

June 3, 1941.

W. M. CAMP

2,244,141

SPINNING OR TWISTING MECHANISM

Filed March 14, 1940

4 Sheets-Sheet 1

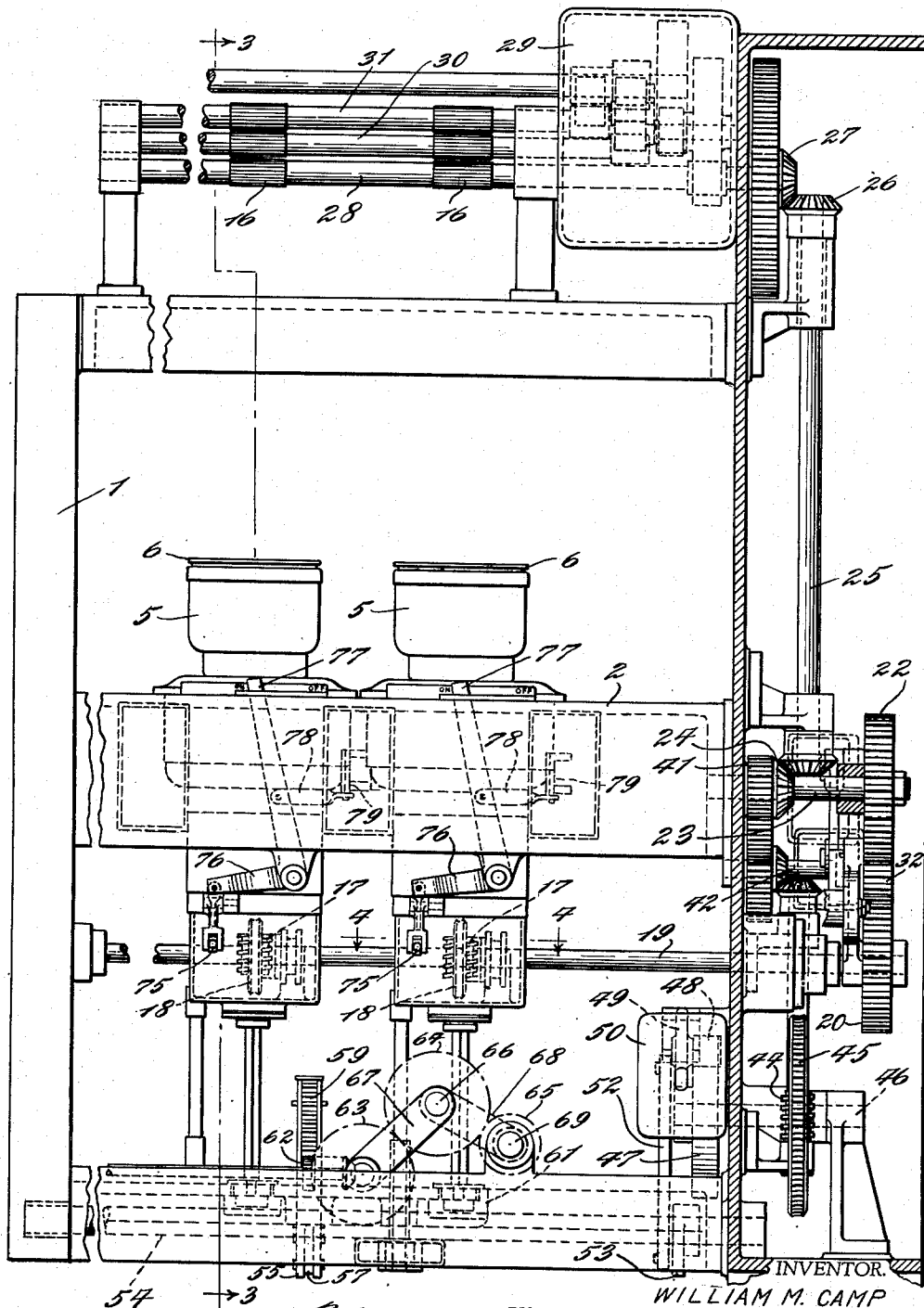


Fig. 1.

