Aug. 5, 1941. S. AKABOSHI 2,251,879

SPINNING APPARATUS

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Fig. 1.

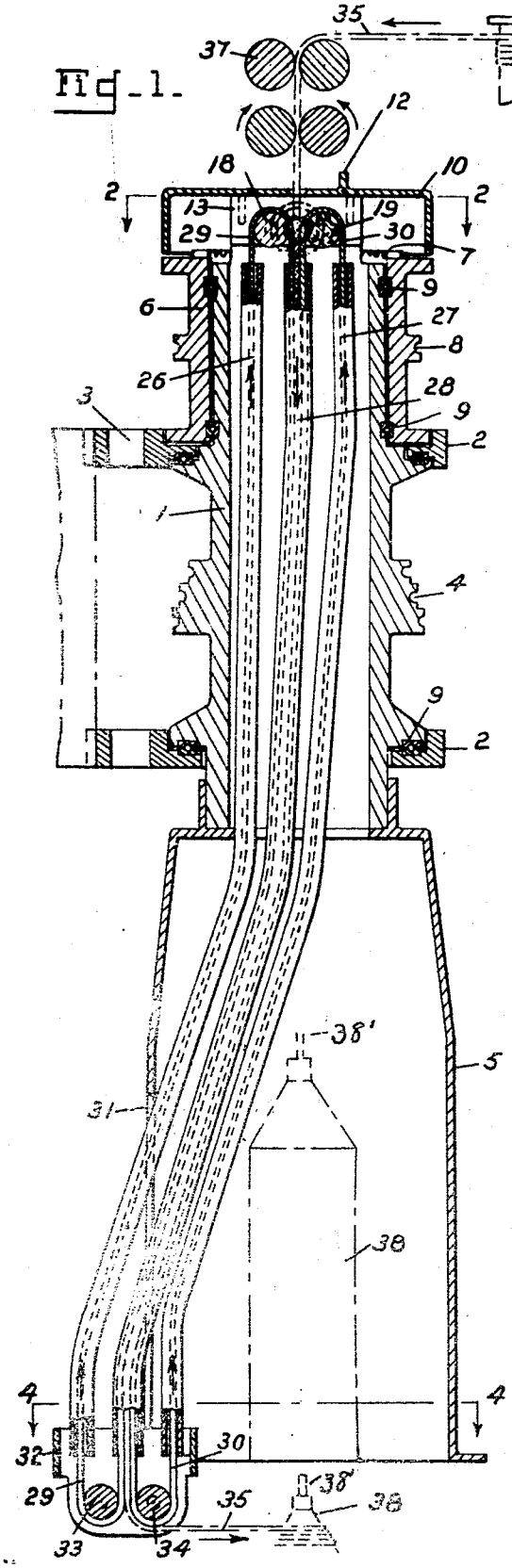


Fig. 5.

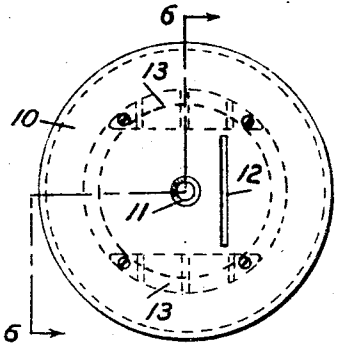


Fig. 6.

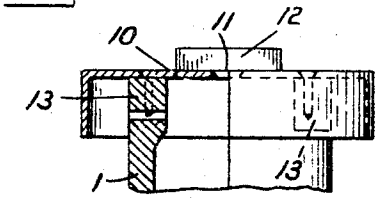
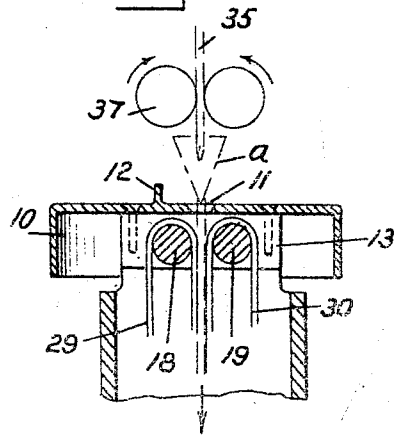


Fig. 7.



