

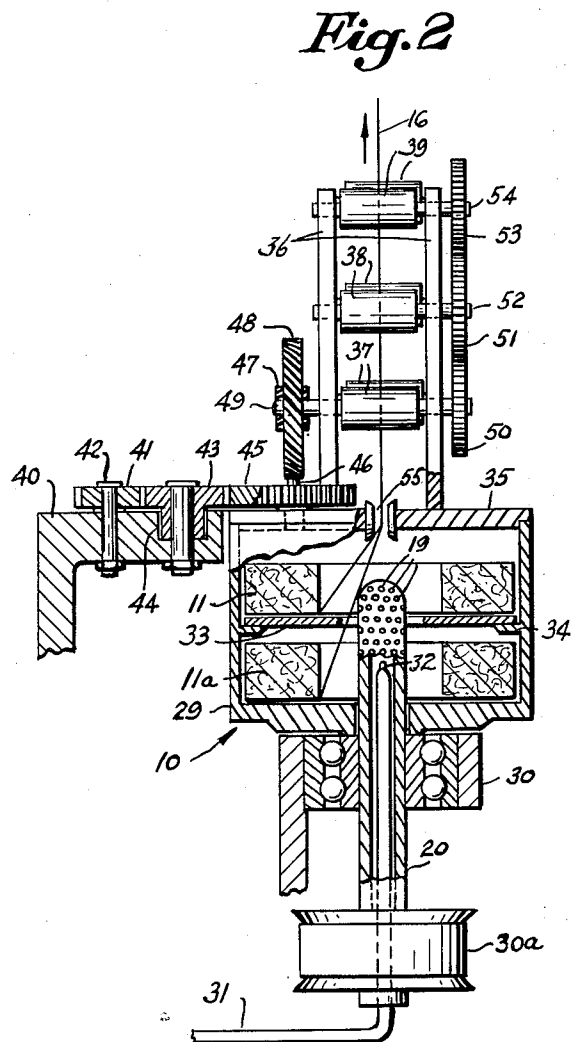
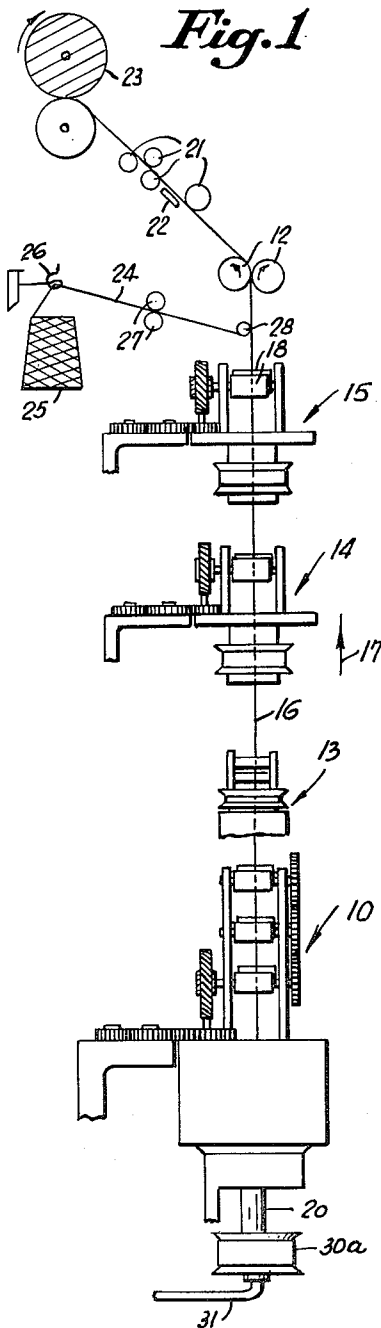
March 9, 1954