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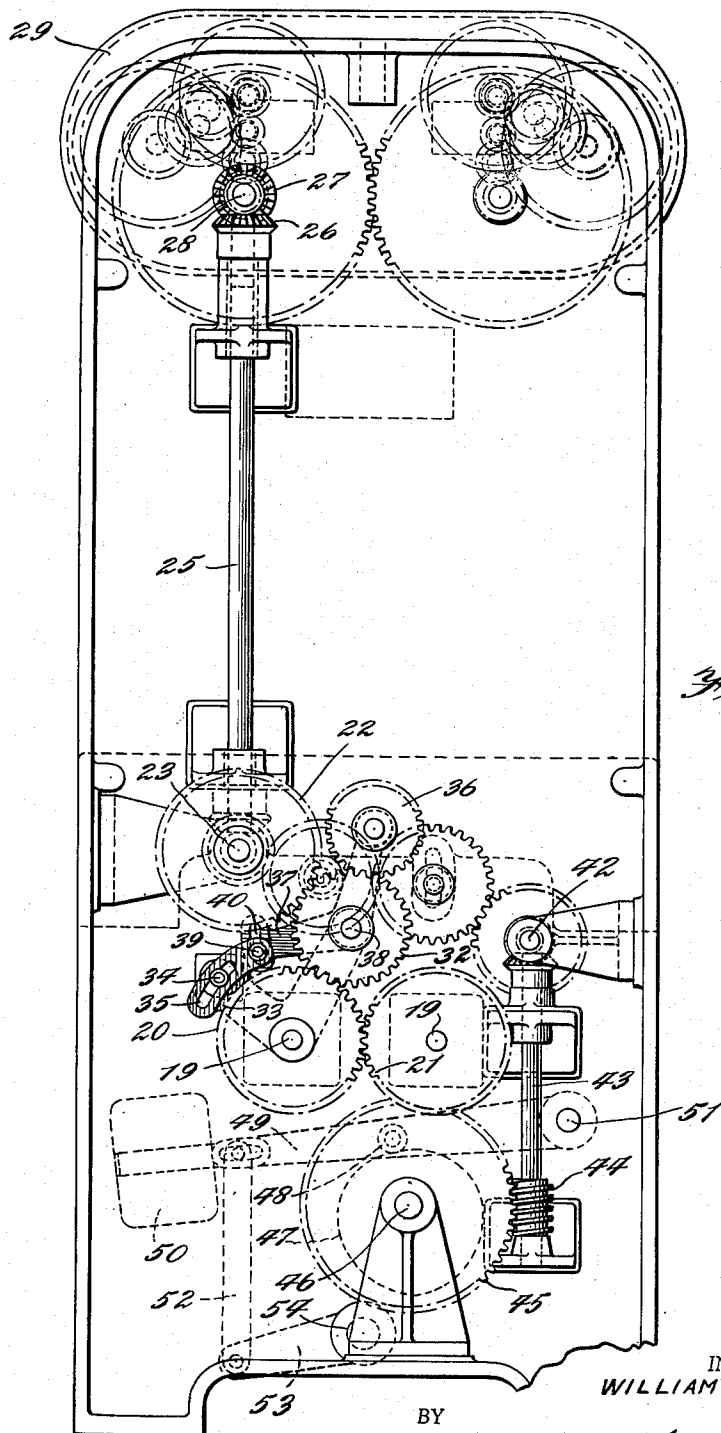
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4 Sheets-Sheet 2