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SPINNING APPARATUS

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Fig-2-

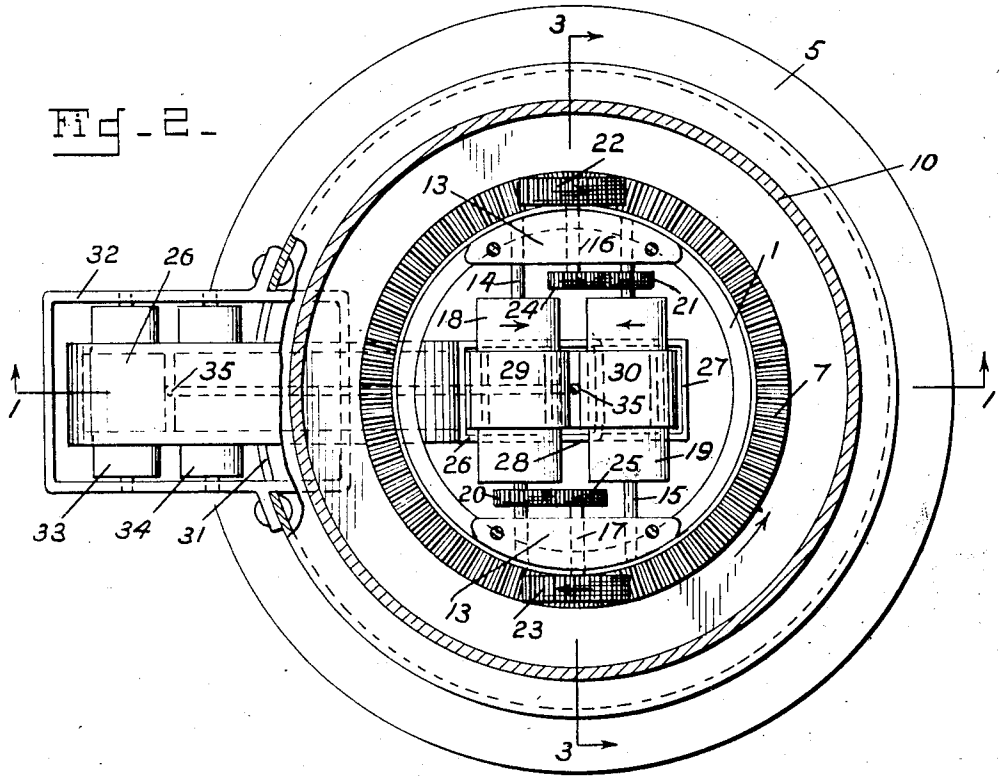


Fig-3-

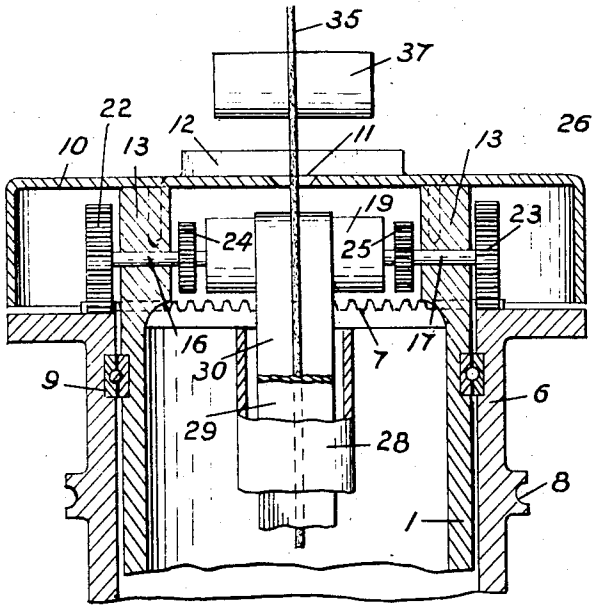
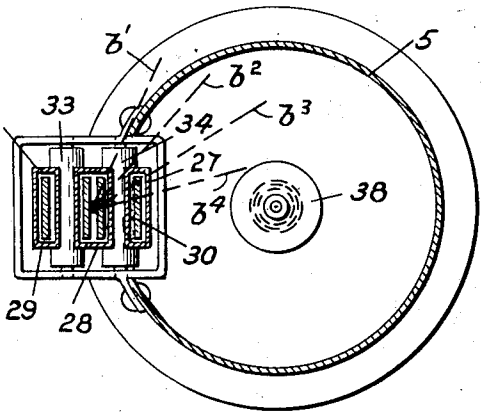


