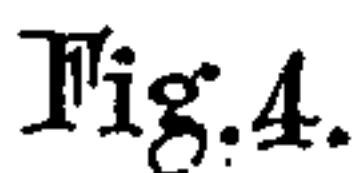
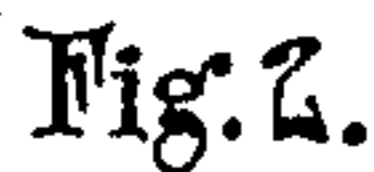
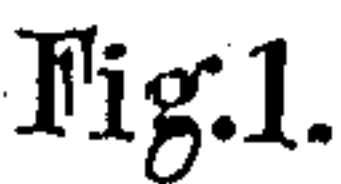


970,203.

Patented Sept. 13, 1910.



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# UNITED STATES PATENT OFFICE.

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## SPINNING-MACHINE.

970,203.

Specification of Letters Patent. Patented Sept. 13, 1910.

Original application filed August 3, 1905, Serial No. 272,560. Divided and this application filed April 10, 1909. Serial No. 489,126.

*To all whom it may concern:*

Be it known that I, SEBASTIAN ZIANI DE FERRANTI, a subject of the King of Great Britain and Ireland, and residing at Grindleford, near Sheffield, in the county of Derby, England, have invented certain new and useful Improvements in Spinning-Machines, of which the following is a specification.

10 The present invention relates to machines for spinning, twisting or doubling fibrous material, (such operations being hereinafter referred to generically as "twisting") and particularly to machines of the type in  
15 which it is necessary to moisten the material before receiving twist.

20 A common plan for effecting the moistening of the material is to pass it through water contained in suitable troughs, guide rods or the like devices being provided to cause the material to dip below the surface of the water and emerge therefrom.

25 The primary object of the present invention is to provide a simpler device for the purpose so as to dispense with the guide rods or the like at present in use.

30 For this purpose the invention consists broadly in a rotatable twisting device provided with an annulus of water maintained by the action of centrifugal force.

The invention further consists in means also dependent on the action of centrifugal force for passing the fibrous material under treatment, through such an annulus.

35 Other features of the invention will be hereinafter described and particularly pointed out in the claims.

Referring to the accompanying drawings which illustrate the invention, Figure 1  
40 shows a form in which the water annulus is formed in a part of the cover of a twisting chamber, while Fig. 2 shows a modified form in which the annulus is maintained in the hollow spindle of the twisting chamber.  
45 Fig. 3 shows to an enlarged scale a detail of the helical twist retarder, Fig. 4 showing a modified form of twist-retarder.

The drawings are to a certain extent of a diagrammatic nature, only those details of

a complete twisting machine being shown 50 which are necessary for understanding the present invention.

In carrying the invention into effect according to one form as shown in Fig. 1, I dispose a wound mass of material forming 55 the bobbin *a*, on the spindle *b*, and inclose this by a cup or chamber *c*, provided with a lid which at first narrows to a constriction *d*, then widens forming a parallel part *e*, and again narrows to the opening *f*. The cup 60 or chamber *c*, may run with air lubrication in a sleeve *h*, this sleeve being carried in turn by a fixed part of the framework of the machine *i*, with the interposition of rubber rings *j* to assist in securing smooth running 65 at very high speeds. Further, I may drive the cup by a turbine *k*, fixed to the same, and driven by any suitable working fluid. The top of the cup I prefer to provide with a series of slits *m*, and a circumferential 70 bead *n*, the lid being provided with a corresponding bead. With this construction when running at high speeds, the tongues of metal near the rim of the cup between the slits *m*, tend to move outward under the in- 75 fluence of centrifugal force, and so force the two beads together, and hold the lid in place.