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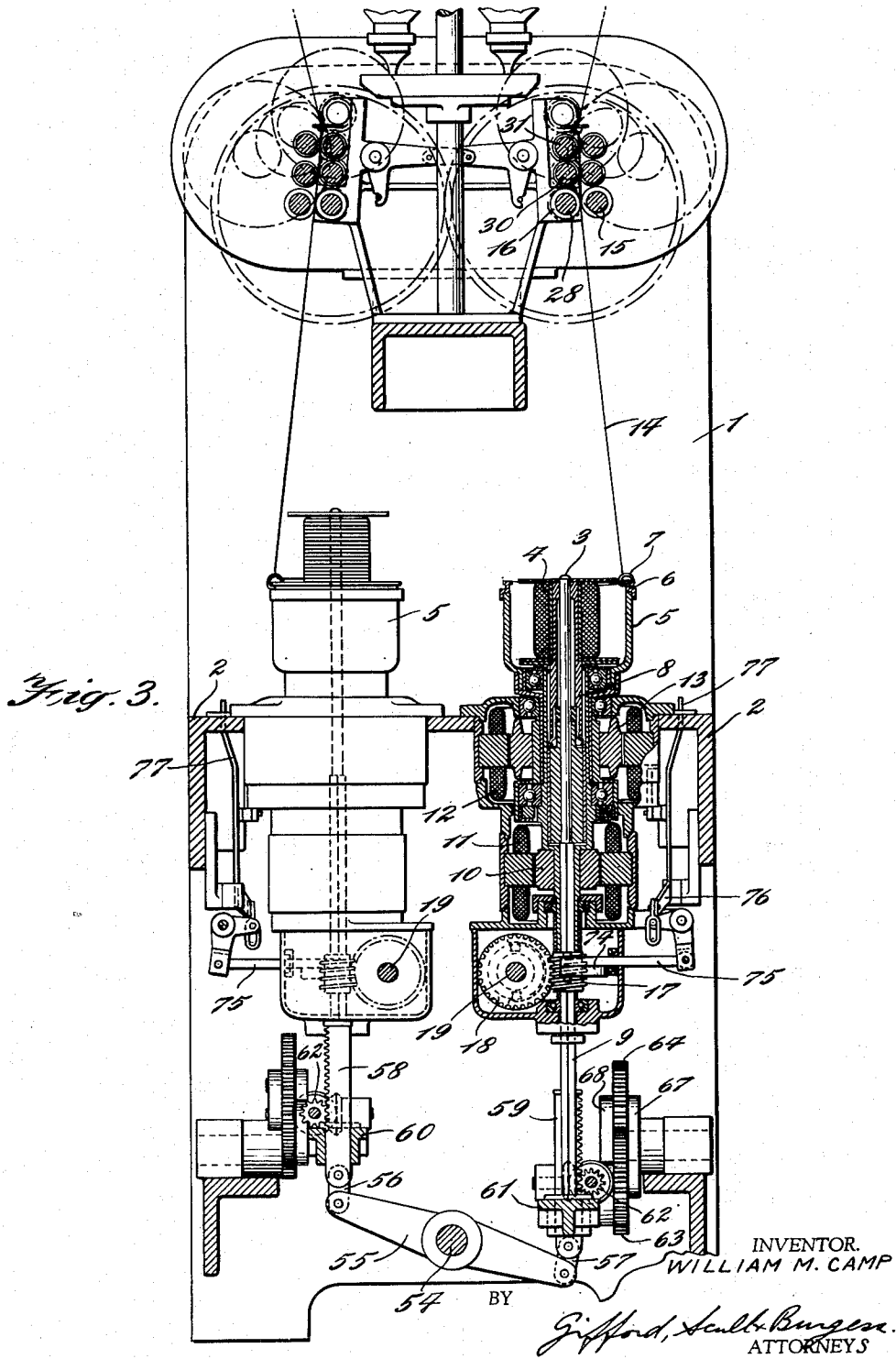
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Fig. 4.