Fig-4-



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UNITED STATES PATENT OFFICE

2,251,879

SPINNING APPARATUS

Sokichi Akaboshi, Higashinagasu, Amagasaki, Japan

Application May 17, 1940, Serial No. 335,856

5 Claims. (Cl. 57—66)

This invention relates to a spinning apparatus for spinning cotton or other textile fibre for the production of yarn.

One object of the invention is to provide a spinning apparatus which is rapid in operation and obviates or reduces to the minimum liability of breakage of the roving or yarn, and necessity of knotting the same, on its travel from the supply spool to the spinner or from the spinner to the winding spool.

Another object of the invention is to provide a spinning apparatus by which the material may be spun and twisted to the desired degree in a highly efficient manner.

Still another object of the invention is to provide a spinning apparatus which dispenses with the use of the traveler customarily employed.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:

Fig. 1 is a vertical section through a spinning apparatus embodying the invention, the plane of section being indicated by line 1—1 of Fig. 2.

Fig. 2 is a sectional plan view, on an enlarged scale, on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section through the upper portion of the apparatus on line 3—3 of Fig. 2.

Fig. 4 is a sectional plan view on line 4—4 of Fig. 1.

Fig. 5 is a plan view of the cap or head.

Fig. 6 is a side elevation of the same.

Fig. 7 is a vertical section through the cap or head showing associated driving rolls and illustrating a function of a part of the head.

Referring now more particularly to the drawings, 1 designates an inner cylinder which extends through and is journaled to rotate in bearing rings 2 carried by a suitable supporting frame or bracket 3. This cylinder is provided with a stepped pulley 4 having grooved surfaces for engagement with a drive belt whereby it may be driven at any one of a number of different speeds from a suitable source of power. Fixed to the lower end of said cylinder 1 is a tubular extension or housing 5 which is open at its upper and lower ends and communicates at its upper end with the cylinders.

Rotatably mounted upon the upper bearing ring 2 and about the upper portion of the cylinder 1 is a second and relatively shorter outer cylinder 6, the upper end of which terminates substantially at the same level as the upper end of cylinder 1. This cylinder 6 is provided at its upper edge with an annular series of gear teeth 7 forming a gear ring and is also provided with a grooved pulley 8 for engagement with a drive belt whereby it is adapted to be rotated when the cylinder 1 is rotated in a spinning action. Antifriction bearing members 9 may be interposed between the respective bearing surfaces of the bearing rings and cylinders. The cylinders 1 and 6 are rotated in a spinning action in the same direction but at different speeds which may be relatively varied as required for any particular spinning action.

Disposed above the upper ends of the cylinders 1 and 6, in axial alinement therewith, is a hollow head or cap 10 which is coextensive in diameter with the cylinder 6. Formed in the top of this head is a roving feed slot or opening 11, adjacent to which, on the upper surface of the head, is arranged an air propeller blade 12. Extending into this head from the upper end of the cylinder 1 and forming fixed parts of the latter are segmental bearing blocks or posts 13 which are arranged diametrically opposite each other and spaced from each other and from the adjacent sides of the head. The head 10 is fastened to these posts or blocks 13, as by fastening screws, so as to rotate with cylinder 1.

Journaled in the blocks 13 are two long outer shafts 14 and 15 and two shorter intermediate shafts 16 and 17. Carried by the shafts 14 and 15 are drive rolls 18 and 19 and gear pinions 20 and 21, and carried by the shafts 16 and 17 are drive gears 22 and 23 and gear pinions 24 and 25. As shown, the gears 22 and 23 mesh with the gear ring 7 at diametrically opposite sides thereof, or at angles of 180° to each other, and are driven in opposite directions, and the gear pinions 24 and 25 mesh respectively with the gear pinions 20 and 25 whereby the shafts 14 and 15 and rolls 18 and 19 are driven in opposite directions or inwardly with relation to each other.