W. ROWEDDER
SPINNING SYSTEM

2,671,304

Filed Sept. 13, 1949

2 Sheets-Sheet 1



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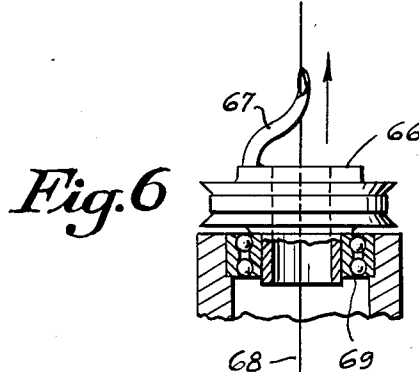
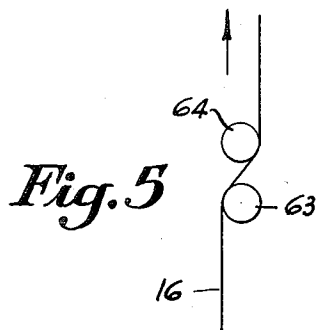
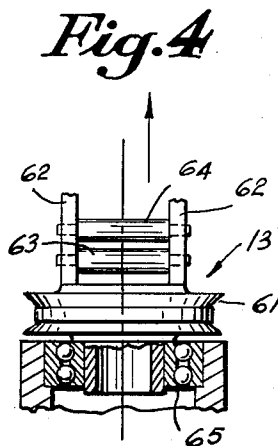
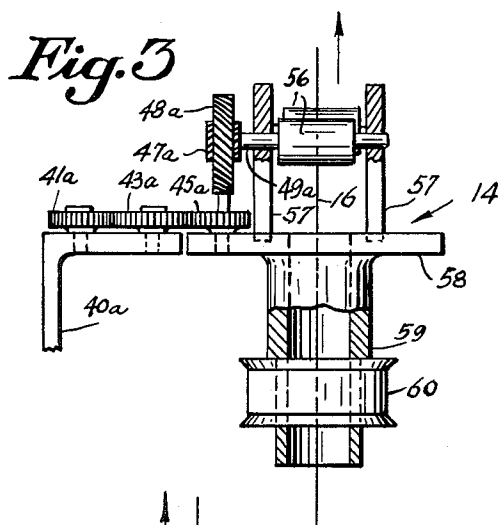
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2 Sheets-Sheet 2



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SPINNING SYSTEM

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10 Claims. (Cl. 57—51)

1

This invention relates to improvements in the art of spinning and refers more particularly to a method and system for spinning rovings and fibers, of all types.

An object of the present invention is to eliminate excessive breakage of fibers, and loss in resistivity which takes place in prior art methods.

Another object is the provision of a spinning system which will increase to a substantial extent the elasticity and strengthen the yarn.

A further object is to provide means for untwisting a yarn and of drafting and twisting the roving thus obtained into a yarn in a single operation to provide a smoother and finer thread.

Other objects of the present invention will become apparent in the course of the following specification.

The objects of the present invention may be realized through the provision of a spinning method wherein the twist and the draft are controlled simultaneously by subdividing the drafting. The fibers can be lubricated and heated in the course of the operation, and additional amounts of the fibrous mass may be added to the fibers being treated in the course of the process. The method is particularly suitable for wool, although cotton jute, specialty fibers and synthetic fibers can be conveniently utilized.

The installation for carrying out this method consists essentially of a twisting and drawing unit (which may be of the type described in my co-pending patent application, Serial No. 740,758, filed April 11, 1947, now Patent No. 2,481,538), a unit consisting of take-up rolls for the finished yarn and a number of twister and drawing heads interposed between these devices and used for varying the drafting and the twisting at the will of the operator.

The invention will appear more clearly from the following detailed description, when taken in connection with accompanying drawings showing, by way of example, a preferred embodiment of the invention idea.

In the drawings:

Figure 1 is a diagram illustrating a spinning system constructed in accordance with the principles of the present invention.

Figure 2 illustrates in section a twisting and drawing unit for the roving.

Figure 3 shows in section an intermediate drafting and twister head.

Figure 4 illustrates a twister head, partly in section and partly in front elevation.

Figure 5 is a diagram indicating the path of the material through the twister head shown in Figure 4.

2

Figure 6 illustrates diagrammatically and in section a twister head of a somewhat different type.

The spinning system shown in Figure 1 of the drawings includes a twisting and drawing unit 10 which may also serve as a container for the fibrous material 11.

Take-up rolls 12 receive the finished yarn. In accordance with the present invention a twister-head 13 and combination twister and drawing heads 14 and 15 are located between the units 10 and 12 within the path of the fibrous material 16, which travels in the direction of the arrow 17.

It is apparent that the total amount of the drawing out of the fibrous material and the number of turns per given length of the material are determined between the units 10 and 12. The intermediate twister-heads 13, 14 and 15 have the function of preventing the twisting process from being further advanced than the drafting operation. It should be noted in this connection that once the fibers are twisted they cannot be easily drawn out, and then excessive breakage and loss in elasticity results.

An important feature of the present invention is the provision of means for retarding the twisting operation until the drafting has progressed to a more favorable degree, such means consisting essentially of the twister-head 13.