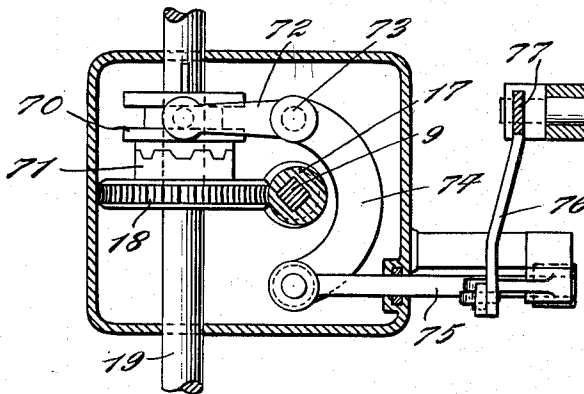
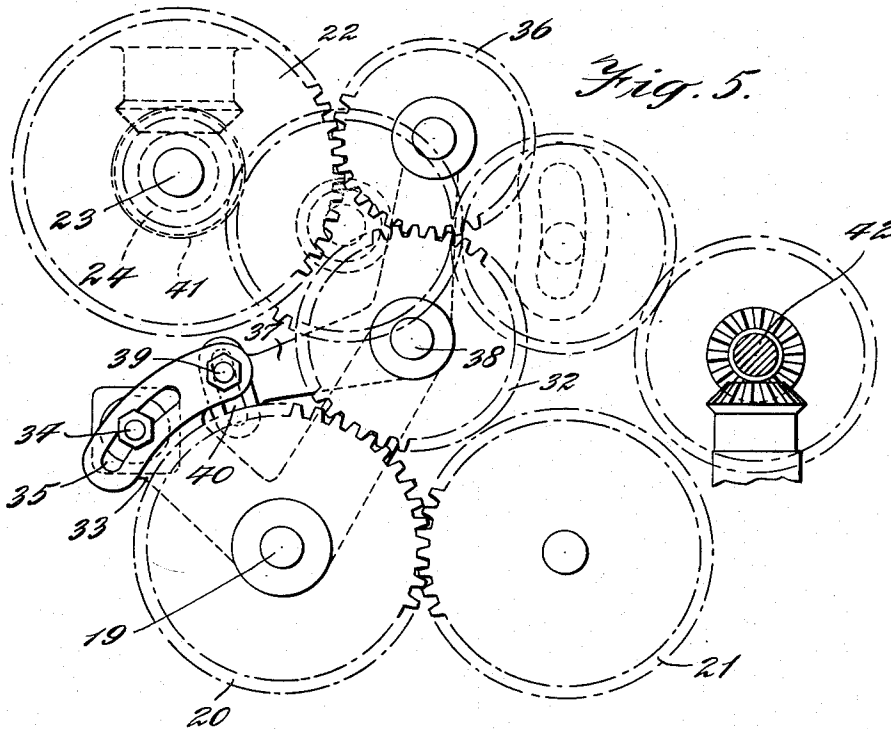


Fig. 5.



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2,244,141

SPINNING OR TWISTING MECHANISM

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Application March 14, 1940, Serial No. 323,986

11 Claims. (Cl. 57—100)

This invention relates to a novel and improved form of spinning or twisting mechanism, which hereafter shall be referred to as spinning mechanism, the novel features of which will be best understood from the following description and the annexed drawings in which I have shown a selected embodiment of the invention and in which:

Fig. 1 is a face view of a spinning frame having my invention applied thereto, parts being broken away and other parts shown in section;

Fig. 2 is a view of the mechanism appearing in Fig. 1 as viewed from the right-hand end of that figure;

Fig. 3 is a view taken approximately on the line 3—3 of Fig. 1;

Fig. 4 is a view taken approximately on the line 4—4 of Fig. 1;

Fig. 5 is a view on an enlarged scale showing some of the gearing appearing in Fig. 2, but with certain gears in different position.

The invention is shown as embodied in what may for convenience be called a spinning or twisting frame, but it may be used with any other similar piece of apparatus where it may be found applicable.

For the sake of illustration, I have shown a frame 1 having fixed guide rails 2 extending horizontally of the frame and adapted to support two banks of spindles, one being in front of the frame and the other behind the frame. It will be assumed that the part of the frame seen in Fig. 1 is the front of the frame and therefore the spindle appearing at the right of Fig. 3 is one of the front bank and that appearing at the left of Fig. 3 is one of the rear bank. Each bank may include any number of spindles and there will usually be a plurality of them or even a multiplicity thereof. Since all spindles have substantially the same construction, I will describe only one of them briefly.

Each spindle 3 carries at its upper end a core 4 upon which a bobbin or the like may be formed. For convenience this will be referred to as a bobbin. Surrounding the bobbin when it is in the position shown at the right of Fig. 3 is a cup 5 having at its upper periphery a traveler ring 6 upon which slides a traveler 7. The spindle may move upwardly in the cup, and the cup is preferably driven independently of the spindle, in a manner more fully disclosed and claimed in my Patent 2,142,111, granted January 3, 1939. The upper end of the spindle is shown as being round and as carrying thereon a tube 8 which is long enough to support two bobbins. The

lower end of the spindles, as shown at 9, is squared and may be raised and lowered by a traversing mechanism, which may be of any usual kind or may be of the kind to be described presently. The spindle is positively driven by a motor, the armature 10 of which may be secured to a sleeve surrounding and rotating with the squared portion 9 of the spindle, and the winding of which is indicated at 11. The cup 5 may be and preferably is driven independently by another motor, whose winding is indicated at 12 and whose armature is indicated at 13, the armature being secured to a tubular extension of the cup, as shown. This arrangement of motors is somewhat the same as that shown in my aforesaid patent and need not be further described.

