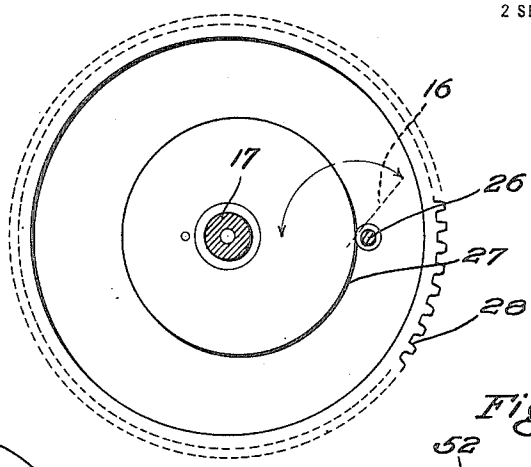


Fig. 4.

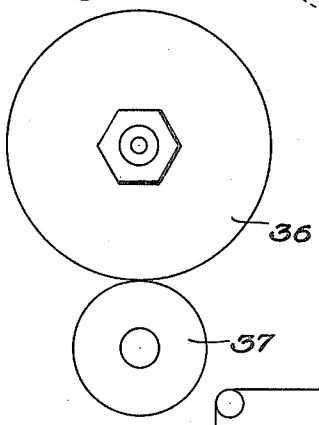
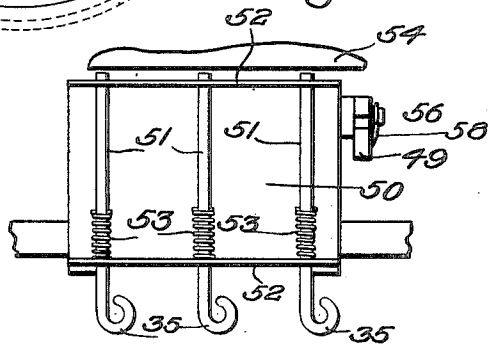


Fig. 5.



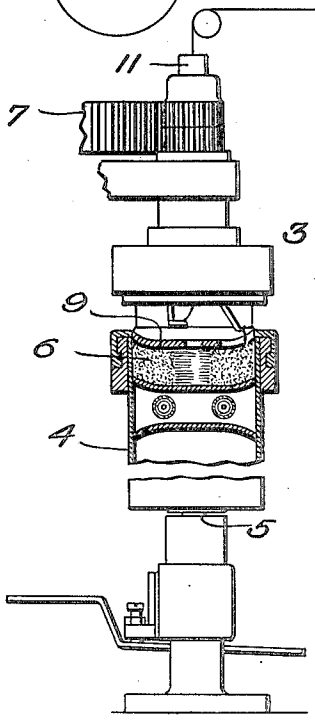
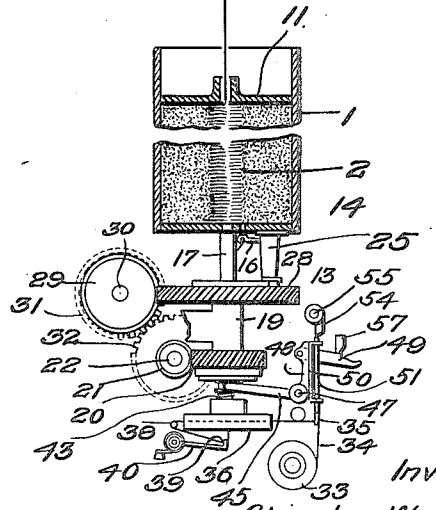


Fig. 6.



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UNITED STATES PATENT OFFICE

CHARLES W. HUBBARD, OF WESTON, MASSACHUSETTS.

APPARATUS FOR WINDING AND TWISTING YARN.

Application filed March 31, 1920. Serial No. 370,259.

To all whom it may concern:

Be it known that I, CHARLES W. HUBBARD, a citizen of the United States, residing at Weston, county of Middlesex, State of Massachusetts, have invented an Improvement in Apparatus for Winding and Twisting Yarn, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to an improved apparatus adapted to wind yarn into a yarn mass and simultaneously to withdraw said yarn from said yarn mass and subjected it to a further operation, such as twisting, polishing, beaming, etc.