Extending longitudinally within the cylinder 1 and housing conveyor 5 is a conveyor comprising a group of guide tubes 26, 27 and 28. The upper portions of these tubes are arranged vertically and substantially in parallel relation to each other within the cylinder 1 and substantially parallel with the axis of the cylinder 1, and the upper ends of the tubes terminate just below the rollers 18 and 19 and are suspended therefrom by endless traveling belts 29 and 30, while the lower portions of the tubes disposed in the housing 5 are offset from the vertical and extend downwardly and laterally toward one side of the housing and project at their lower ends

outward through a slot 31 in on side of the housing and down between the walls of an enclosing bracket or support 32 fixed to the base of the housing. Journaled in this bracket or support are guide rolls 33 and 34. The belt 29 travels at its upper and lower ends about rolls 18 and 33 with one of its stretches passing through tube 26 and its other stretch passing through tube 28, while the belt 30 travels at its upper and lower ends about rolls 19 and 34 with one of its stretches passing through tube 27 and its other stretch passing through tube 28. The outer stretches of the belts which pass through tubes 26 and 27 travel upwardly, while the inner stretches of the belts which pass through tube 28 travel downwardly in parallel relation to each other and serve as feed stretches to feed the roving 35 unwinding from the supply spool 36, and drawn therefrom by the driving rolls 37, to the winding spool 38, during which it travels through tube 28 and is subjected to twisting treatment. The spool 36 and rolls 37 are suitably mounted above the twisting head 10 for the feed of the roving therefrom through slot 11 to the rolls and between the same to the feed stretches of the belts 29 and 30, and the construction of the head 10 is such as to allow rolls 37 to be arranged in such close relation thereto that but a short course of travel of the roving is required in its passage from the rolls to the slot 11. This reduces liability of breaking of the roving during this portion of its course of travel. The spool 38 is suitably mounted in practice for rotation and up and down reciprocation for the winding of the yarn thereon, and in its reciprocating movements may pass upward and downward through the open bottom of housing 5. This reduces the extent of travel of the yarn from the delivery ends of the conveyor belts to the winding spool and liability of breakage of the yarn at this stage of travel and obviates the use of a traveler in the winding operation. The arrangement is such that the offset lower ends of the tubes gyrate about the spool as the latter reciprocates and affords ample clearance for the movements of the spool into and out of the housing.

In the operation of the apparatus, it will be understood that the roving passes from the supply spool 36 to and between the guide rolls 37 and through the feed opening 11 in the head 10 downwardly to and between the feed stretches of belts 29 and 30 and to the winding spool 38. The cylinders 1 and 6 are rotated, as stated, in the spinning action in the same direction, but at different relative speeds, the relative speeds being variable and varied in practice according to the character of the particular spinning operation to be performed. Through the action of the gear ring 7 and associated gearing within the head 10, the conveyor belts are operated and the roving thereby caused to travel through the spinner and to be wound at the close of the spinning operation upon the vertical reciprocating and rotating spool 36. As the tubes revolve the roving on its downward speed is caused to travel in a spiral path and that portion of the roving which is gripped between the belts rotates with the conveyor and its carrier cylinder 1 at the speed of said cylinder, whereby in its travel the roving is twisted to the desired degree before passing to the winding spool 38. In the rapid rotation of the spinner, the blade 12 operates to produce a current of air above the surface of the head 10 and between the same and the rolls 37 and in the region of the feed opening 11, which assumes the shape of a vortex, as diagrammatically indicated at *a* in Fig. 7, and which air is drawn downwardly and into the cylinder 1 through the slot 11 by suction induced in the cylinder in its rapid operation. This downdraft or down current of air thus produced causes any and all loose particles of lint which may be deposited on the top of the head or project loosely from the roving to be drawn down with the roving through the slot and compressed or matted into the roving by the end of the feed belts. By this means the loss of small bits of raw cotton is prevented and in the event of attenuation of the roving tending to cause a break therein at any point between the head 10 and rolls 37 the suction draft on the roving and particles and matting of the particles with the roving as it moves downwardly into and through the opening 11 will usually serve to keep the roving intact and to prevent breakage thereof, thus obviating the necessity of frequently stopping the spinner for the knotting of the yarn. By taking up the small bits of loose cotton ordinarily allowed to float off into the air contamination of the atmosphere, such as occurs in the operation of ordinary spinning devices, is effectually prevented. The apparatus in operation works very smoothly and without strain on the material and the degree of twist of the roving, as stated, may be varied as desired by varying the relative speeds of rotation of the cylinders 1 and 6. Spool 38 as it reciprocates rotates on its shaft 38' at a somewhat slower speed than the housing and as a result of the described operation of the parts the yarn is wound on the spool along straight lines, such as indicated by the dotted travel lines *b1*, *b2*, *b3*, *b4*, shown in Fig. 4, ensuring an easy winding action of the yarn on said spool.