Thread 14, by which term I mean any thread or other material which is to be wound on the bobbin, may come from any suitable source of supply and then pass over one or more rollers or pairs of rollers on its way to the traveler on the traveler ring. In the present instance I have shown three pairs of rollers 15 and 16, preferably the three rollers 16 being positively driven and the rollers 15 being idlers or pressure rollers, each contacting with one of the rollers 16. In the past it has been customary to drive these rollers direct from the motor which drives the spindle (in the case of tape driven spindles), or to provide a separate motor to drive the rollers (in the case of motor driven spindles), this motor being synchronized as far as possible with the other motors on the frame. It is evident that the rollers should be driven at a speed in direct ratio to the speed of rotation of the spindle, to give the correct twist per inch to the thread being wound on the spindle. Various attempts have been made to synchronize the speeds of the rollers and spindles, but in spite of those efforts usually slippage has occurred between the rollers and the spindles, thus preventing the giving of the correct twist per inch to the thread which is being wound on the spindle. This twist should be uniform inch for inch for the entire length of the thread, but such uniformity is destroyed by the slippage or lack of synchronization between the spindle speed and the roller speed.

According to my invention, I drive the rollers from the spindles. Each spindle is driven by its own motor, there being one motor 10—11 for each spindle, and preferably each spindle is provided with a worm 17 engaging a worm gear 18 which is clutched to a shaft 19. It will be observed that there are two shafts 19, one for each

bank of spindles and these shafts extend through one end of the frame where they are geared together by meshing gears 20 and 21, as shown in Fig. 2.

The gear 20 is connected by a train of gearing shown in Figs. 2 and 5, and which will be more fully discussed presently, to a gear 22 on a shaft 23 on which is a bevel gear 24 meshing with a bevel gear on a vertically extending shaft 25. At its upper end this shaft is provided with another bevel gear 26 meshing with a bevel gear 27 on a horizontally extending shaft 28 carrying one set of the rollers 10. In other words, the shaft 28 is one of the shafts carrying the driven rollers of the lower pairs of rollers. Through intermediate gearing in a gear box 29, the other shafts 30 and 31 are positively driven in the same direction as the shaft 28. The details of this gearing for connecting the shafts 28, 30, and 31 are not necessary for an understanding of the invention and therefore will not be further described.

By the above arrangement it will be seen that the motors which drive the spindles likewise drive the front rollers by a positive driving connection between the motors and the shafts 28, 30, and 31 upon which the rollers are mounted. Therefore an absolute synchronism can be obtained between the spindles and the rollers. As described presently, means are provided for disconnecting any spindle from the shaft 19 when a thread being wound on that spindle breaks or when it is desired to make this disconnection for any other reason, such as removing or replacing a bobbin. Nevertheless, even though one or even several motors are disconnected, the other motors are enough to maintain the speed of the mechanism substantially the same as before and at all times the speed of the rollers will bear a constant relation to the speed of rotation of the spindles. Thus I combine all the advantages of independently driven spindles with synchronized movements of the spindles and front rollers.

Referring now to Figs. 2 and 5, the two shafts 19, as noted above, have their gears in constant mesh with each other and so together furnish a means for transmitting the driving power for the rollers from all motors in both front and rear banks of spindles. The gear 20 is in constant mesh with a gear 32 which is mounted upon a bell crank lever 33 which is pivoted upon the shaft 19 to which the gear 20 is secured. The position of the bell crank lever 33 may be adjusted by means of the bolt 34 and slot 35 so that the gear 32 may be moved into mesh with the gear 22, as shown in Fig. 2, or out of engagement therewith, as shown in Fig. 5.

When the parts are in the position shown in Fig. 5, the gear 22 is driven from a gear 32 through an idler pinion 36 which is mounted on a second bell crank lever 37 which is pivoted on a stub shaft 38 upon which the gear 32 rotates. The positions of the bell crank levers 33 and 37 with respect to each other may be adjusted by means of the bolt 39 and slot 40, as will be evident to those skilled in the art.

