Sept. 27, 1949. W. H. HAM 2,483,276

SPINNING MACHINE

Filed July 19, 1946

2 Sheets-Sheet 1

Fig. 1.

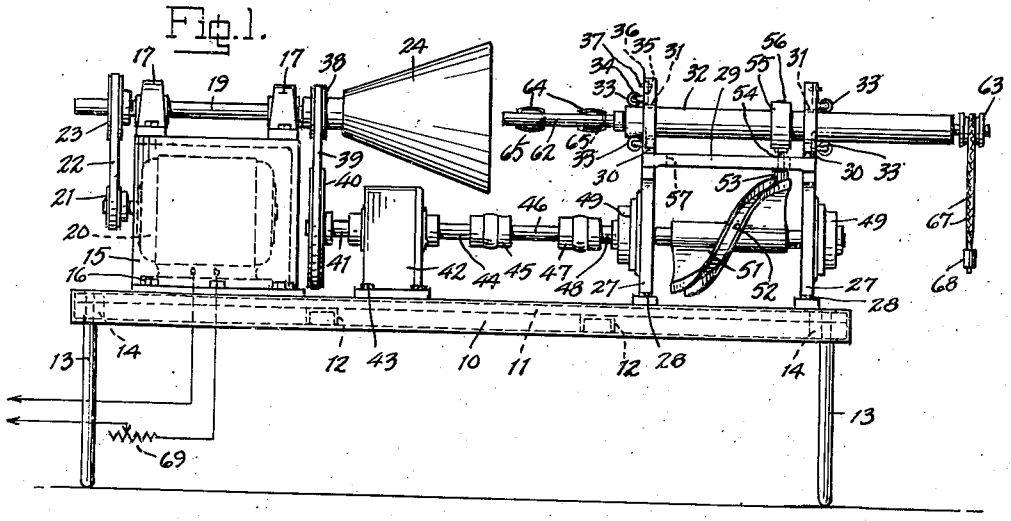


Fig. 2.

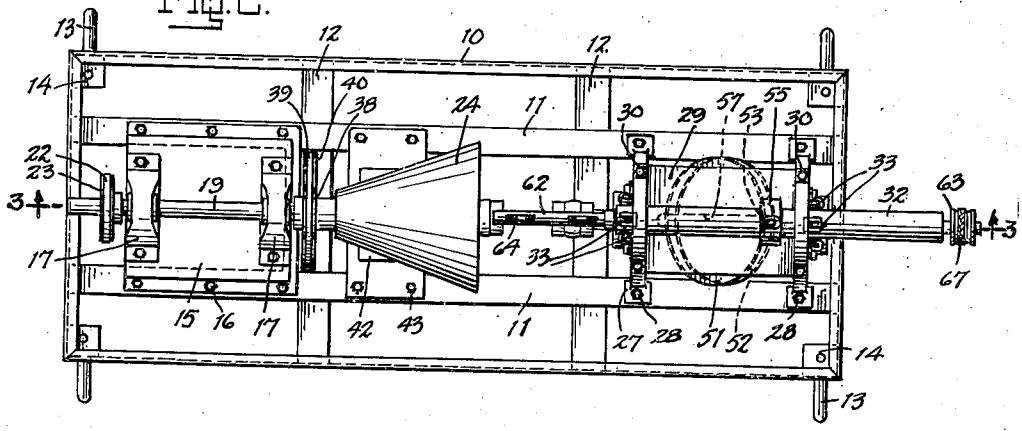
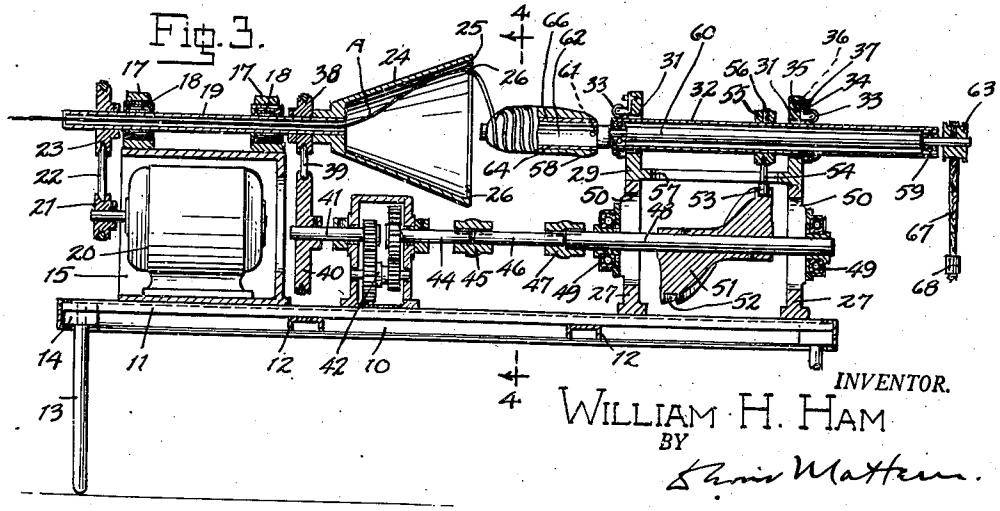