My improved apparatus is so constructed that these two operations are performed on the yarn simultaneously and without any necessity of handling the yarn between the operations.

My improved machine comprehends a yarn receiver, means to wind yarn into said yarn receiver, and a separate independent machine for withdrawing the yarn from the yarn receiver and subjecting it to some further treatment, such as twisting, polishing, etc. The yarn receiver will preferably be one of considerable capacity and capable of holding a relatively large yarn mass, and the winder, twister or other machines are so arranged that they may operate simultaneously, the winder functioning to wind yarn into the yarn receiver, and the twister or other machine functioning to withdraw the yarn directly from the yarn receiver and twist it or otherwise treat it. With this arrangement the winder operates automatically to perform the function of creeling the twister or other machine, and said twister or other machine operates automatically to perform the function of doffing the winder.

This combination has special advantage in those cases where the two machines operate most advantageously at different speeds. In the case of a twisting machine and winding machine, for instance, it is possible to wind the yarn into the yarn receiver at a greater speed than it is possible to withdraw the yarn and properly twist it. With my arrangement, therefore, it is practical to run both the winding machine and the twisting machine during the day time and to run only the twister during the night time. While both machines are operating simultaneously, the winder will gradually accumulate a slowly-growing thread mass in the yarn receiver because of its greater speed of operation, and this mass of yarn will be such at the end of the day as to provide a sufficient supply of wound yarn for the twister during its continuous operation through the night. The yarn receiver, therefore, acts as a reservoir to receive yarn from the winder and from which yarn may be delivered to the twister or other machine.

In order to give an understanding of my invention, I have illustrated in the drawing a selected embodiment thereof which will now be described, after which the novel features will be pointed out in the appended claims.

Fig. 1 is a vertical sectional view showing part of the yarn receiver and a form of winding apparatus adapted to wind yarn into the receiver;

Fig. 2 is a diagrammatic view showing the operation of the machine;

Fig. 3 is a section on the line 3—3, Fig. 1;

Fig. 4 is a bottom plan view of the feed rolls for the winder;

Fig. 5 is a front view of the drop wires;

Fig. 6 is a view showing the complete apparatus including the yarn receiver, the winding unit and the twisting or other unit.

The principle on which the apparatus operates is illustrated diagrammatically in Fig. 2. In said figure, 2 indicates a wound yarn mass which has been built up by winding yarn onto one end thereof (the bottom end in Fig. 2), and 10 indicates the yarn end as being withdrawn from the top end of the yarn mass 2 and as subjected to some further treatment, such, for instance, as being twisted and then wound into another yarn mass 6. The winding of the yarn onto the bottom of the yarn mass 2 and the withdrawing of the yarn 10 from the top of the yarn mass for further treatment may be carried on either simultaneously or separately in point of time. The yarn mass 2 forms a reserve supply for the twisting or other subsequent treatment, so that in case the winding of the yarn onto the yarn mass 2 should cease, the twisting operation may still continue by drawing on this reserve supply.

In Fig. 6 I have illustrated an apparatus comprising an apparatus by which this oper-

ation may be carried out. This apparatus comprises a yarn receiver 1 which may be in the form of a tubular chamber open at each end and adapted to contain the wound yarn mass 2. A winding apparatus is situated at the lower end of the yarn receiver 1 and operates to wind yarn into said end of the yarn receiver and thus to build up the yarn mass 2 therein. The yarn 10 is withdrawn from the other end of the yarn receiver and delivered to the twister or other machine which gives the yarn subsequent treatment.

While my invention contemplates the use of any machine, such as a twister, polisher, or beaming machine for giving the yarn subsequent treatment after withdrawing it from the yarn receiver 1, I have for illustrative purposes shown a twister which is indicated generally at 3 and which may have any suitable construction, such, for instance, as that shown in my Patents No. 1,232,686, dated July 10, 1917, No. 1,258,411, dated March 5, 1918, or No. 1,258,412, dated March 5, 1918.