By way of example only, let it be assumed that a fibrous mass is to be drafted or drawn out by 80 per cent and a twist of ten turns per inch is desired. Then the distribution of the draft can be equally divided between the unit 10 and the unit 14, and also between the unit 14 and the unit 15. Only enough twist is inserted therebetween to hold the fibers together. The twisting process is then completed between the units 15 and 12 without using any draft. On the contrary, the delivery rolls 18 of the unit 15 should revolve at a slightly higher surface speed than the take-up rolls 12, since this will greatly increase the elasticity and strength of the yarn.

It is apparent that this procedure, in accordance with the present invention, improves the spinning process to a considerable extent.

By way of another example only, it is possible to draft the fibrous mass 16 between the units 10 and 14 and to give it, say, a left-hand twist. Between the units 14 and 15 this twist can be fully or partially taken out, the twisting being completed between the units 15 and 12. The untwisting of a yarn and of drafting and twisting the roving thus obtained again into a yarn much thinner than the original yarn or double

3

spinning can be accomplished on conventional spinning equipment, particularly on the spinning mule (self-acting mule). However, on such machines a separate operation is involved whereas in subject device double spinning is accomplished in one continuous operation by using a series of several combination twister and drawing heads. The twister and drawing heads permit drafting and twisting the fibrous material 16 into a yarn between any number of units, for example 10 and 14. A twist could be obtained by rotating both units at different speeds, or by stopping such rotation of unit 14, or by rotating the units in opposite directions. Drafting is achieved by increasing the angular velocity of rollers 56 over that of rollers 39.

The twist in the drawn out fibrous material may be removed again by the twister head 15 which follows the head 14 (Fig. 1). The process may be repeated as often as desired by interposing additional combination twister and drawing heads between units 10 and 12.

It is apparent that many combinations of drafting and twisting operations are made possible between points 10 and 12 by the use of intermediate combination twisting and drawing heads. The fundamental purpose always being to draft the fibrous mass while it is being held together by a sufficiency of twist, double spinning being merely one of the possibilities.

The roving or cake 11, from which the mass being spun 16 is drawn may be conveniently lubricated or otherwise chemically treated by any suitable means which may consist of perforations 19 provided in the shaft 20 used for revolving the roving 11.

The fibrous mass 16 may be heated by passing it over heated rollers 21 and/or a heated surface 22. In the example illustrated the heated members 21 and 22 are located beyond the take-up rolls 12, and are not far from the wound mass 23 of the finished yarn. These heating elements dry out the lubricants in the yarn, remove moisture and are most useful to set or fix the twist and/or to impart a smooth and ironed appearance to the fibers.

In accordance with another feature of the present invention, any suitable amount of fibrous material 24 may be introduced at any point of travel of the fibrous material 16. In the example illustrated the additional fibrous material 24 is withdrawn from a supply cone 25 and is passed through guide 26, as well as delivery rolls 27. Then the fibrous material 24 is guided over a guide rod 28 and is introduced into the yarn 16 being spun.

The twisting and drawing unit 10 is illustrated in detail in Figure 2. As already stated, it includes a main shaft 20 provided with perforations 19. The roving or fibrous material 11 is located within a container 29 which is firmly connected with the shaft 20 and is rotatable therewith. Bearings 30 enclose the shaft 20 and support the container 29. The shaft 20 is rotated from a pulley 30a by any suitable means, not shown in the drawings. The lubricant or any other suitable chemical for the fibrous material is supplied from a container, not shown in the drawings, through a pipe 31 which has a nozzle 32 located within the shaft 20 and close to the openings 19. Thus a lubricant ejected through the nozzle 32 will flow through the openings 19 and reach the fibrous material located in the container 29.

In accordance with the present invention, a number of separator plates 33 may be located

4

within the container 29 and held upon suitable projections 34, constituting a part of the container walls.

The separator plates 33 divide the fibrous material located within the container into sections 11a, etc. Thus, it is possible to load the container 29 with different cakes or different types of fibrous material, or to have fibrous material of different colors. Obviously, the plates 33 may be removed whenever a single material is to be used.

The container 29 carries a cover 35 which is firmly connected therewith and which carries supports 36 for roller pairs 37, 38, and 39. Obviously, the number of roller pairs may be varied, depending upon specific requirements.