Fig. 3.



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Fig. 4.

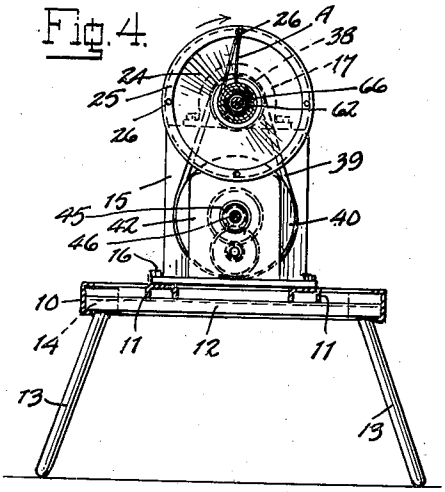


Fig. 5.

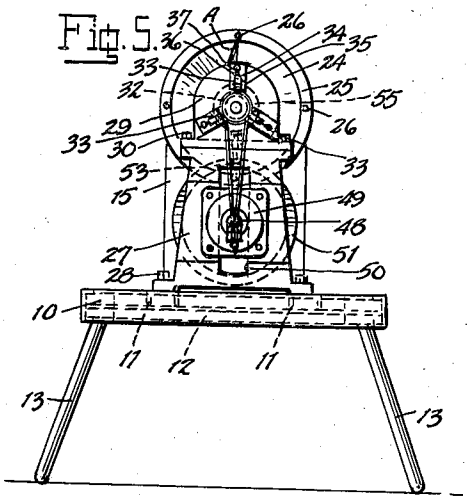


Fig. 6.