Such twister comprises a yarn container 4 rotatably mounted on a step bearing 5 and having within it a winding head, not shown in the drawings, for winding a yarn mass 6 therein in layers extending transversely to the vertical axis of rotation.

This twister is operated from a driving gear 7 and the yarn 10 which is withdrawn from the yarn mass 2 is led into the upper end of a hollow shaft 11 through which it is delivered to the winding plate 9, all as described more at length in my above-mentioned patents. Inasmuch as this twister 3 may have the construction and operation described in any one of the above-mentioned patents, I have not deemed it necessary to further describe or illustrate it herein.

In the apparatus shown in Fig. 6, the twister 3 is arranged to take the yarn 10 from the top of the yarn container 1. The yarn mass 2 which is received in said yarn container is preferably wound therein after the manner described in my above-mentioned patents, that is, in layers which extend transversely to the axis of the yarn container and arranged so that the yarn may be withdrawn from either end of the yarn mass in an axial direction. A presser-plate 11 will preferably be employed in the yarn container 1, which plate rests on the yarn mass 2 and holds the top layers thereof in proper position. Said presser plate is provided with a central yarn-delivery opening through which the yarn 10 is withdrawn.

The winder is indicated generally at 13 and is constructed to wind the yarn mass into the open lower end of the yarn container 1 which is stationarily mounted. This winder comprises a winding plate 14 situated in the open bottom of the yarn container 1 and provided with a curved radial yarn-guiding slot 15 through which the yarn 10 is delivered, and a vibrating arm 16 movable longitudinally of said slot for the purpose of traversing the yarn toward and from the center and thereby laying it in loops which form the transverse layers.

The weight of the yarn mass 2 is sustained on the winding plate 14, but the yarn mass is held from rotation in the stationary yarn container so that the rotation of the winding plate serves to lay the yarn in loops or layers on the underside of the growing yarn mass 2. As the yarn mass is built up by this winding operation, it will be gradually forced upwardly through said yarn container 1, and the friction of said yarn mass with the walls of said container furnish sufficient pressure between the yarn mass and winding plate to cause the yarn to be compactly laid.

The winding plate 14 and traversing arm 16 may be operated by any suitable means. I have herein shown said winding plate as mounted on a hollow shaft 17 which extends through and is rotatably mounted in a sleeve 18 that in turn is journaled in suitable bearings 19. The hollow shaft 17 is driven from a gear 20 that is loosely mounted on the sleeve 18, and which in turn is driven from a gear 21 on a shaft 22. The yarn to be wound extends through the hollow shaft 17 and through a delivery opening 23 in the side of the shaft to the traversing arm 16, and thence to the yarn-guiding slot 15. The traversing arm 16 is carried by a rock shaft 24 which is journaled in bearings 25 secured to the winding plate 14. Said rock shaft has at its lower end a crank arm 26 carrying a roll that engages a traversing cam 27 that is rigid with a gear 28 also loosely mounted on the sleeve 18. The gear 28 meshes with and is driven by a gear 29 on a shaft 30. The shafts 22 and 30 are connected by suitable gearing 31, 32 so that they operate in timed relation, and power may be applied to either shaft 22 or 30 as desired. When power is thus applied to the machine, the hollow shaft 17 with its winding plate 14 will be driven through the gears 20, 21, and the traversing cam 27 will be rotated through the gears 28, 29. The gears which drive the shaft 17 and traversing cam 27 can be so proportioned that one revolution of the cam will correspond with any desired number of revolutions of winding plate, thus controlling the open or close lay of the loops.

This winder may wind a single end or may wind two or more ends simultaneously, in which case when the two or more ends are withdrawn from the yarn container 1 and carried to the twister, they will be twisted together to form a single strand. In Fig. 1, I have shown three different ends taken from three bobbins 33, said ends being all led together through the hollow shaft

17. These separate ends which are indicated at 34 are taken through three separate guide-eyes 35 and are then passed between a pair of feed rolls 36, 37 which positively withdraw them from the bobbins 33 and lead them to the winder. The feed roll 36 is shown as fast to the lower end of the hollow shaft 17 and is, therefore, driven by said shaft. The feed roll 37 is merely an idler. The combined ends after passing the feed rolls are taken over a guide-rod 38 and thence to a guide-eye 39 carried by a spring-actuated arm 40 which operates to produce the required tension on the arm. From the guide-eye 39, the combined ends pass to the hollow shaft 17.