By the arrangement described above, it will be seen that the rollers 16 may always be caused to rotate in the same direction, regardless of which direction the spindles are rotating. In either case, the travel of the spindles in a vertical direction will be operated by means of the pinion 41 on the shaft 23 which, through the train of gearing shown in Figs. 2 and 5, will rotate the shaft 42 which, through the bevel

gear connection shown, will rotate the shaft 43 upon which is a worm 44 engaging a worm gear 45 on a shaft 46. The shaft 46 carries a cam 47 engaging a cam roller 48 on a lever 49 having a weight 50 on the end thereof and pivoted to the frame of the mechanism at 51. The lever 49 is pivoted to a link 52 which is pivoted at its opposite end to a rock arm 53 on a rock shaft 54.

As best shown in Fig. 3, the rock shaft 54 carries a lever 55 which is pivoted at its opposite ends to links 56 and 57 which in turn are pivoted to vertically movable racks 58 and 59. These racks are vertically movable in spindle rails 60 and 61 and, in the positions shown in the drawings, the racks are held in correct position in the spindle rails so that the bobbins are formed at the upper end of the spindles, as shown, it being understood that the spindles are rotatably mounted at their lower ends in bearings on the spindle rails. The racks are held in these positions by an arrangement which is duplicated on opposite sides of the mechanism, as seen in Fig. 3, and therefore the description of only one such arrangement will be given.

Each rack is engaged by a pinion 62 which is rotatably mounted upon one of the spindle rails and normally held against rotation thereon. Therefore, as the rack is reciprocated vertically by the action of the lever 55, the corresponding spindle rail will reciprocate with the rack. However, as shown in Fig. 1, the pinion 62 is mounted on a short shaft connected through bevel gearing to a gear 63 which in turn meshes with a gear 64 which in turn meshes with a pinion 65. The gear 63 is rotatably mounted on the rail 60, whereas the pinion 65 is rotatably mounted upon a fixed part of the frame and the intermediate gear 64 rotates on a shaft 66 which is held in proper position by means of the two links 67 and 68, as shown in Fig. 1.

With the above described arrangement, the pinion 62 normally will be prevented from rotating, and so cause the corresponding spindle rail to move with its rack, but when desired the shaft 69 on which the pinion 65 is secured may be rotated by hand or by any other suitable means (not shown) and thus cause rotation of the pinion 62, which will cause a bodily movement of the corresponding spindle rail along the rack which reciprocates therewith. For example, the rail 60 may be moved by this means upwardly to a place where another bobbin may be wound beneath the bobbin which has already been formed on top of the spindle.

In order that any spindle may be stopped when necessary, I provide a clutch between each spindle and the shaft 19. At the same time, I provide a switch for shutting off the motors which operate any one spindle and its cup. A convenient arrangement for performing the above functions is shown in the drawings, and, referring particularly to Fig. 4, it will be seen that each worm gear 18 is rotatably mounted on a shaft 19 and may be clutched thereto by providing a slider collar 70 which is keyed to that shaft 19 and which has a clutch element engaging a co-operating clutch element on the hub 71 of the gear 18.

The collar 70 may be operated by a yoke 72 rotating on a fixed pivot 73 and connected to a lever 74 rocked by an arm 75 connected to a bell crank lever 76, the upper end of which forms a handle 77. The handle may be connected by a link 78 to an electric switch indicated general-

ly at 79. The details of this switch are not necessary to an understanding of the invention and so will not be further described.

By the above arrangement, when the handle 77 is at the "on" position shown in Fig. 1, the switch 79 will be closed so as to furnish electric current to the two motors operating that spindle and cup, and that spindle will be clutched to the shaft 19. On the other hand, when the spindle 77 is moved to the "off" position, the switch 79 will be opened so as to stop the motors of that spindle and at the same time the clutch will be disconnected so that that spindle will not be connected to the shaft 19.

In starting up a motor when the frame is running, the on and off lever is pushed on half way, which will close the electrical connections but not throw in the clutch. This allows the motor and spindle to get up to speed before the clutch is thrown in and this prevents clashing. In stopping the motor, the lever is pushed completely from on to off position without any pause at the half way mark.