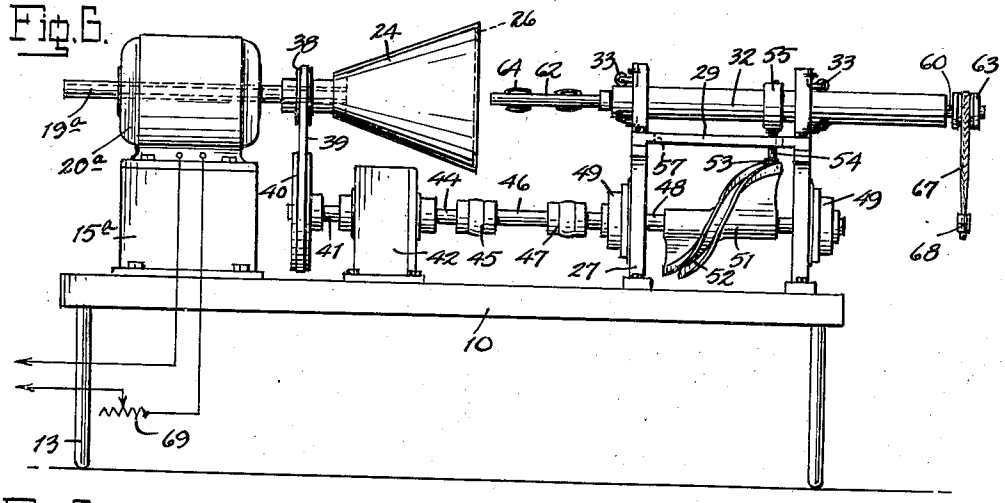
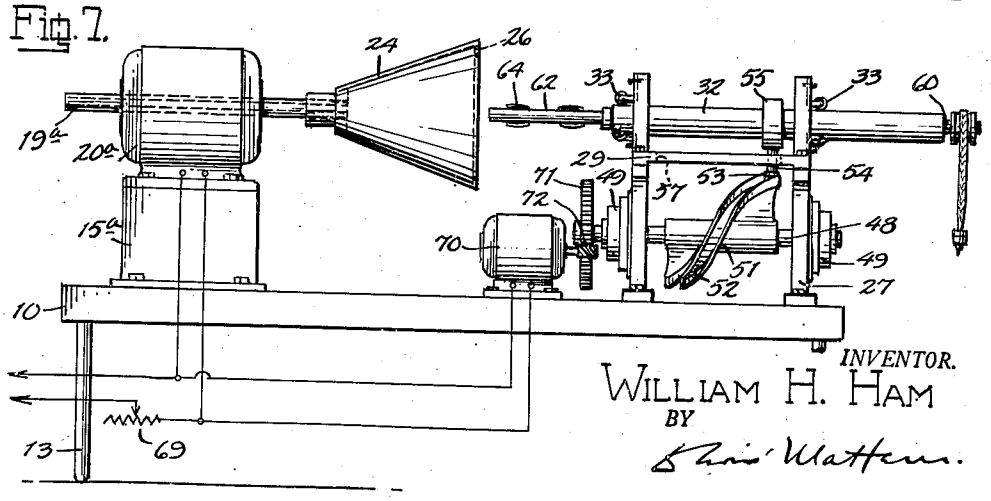


Fig. 7.



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SPINNING MACHINE

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9 Claims. (Cl. 57—70)

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The present invention relates to a spinning machine, and particularly a spinning machine for individual or home use, wherein fibers to be spun are drafted from the hands of the operator, as distinguished from automatic industrial spinning machines where the fibers are fed by drafting rollers or other automatic means, the product of the present invention therefore being in the nature of true home-spun yarn or thread having the individual characteristics of this type of material.

An object of the invention is to provide a spinning machine of this type which is power driven by an electric motor or the like, and wherein the moving parts are so balanced and so supported in anti-friction bearings, that they may be rotated at relatively great speed, without excessive vibration, to the end that the home or individual production of thread or yarn may be carried on profitably, with a relatively great volume of production in comparison with time and effort spent by the operator.

Another object is to provide a spinning machine wherein the speed of rotation of the yarn twisting flyer may be under the constant control of the operator, so that the tension of the thread and the twist may be controlled according to the spinning technique of the individual operator, to the end that the product will have the individuality of home-spun material.

A further object is to provide an improved type of flyer of enclosed form and preferably in the form of a cone, whereby improved balance in the flyer is obtained and the thread is maintained in a substantially constant position within the flyer and is prevented from ballooning.