I have herein shown a stop motion adapted to stop the winder whenever any one of the ends 34 break. This is done by providing a clutch for connecting the gear 20 to the shaft 17, and by further providing means to open or disengage the clutch if any one of the ends 34 break. The clutch for thus connecting the gear 20 to the shaft 17 comprises a clutch member 41 which is splined to the shaft 17 and which co-operates with a clutch member 42 formed on the gear 20. The movable clutch member 41 is acted on by a spring 43 which tends normally to throw the clutch into engagement, said spring being confined between said clutch member 41 and a shoulder 44 formed on the feed roll 36. The clutch is shifted into open position by means of a clutch-actuating lever 45 having a forked end which engages a groove 46 in the clutch member 41. Said clutch-actuating lever 45 is mounted on a shaft 47 and is provided with an upwardly-directed arm 48 to which is pivotally connected a locking member 49. The upright arm 48 has a holder 50 secured thereto in which are mounted three drop wires 51. Each drop wire has a guide-eye 35 at its lower end. The holder 51 has the two flanges 52 in which the drop wires are slidably mounted, and each drop wire is acted on by a spring 53 which tends to raise it into the dotted line position. The strength of the springs 53 is such that the tension on the yarn ends 34 will normally hold the drop wires in their lowered position shown. If, however, any yarn end breaks, the spring 53 will raise the drop wire into the dotted line position. Operating above the drop wires is a rocking member 54 mounted on a shaft 55. This rocking member is arranged to vibrate back and forth across the upper ends of the drop wires, and so long as the drop wires are in their lowered position the vibrator is free to have its vibrating movement without engaging the drop wires, but if any drop wire is raised into the dotted line position, then it will be engaged by the vibrator 54 during the movement of the latter to the left, and the vibrator acting against the raised drop wire will swing the lever 48, 45 thereby to open the clutch. The locking member 49 serves to lock the clutch open. This is accomplished by providing said locking member with a locking shoulder 56 which is adapted to engage a stop or latch 57 when the clutch is in open position. The locking arm 49 is acted on by a spring 58 which yieldingly holds it against the stop 56 so that when it has been moved to the left sufficiently to carry the shoulder 56 beyond the stop, the spring will raise the arm and carry the shoulder into position to engage the stop thereby preventing the clutch spring from operating.

In the operation of the device the winder, while in operation, functions to wind yarn into the yarn receiver 1 thereby building up a wound yarn mass 2 therein, and the twister or other machine 3 operates to withdraw yarn from the other end of the yarn receiver and to twist it or otherwise treat it. A continuous yarn is, therefore, fed into one end of the yarn receiver and wound therein in a yarn mass, and withdrawn from the other end of the yarn mass through the other end of the yarn receiver for the purpose of twisting or otherwise treating said yarn.

The operations of winding the yarn onto the lower end of the yarn mass 2 and withdrawing the yarn from the upper end thereof, and twisting or otherwise treating it, may be carried on simultaneously or separately in point of time. If these operations are carried on simultaneously, then the yarn mass will be gradually built up at its lower end and may be forced up through the yarn receiver as it is built, and will then be delivered from the upper end to the twister which twists it and builds it into the yarn mass 6.

Under some circumstances it may be desirable or necessary to stop the winding of the yarn onto the yarn mass 2 and this can be done without stopping the operation of the twister or other machine 3, for the yarn in the yarn mass 2 will furnish a reserve supply which can be drawn on for operating the twister or other machine 3. Similarly, it will be possible to operate the winding machine without operating the twister if such action were desirable.