I provide suitable means for receiving the material after it has been transferred from the holding means, such as the cup *c*, such 80 receiving means in the form shown, being supplied by the roller *o*, carried in the bracket *q*, having a slot *r* in which the axle of the roller can move up and down. This roller *o*, on which the material is wound, 85 rests on a lower roller *s*, the rotation of which acts to transfer material from the cup. The roller *s*, carries at one end a bevel wheel *t*, to which motion is transmitted from the spindle *b*, by means of a vertical spin- 90 dle *u*, having a bevel wheel *v*, at the top gearing with the corresponding wheel *t*, while at the lower end the vertical shaft engages with the spindle *b*, by way of the gear wheels *w* and *x*. In order to introduce 95 water into the widened part *e*, of the cover to form an annulus or neck of water in a manner to be described, I provide a hollow



arm  $z$ , pivoted at the point 2, and supplied with water through the pipe 3. This arm  $z$  on the one hand carries a roller 4, acting as a guide for the thread on its way to the roller  $o$ , and on the other hand is provided at its free end with an eye or aperture 5, through which the thread passes in the one direction, and water in the other.

I preferably arrange a two-way cock at the pivot of the arm  $z$ , as shown, so that on turning the arm  $z$ , up into a vertical position, the water for moistening the thread may be shut off.

In order to prevent the twist imparted to the material by the rotation of the cup, running back into the same I provide some form of twist-retarder. In the example shown in Fig. 1, a bar 6, passes from side to side of the widened part  $e$  of the cover and carries a helix of wire 7, shown diagrammatically in Fig. 1, and in detail in Fig. 3. The shape of this helix may be best realized by imagining a close coil to be wound on a circular rod, for instance, and then to be drawn out longitudinally to such an extent that when looked at endwise there is no central passage through which the thread may pass in a straight line, or in other words, the helix is of a very quick pitch and of a diameter which is comparable with the size of wire forming it. The thread 8, when wound around this helix, as shown in Fig. 3, is itself forced to take a helical course, the helix thus acting as a retarder to prevent the material twisting until it has passed through the water neck. Instead of the twist-retarder shown in Fig. 1 however, I might use the modification shown in Fig. 4, in which spring clips 9 fastened to opposite sides of the walls of the water neck, cross each other and are provided at their free ends with jaws 10, between which the thread passes. By weighting these clips with suitable weights 11, below the point of crossing, centrifugal force will act to press the jaws 10 together, and so impart a certain amount of frictional resistance to the passage of the thread between them. The course of the thread 8 from the bobbin  $a$  to the roller  $o$ , is by way of the lid, against the inner surface of which it is pressed by the action of centrifugal force, thence by way of the twist-retarder 7, through the eye 5, over the guide 4 to the receiving roller  $o$ . The water passing through the hollow arm  $z$ , drops down by way of the retarder 7 assisted to a certain extent by the thread 8, and rapidly collects in the widened part  $e$ , of the cover so forming an annulus or neck as indicated diagrammatically in Fig. 1, held in place by the action of centrifugal force. As is well known the free surface of such an annulus is paraboloidal in form. Centrifugal force is thus utilized not only to maintain the

water neck but also to throw the yarn outward into this water neck, thus moistening it before any twist is put into the yarn. It will be understood that the rotation of the cup with its bobbin, cover, and retarder, as one body by means of the turbine  $k$ , puts the twist into the material, while at the same time by means of the roller  $s$ , the material is transferred from the cup to the receiving roller  $o$ , the twist thus being progressively imparted to the material during such transfer.

According to the modified form of the invention shown in Fig. 2, a cup  $c$ , is provided with a hollow spindle having a narrow part 12 at the top, a wider part 13 near its lower end and a second restriction 14 below so as again to form a suitable chamber, in which an annulus of water may form as before. In this modification the hollow spindle may very conveniently be formed integrally with the cup itself. The mounting of the cup and the gearing between the same and the receiving roller  $o$ , are as in the first form of the invention described, but in this case since the retarder 7 is disposed at the lower end of the cup, the water is arranged simply to drop into the actual spindle somewhat out of the center, so that it may pass through the upper constriction 12 and strike the inner wall of the spindle before reaching the lower smaller constriction 14. Owing to the high speeds of rotation an annulus is rapidly formed as before, its paraboloidal shape being indicated diagrammatically in Fig. 2. In this modification the thread drawn from the bobbin passes into the hollow spindle at its upper end through the water neck where it is moistened, to the retarder, and so to the receiving roller  $o$ .

It will be obvious that the mounting and driving of the spindle or the gearing between the same and the rollers  $s$  and  $o$ , are not of the essence of the invention, and may be replaced by suitable equivalents.