What I claim is:

1. In a spinning apparatus, an inner cylinder, an outer cylinder rotatable about the inner cylinder, said cylinders designed to be simultaneously rotated in the same direction at different speeds, a head supported upon the upper end of the inner cylinder and having a feed opening therein for passage of the material to be acted on to the inner cylinder, a conveyor for the material extending through the inner cylinder, means arranged at the upper and lower ends of the inner cylinder for supporting the conveyor for travel in said cylinder, and gearing between the conveyor and outer cylinder for driving said conveyor.

2. In a spinning apparatus, an inner cylinder, an outer cylinder rotatable about the inner cylinder, said cylinders designed to be simultaneously rotated in the same direction at different speeds, a head supported upon the upper end of the inner cylinder and having a feed opening therein for passage of the material to be acted on to the inner cylinder, a propeller blade disposed upon the head adjacent to said feed opening for producing a current of air about and tending to cause loose particles of material to be drawn toward and pass with the main body of material through the feed opening, a conveyor for the material extending through the inner cylinder, means arranged at the upper and lower ends of the inner cylinder for supporting the conveyor for travel in said cylinder, and gearing between the conveyor and outer cylinder for driving said conveyor.

3. In a spinning apparatus, an inner cylinder, an outer cylinder rotatable about the inner cyl-

inder, said cylinders designed to be simultaneously rotated in the same direction at different speeds, a head supported upon the upper end of the inner cylinder and having a feed opening therein for passage of the material to be acted on to the inner cylinder, a conveyor comprising a pair of endless belts extending through the inner cylinder and supported for travel at the upper and lower ends of said cylinder, said belts having opposed feed stretches arranged to engage and feed the material downwardly through the cylinder, a conveyor for the material extending through the inner cylinder, means arranged at the upper and lower ends of the inner cylinder for supporting the conveyor belts for travel in said cylinder, and gearing between the conveyor and outer cylinder for driving said conveyor.

4. In a spinning apparatus, an inner cylinder, an outer cylinder rotatable about the inner cylinder, said cylinders designed to be simultaneously rotated in the same direction at different speeds, a head supported upon the upper end of the inner cylinder and having a feed opening therein for passage of the material to be acted on to the inner cylinder, a conveyor comprising a pair of upper guide and drive rollers mounted upon the head, a pair of guide rollers mounted at the lower end of the inner cylinder and a pair of endless belts extending through the inner cylinder and about the rollers, said belts having opposed feed stretches arranged to engage and feed the material downwardly through the inner cylinder, and gearing between the conveyor and outer cylinder for driving said conveyor.

5. In a spinning apparatus, an inner cylinder, an outer cylinder rotatable about the inner cylinder, said cylinders designed to be simultaneously rotated in the same direction at different speeds, a head supported upon the upper end of the inner cylinder and having a feed opening therein for passage of the material to be acted on to the inner cylinder, said inner cylinder having a slot opening through one of its sides and its lower end, a pair of rollers mounted in the head on opposite sides of the vertical plane of the feed slot, a pair of rollers supported upon the outer sides of the lower end of the inner cylinder in line with said slot, a pair of endless belts extending through the inner cylinder and trained over said rollers to provide downwardly traveling opposed feed stretches to grip and feed the material and upwardly traveling return stretches, the lower ends of said belt stretches being offset laterally from the center line of the cylinder so that portions thereof project outwardly through the slot for passage about the lower rollers, guiding means within the inner cylinder for guiding the stretches of the belts, and gearing between the outer cylinder and upper rollers for driving the conveyor belts.

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