A table 40 is located close to the container 29 and is fixed to a machine frame or floor. The table 40 carries a pinion 41 which is rotatably mounted upon an axle 42 carried by the table 40. Any suitable motor, not shown in the drawings, is used for driving the pinion 41. The pinion 41 meshes with a gear 43 which is rotatably mounted in a groove 44 formed in the table 40. The gear 43 thus revolves around the container cover 35. The gear 43 meshes with a gear 45 which is rotatably mounted upon a shaft 46 carried by the cover 35. The shaft 46 is integral with a worm 47 which meshes with a gear 48 mounted upon a shaft 49. The shaft 49 drives one of the rolls 37 while the second roll 37, which is in contact with the first roll, is driven by friction. A gear 50 is driven by the shaft 49 and meshes with a gear 51 upon the shaft 52 which is used to drive one of the rolls 38. A gear 53 meshes with a gear 51 and drives one of the rolls 39 by means of its shaft 54. The cover 35 is provided with a sheave or opening 55 for the thread or fibrous material 16, which is drawn from the roving 11 and/or 11a.

The operation of the device is apparent from the above description. The shaft 20 rotates the container 29 while the fibrous material within the container is lubricated through the openings 19. The fibrous material is fed by pairs of rollers 37 to the drafting rollers 38 and 39 which all operate at different surface speeds. These pairs of rolls are rotated by driving pinion 41 meshing with a gear 43 which meshes with a gear 45. The rotation of the gear 45 is transmitted by its shaft 46, the worm 47 and the gear 48 to a shaft 49 actuating the rollers 37. The shaft 52 of the rollers 38 is actuated by means of the intermeshing gears 50 and 51, while the shaft 54 of the rollers 39 is actuated by the intermeshing gears 51 and 53.

The intermediate drafting and twister head 14 (Fig. 3) includes rollers 56 which draw the fibrous material 16. The rollers 56 are carried by supports 57 mounted upon a flange 58. The flange 58 is integral with a hollow body 59 which is rotated by means of a pulley 60. Any suitable motor, not shown, may be used for rotating the pulley 60.

The device for rotating the rollers 56 may be similar to the one described in connection with the unit 10, and may consist of a driving gear 41a meshing with a gear 43a, which meshes with a gear 45a carried by the flange 58, while the elements 41a and 43a are supported by a table 40a. The gear 45a is connected with a worm 47a actuating a gear 48a, which is mounted on a shaft 49a driving the rollers 56. It is apparent that the drafting rolls 56 rotate not only about their axes, but also about a line coinciding with the thread 16. Thus, the drafting rolls 56 not

5

only control the amount of the material 16 passing between them, but also the twist in the material. Obviously, the angular velocity of the rollers 56 about the axes thereof may be quickly changed by varying the ratio of the gear 41a to the crown 43a.

The twister-head 14 can also be used in connection with conventional spinning machinery to replace or augment plain heads which, in themselves, only twist without controlling the draft.

Figure 4 shows a twister-head 13 which is capable of twisting the fibers without a control of the drafting thereof. The twister-head 13 is driven by any suitable means, not shown in the drawings, and includes a body 61, carrying supports 62 and spaced bars or rolls 63 and 64. The body 61 is supported by a suitable bearing 65.

As shown in Figure 5, the fibrous material 16 passes between the rolls 63 and 64, and is twisted by a rotation of these rolls about the material 16.

The twister-head 13, shown in Figure 4, can be conveniently replaced by the twister-head shown in Figure 6, which consists essentially of a rotatable body 66 carrying a finger 67 used to impart a twist to the fibers 68. The body 66 is supported by a bearing 69.

It is apparent that other twister-heads known in the art may be used in lieu of those illustrated. Furthermore, a system of twisting and drawing heads may be used in conjunction with any other fiber-drafting field to subdivide the field and to insert a twist for the purpose of holding the fibers together. This is of particular importance when so-called swimming fibers are present, which are the fibers which are shorter in the staple for which the conventional drafting systems are adjusted. While the longer fibers are controlled by the nip of the rolls, the shorter fibers float uncontrolled. The twist imparted by a system of twisting and drawing heads will overcome this floating.

It is apparent that the specific illustrations shown above have been given solely by way of illustration and not by way of limitation, and that the method and structures above-described are subject to wide variation and modification, without departing from the scope or intent of the present invention. All such variations and modifications are to be included within the scope of the present invention.

What is claimed is:

1. The spinning system which comprises a roving container, means rotating said container and the roving contained therein during the spinning, a roving-twisting and drawing unit withdrawing the roving from said container at a predetermined rate, a device receiving twisted and drawn thread, and at least one twister head interposed between said unit and said device.