Since the yarn mass 2 in the yarn container 1 constitutes at the same time the product of the winder and the supply for the twister, and since the winder delivers its product to the yarn receiver and the twister or other machine takes its supply directly from the yarn receiver, there is no necessity of any manual handling of the yarn between the winding and twisting operations, and thus these two operations can be carried on uninterruptedly. Moreover, since the twisting operation is necessarily slower than the winding operation, the winder will build

up a yarn mass 2 faster than the twister will use said yarn mass, and the yarn container 1 thus constitutes a reservoir to receive such surplus yarn mass, so that the twisting operation can be continued after the winder ceases to operate. The winder will operate normally to build up a yarn mass 2 faster than the twister will function to withdraw the yarn from the yarn mass and twist it, and, therefore, it is possible to operate the winder during the ordinary hours of a working day and to operate the twister for a longer period and even through the night, as the winder will during the usual working hours of the day build up a sufficient reserve supply of yarn in the yarn mass 2 to keep the twister running throughout the night.

While I have illustrated a selected embodiment of my invention I do not wish to be limited to the constructional features shown.

I claim:

1. In a machine of the class described, the combination with a tubular yarn receiver, of means to deliver yarn thereto at one end and to lay said yarn in loops extending transversely to the axis of the yarn receiver thereby to build up a yarn mass, and means for simultaneously withdrawing yarn from said yarn mass at the other end of the yarn receiver, and subjecting it to further treatment.

2. In a machine of the class described, the combination with a tubular yarn receiver, of means for introducing yarn into said yarn receiver at one end and winding said yarn into a cylindrical yarn packing which fits the walls of the receiver, and means for simultaneously withdrawing yarn from the other end of the yarn receiver and subjecting it to further treatment.

3. In a machine of the class described, the combination with a stationary tubular yarn receiver, of means for winding a yarn mass into said yarn receiver at one end in layers extending transversely to the axis of the yarn receiver thereby to build up a cylindrical yarn mass which fits the yarn receiver, and means for simultaneously withdrawing yarn from said yarn mass at the other end of the yarn receiver and twisting the yarn.

4. In a machine of the class described, the combination with a stationary yarn receiver, of means for winding yarn into the lower end of said yarn receiver and building up a yarn mass therein, and means for withdrawing simultaneously the wound yarn from the top of the yarn receiver and twisting or otherwise treating such withdrawn yarn.

5. In a machine of the class described, the combination with a tubular yarn receiver to contain a wound yarn mass, of means to wind yarn onto said mass at one end thereof, whereby the yarn mass is forced through the yarn receiver as it is wound, and means for simultaneously withdrawing yarn from the other end of said yarn mass and twisting it or otherwise treating it.

6. In a machine of the class described, the combination with a tubular yarn receiver, of means for winding simultaneously a plurality of yarn ends into one end of said yarn receiver in loops extending transversely to the axis of the yarn receiver thereby building up a wound yarn mass therein, and means for simultaneously withdrawing said ends from the other end of the yarn receiver and twisting them.

7. In a machine of the class described, the combination with a yarn receiver, of means for winding simultaneously a plurality of yarn ends into said yarn receiver thereby building up a wound yarn mass therein, means for simultaneously withdrawing said ends from the yarn mass and twisting them, and means to stop the operation of the winder when any end breaks without stopping the twisting means.

8. In a machine of the class described, the combination with a yarn receiver, of means to deliver yarn therein at one end and to wind said yarn into a yarn package in said receiver, a yarn-twisting device taking yarn from said yarn package at the other end of the yarn receiver and twisting the yarn and winding it into a yarn mass, said yarn-twisting device withdrawing the yarn from the yarn receiver at a less speed than the yarn is delivered thereto whereby the yarn package constitutes a means for supplying yarn to the twisting apparatus when the winding apparatus is idle.

In testimony whereof, I have signed my name to this specification.

CHARLES W. HUBBARD.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,433,723, granted October 31, 1922, upon the application of Charles W. Hubbard, of Weston, Massachusetts, for an improvement in "Apparatus for Winding and Twisting Yarn," an error appears in the printed specification requiring correction as follows: Page 4, line 37, claim 2, for the word "packing" read *package;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of December, A. D., 1922.

[SEAL.] KARL FENNING,

Acting Commissioner of Patents.