While I have shown the invention as embodied in a specific form, it is to be understood that various changes in details may be made without departing from the scope of the invention as defined by the appended claims.

I claim:

1. A spinning or twisting mechanism comprising a plurality of spindles, each adapted to have a bobbin of thread formed thereon, one or more rollers associated with each spindle and arranged to guide thread to the bobbin on that spindle, a plurality of motors, each connected to one of said spindles to rotate it, and means normally connecting all of said motors to said rollers.

2. A spinning or twisting mechanism comprising a plurality of spindles, each adapted to have a bobbin of thread formed thereon, one or more rollers associated with each spindle and arranged to guide thread to the bobbin on that spindle, a plurality of motors, each connected to one of said spindles to rotate it, means normally connecting all of said motors to said rollers, and means to disconnect any one motor from said rollers.

3. A spinning or twisting mechanism comprising a plurality of spindles, each adapted to have a bobbin of thread formed thereon, one or more rollers associated with each spindle and arranged to guide thread to the bobbin on that spindle, a plurality of motors, each connected to one of said spindles to rotate it, a common shaft operatively connected to all of said spindles and driven thereby, and means to drive said rollers from said shaft.

4. A spinning or twisting mechanism comprising a plurality of spindles, each adapted to have a bobbin of thread formed thereon, one or more rollers associated with each spindle and arranged to guide thread to the bobbin on that spindle, a plurality of motors, each connected to one of said spindles to rotate it, a common shaft operatively connected to all of said spindles and driven thereby, means to drive said rollers from said shaft, and means to disconnect any one spindle from said shaft.

5. A spinning or twisting mechanism comprising a plurality of spindles, each adapted to have a bobbin of thread formed thereon, one or more

rollers associated with each spindle and arranged to guide thread to the bobbin on that spindle, a plurality of motors, each connected to one of said spindles to rotate it, a common shaft operatively connected to all of said spindles and driven thereby, and means to rotate said rollers in one direction from said shaft when said shaft is rotating in either direction.

6. A spinning or twisting mechanism comprising a plurality of spindles, each adapted to have a bobbin of thread formed thereon, one or more rollers associated with each spindle and arranged to guide thread to the bobbin on that spindle, a plurality of motors, each connected to one of said spindles to rotate it, a common shaft operatively connected to all of said spindles and driven thereby, means to drive said rollers from said shaft, and means to disconnect any one spindle from said shaft and to simultaneously stop the motor operating that spindle.

7. A spinning or twisting mechanism comprising a bank of spindles, each adapted to have a bobbin of thread formed thereon, rollers above said spindles and arranged to guide thread to the bobbins on said spindles, a common shaft extending along said bank, clutches arranged to connect or disconnect said spindles to said shaft, a driving connection from said shaft to said rollers, and means to rotate each spindle independently of the others and thereby drive said shaft.

8. A spinning or twisting mechanism comprising a bank of spindles, each adapted to have a bobbin of thread formed thereon, rollers above said spindles and arranged to guide thread to the bobbins on said spindles, a common shaft extending along said bank, clutches arranged to connect or disconnect said spindles to said shaft, a driving connection from said shaft to said rollers, each spindle having a separate electric motor arranged to drive that spindle, and means to stop said motor and simultaneously disconnect the clutch connecting that spindle to said shaft.

9. A spinning or twisting mechanism comprising a bank of spindles, each adapted to have a bobbin of thread formed thereon, rollers above said spindles and arranged to guide thread to the bobbins on said spindles, a common shaft extending along said bank, clutches arranged to connect or disconnect said spindles to said shaft, a driving connection from said shaft to said rollers, and means to rotate said spindles and thereby drive said shaft.

10. A spinning or twisting mechanism comprising a bank of spindles, each adapted to have a bobbin of thread formed thereon, rollers above said spindles and arranged to guide thread to the bobbins on said spindles, a common shaft extending along said bank, and means to rotate said spindles and thereby drive said shaft.

11. In a spinning or twisting frame, a plurality of spindles, a plurality of electric motors driving said spindles, rollers conducting thread to said spindles, and direct gearing connecting all of said spindles to all of said rollers, thus providing a positive drive for the rollers and synchronizing the speed of all the spindles and motors with the rollers to insure uniform twist in the thread at all times.

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