2. The spinning system which comprises a roving container, means rotating said container and the roving contained therein during the spinning, a roving-twisting and drawing unit withdrawing the roving from said container at a predetermined rate, a device receiving twisted and drawn thread, and at least one drafting and twisting element controlling the amount of the draft and interposed between said unit and said device.

3. A spinning system having a roving-twisting and drawing unit, a device receiving twisted thread, and at least one drafting and twisting element interposed between said unit and said

6

device, wherein said roving-twisting and drawing unit comprises a driving shaft, a fibre container axially aligned and connected to said driving shaft, means connected with said shaft for rotating the same, a fixed table adjacent said container, a gear drive rotatably mounted upon said table, a cover upon said fibre container, a plurality of pairs of delivery rollers upon said cover, means connected with said cover for passing a strand from said fibre container through said cover and said pairs of delivery rollers, and a gear drive actuating said pairs of delivery rollers and actuated by the first-mentioned gear drive.

4. A spinning system having a roving-twisting and drawing unit, a device receiving twisted thread, and at least one drafting and twisting element interposed between said unit and said device, wherein said roving-twisting and drawing unit comprises a driving shaft, a fibre container axially aligned and connected to said driving shaft, means connected with said shaft for rotating the same, a fixed table adjacent said container, a gear drive rotatably mounted upon said table, a cover upon said fibre container, at least one pair of delivery rollers upon said cover, means connected with said cover for passing a strand from said fibre container through said cover and said delivery rollers, a gear drive actuating said pairs of delivery rollers and actuated by the first-mentioned gear drive, and means lubricating the fibres within said container.

5. A spinning system having a roving-twisting and drawing unit, a device receiving twisted thread, and at least one drafting and twisting element interposed between said unit and said device, wherein said roving-twisting and drawing unit comprises a driving shaft, a fibre container axially aligned and connected to said driving shaft, means connected with said shaft for rotating the same, a fixed table adjacent said container, a gear drive rotatably mounted upon said table, a cover upon said fibre container, at least one pair of delivery rollers upon said cover, means connected with said cover for passing a strand from said fibre container through said cover and said delivery rollers, a gear drive actuating said pairs of delivery rollers and actuated by the first-mentioned gear drive, and removable separator plates located within said container for separating the fibres therein into a plurality of sections, strands from all sections passing through said cover and said delivery rollers.

6. A spinning system having a roving-twisted and drawing unit, a device receiving twisted thread, and at least one drafting and twisting element interposed between said unit and said device, wherein said roving-twisting and drawing unit comprises a driving shaft, a fibre container axially aligned and connected to said driving shaft, means connected with said shaft for rotating the same, a fixed table adjacent said container, a driving gear rotatably mounted upon said table, a cover upon said fibre container, at least one pair of delivery rollers upon said cover, means connected with said cover for passing a strand from said fibre container through said cover and said delivery rollers, a gear meshing with said driving gear, another gear rotatably mounted upon said cover and meshing with the first-mentioned gear, and a drive actuated by said other gear for driving said delivery rollers.

7. A spinning system having a roving-twisting and drawing unit, a device receiving twisted thread, and at least one drafting and twisting

7

element interposed between said unit and said device, wherein said drafting and twisting element comprises a rotary hollow member, a fixed table adjacent said rotary hollow member, a driving gear rotatably mounted upon said table, a pair of delivery rollers upon said hollow member and rotatable therewith to draw a strand through said hollow member, a gear meshing with said driving gear, another gear meshing with the first-mentioned gear, and a drive actuated by said other gear for driving said delivery rollers.

8. The spinning system which comprises, in combination, a roving-twisting and drawing unit withdrawing the fibers at a predetermined rate, a device receiving twisted and drawn thread, a twister head located adjacent said roving-twisting and drawing unit and between said unit and said device, and two drafting and twisting elements controlling the rate of draft located between said twister head and said device.

9. The spinning system which comprises, in combination, a roving-twisting and drawing unit withdrawing fibers at a predetermined rate, a device receiving twisted and drawn thread, at least one drafting and twisting element controlling the rate of the draft located between said unit and said device, and means located between said drafting and twisting element and said device for supplying an additional amount of the fibrous mass into the system.

8

10. The spinning system which comprises, in combination, a roving-twisting and drawing unit withdrawing fibers at a predetermined rate, a device receiving twisted and drawn thread, at least one drafting and twisting element controlling the rate of the draft located between said unit and said device, and fibre-heating means located between the drafting and twisting element and said device.

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