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

1. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing a certain quantity of liquid maintained in juxtaposition to inner superficial areas thereof by forces dependent on the rotation of said element; means for rotating the said element; and means for causing relative movement between said liquid and said material progressively to wet the same.

2. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing liquid symmetrically wetting certain parts thereof, said symmetrical wetting being in part dependent on forces due to the rotation of said ele-



ment; means for rotating the said element; and means for causing relative movement between said liquid and said material progressively to wet the same.

3. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing an annulus of liquid maintained therein by forces dependent on the rotation of said element; means for rotating the said element; and means for causing relative movement between said liquid and said material progressively to wet the same.

4. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing liquid, means for rotating the said element, and means in part dependent on forces due to the rotation of said element for progressively contacting said liquid and said material to wet the same.

5. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing a certain quantity of liquid, means for rotating the said element, and means for causing relative movement between said liquid and said material, forces due to the rotation of said element acting both to maintain liquid in juxtaposition to inner superficial areas of said element, and also to assist in the progressive contacting of said material and said liquid.

6. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing a certain quantity of liquid maintained in juxtaposition to inner superficial areas thereof by forces dependent on the rotation of said element; means for rotating the said element, and means for moving said material in relation to said liquid progressively to wet said material.

7. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing liquid symmetrically wetting certain parts thereof, means for rotating the said element, said symmetrical wetting being in part dependent on forces due to the rotation of said element; and means for moving said material in relation to said liquid progressively to wet said material.

8. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing an annulus of liquid maintained therein by forces dependent on the rotation of said element; means for rotating the said element, and means for moving said material in relation to said liquid progressively to wet said material.

9. In apparatus for the treatment of fibrous material, the combination of a rotatable element containing liquid, means for rotating the said element, and means in part

dependent on forces due to the rotation of said element for progressively bringing said material into contact with said liquid to wet said material.

10. In apparatus for the treatment of fibrous material, the combination of a rotatable element carrying a mass of said material and containing a certain quantity of liquid out of contact with said material, together with means for causing relative movement between said liquid and said material progressively to wet the same, and means for rotating the said element.

11. In apparatus for the treatment of fibrous material, the combination of a rotatable element carrying a mass of said material and containing a certain quantity of liquid out of contact with said material; together with means for progressively bringing said material into contact with said liquid to wet said material and means for rotating the said element.

12. In apparatus for the treatment of fibrous material, the combination of a hollow rotatable element having an enlarged portion intervening between two comparatively narrow portions, said enlarged portion having a certain quantity of liquid maintained therein by forces dependent on the rotation of said element together with means for progressively contacting said material with said liquid, and means for rotating the said element.

13. In apparatus for the treatment of fibrous material, the combination of a rotatable twisting element; means for rotating the said element, thread-transfer means serving the same and means for introducing liquid into said element, said means including a pivotally mounted duct.

14. In apparatus for the treatment of fibrous material, the combination of a rotatable twisting element, means for rotating the said element, and means for introducing liquid thereinto, said means including a duct provided with an aperture and thread-transfer means acting to pass said material through said aperture.

15. In apparatus for the treatment of fibrous material, a rotatable twisting element, means for rotating the said element, thread-transfer means serving the same; means for introducing liquid into said element, said means including a movable duct together with means operated by said duct for controlling flow of fluid to said twisting element.

16. In apparatus for the treatment of fibrous material, a rotatable twisting element containing a certain quantity of liquid maintained in juxtaposition with inner superficial areas thereof by forces dependent on the rotation of said element; means for rotating the said element, and thread-transfer



means geared to said element and acting progressively to bring said material into contact with said liquid.

17. In apparatus for the treatment of  
5 fibrous material, a rotatable element containing a certain quantity of liquid, the free surface of which is substantially paraboloidal in form together with means for causing relative movement between said liquid and

said material progressively to wet the same 10 and means for rotating the said element.

In witness whereof I affix my signature in presence of two witnesses.

SEBASTIAN ZIANI DE FERRANTI.

Witnesses:

ALBERT HALL,

WILLIAM DUNCAN DAVIDSON.