Another object is to provide a spinning machine wherein the bobbin upon which the spun thread is wound is rotated by the flyer through the pull of the tensioned thread extending from the flyer to the bobbin. A further object is to provide improved drag means acting on the bobbin spindle, whereby the drag may be conveniently increased or diminished as desired, the increase in drag causing an increase in tension of the thread and an increase in the relative winding speed of the thread as compared to the number of twists imparted thereto by the flyer, while decrease in the drag causes the relative winding speed to be decreased. It is particularly proposed to provide drag means consisting of a weighted band extending about a pulley and which permits small weights to be conveniently added or removed as desired. Such weights may, for instance, be added during the winding of a single bobbin in order to

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compensate for the change in tension resulting from the building up of the thread on the bobbin, the tension being greatest when the bobbin is of relatively small diameter and decreasing as it increases in diameter. Thus by adding weights as the diameter of the bobbin increases the operator may maintain a substantially constant tension between the flyer and the bobbin.

A further object is to provide a spinning machine wherein the working parts are of relatively simple construction and are conveniently accessible, so that the machine may be effectually operated by blind or other partially incapacitated persons.

With the above and other objects in view, embodiments of the invention are shown in the accompanying drawings, and these embodiments will be hereinafter more fully described with reference thereto, and the invention will be finally pointed out in the claims.

In the drawings:

Fig. 1 is a side elevation of a spinning machine, according to the illustrated exemplary embodiment of the invention.

Fig. 2 is a plan view.

Fig. 3 is a longitudinal sectional view, taken along the line 3—3 of Fig. 2, and showing the winding or bobbin spool in place with the thread extending through the flyer to the bobbin.

Fig. 4 is a transverse vertical sectional view, taken along the line 4—4 of Fig. 3.

Fig. 5 is a rear end elevation.

Fig. 6 is a side elevation of a modified form of spinning machine, according to the invention.

Fig. 7 is a side elevation of another modified form of spinning machine, according to the invention.

Similar reference characters indicate corresponding parts throughout the several figures of the drawings.

Referring to the drawings and more particularly to Figs. 1 to 5 thereof, the spinning machine, according to the illustrated exemplary embodiment of the invention shown therein, comprises a rectangular frame 10 formed of channel iron strips provided with a pair of longitudinally extending channel iron beams 11—11 and transverse channel iron bracing beams 12—12. Supporting legs 13 are provided at the corners of the frame, being inserted and secured in drilled block members 14 welded or otherwise suitably secured within the frame.

At the forward portion of the frame there is mounted upon the longitudinal beams 11—11 the motor housing 15, secured at its base to the beams

by means of bolts 16, and having mounted upon its upper side a pair of longitudinally aligned bearing blocks 17—17 provided with roller or other suitable anti-friction bearing units 18—18 in which the tubular spindle 19 of the flyer is rotatably engaged. An electric motor 20 is mounted within the housing 15 and is provided with a pulley 21 connected by a belt 22 to a pulley 23 secured upon the spindle 19 forwardly of the forward bearing block 17.

Upon the rearward end of the spindle there is secured a flyer 24, in the form of a hollow cone, preferably formed of relatively light metal, and provided at its divergent open end with an inwardly extending rim flange 25 having a series of equally spaced eye-openings 26 therein, the thread adapted to extend through one of these openings to the bobbin, as will hereinafter more fully appear. The eye-openings are provided at equally spaced points in order to accurately balance the weight of the flyer.

Upon the rearward portion of the frame there is mounted the bobbin supporting stand, consisting of a pair of leg members 27—27, secured to the longitudinal beams 11—11 by means of bolts 28, and supporting upon their upper ends a U-shaped bracket member 29 having a horizontal base and vertical bearing supports at each end, the base being secured upon the upper ends of the leg members by means of bolts 30. In the vertical end supports there are provided axially aligned circular openings 31 in which a tubular cylindrical shaft 32 is engaged for forward and backward reciprocating movement, this shaft being supported within the openings by means of radially disposed roller wheels 33 carried by angular bracket members 34 mounted for inward and outward adjustment in radial slots 35 provided in the bearing supports, the bracket members 34 having slots 36 therein engaged by clamping screws 37 to secure the adjusted position of the roller wheels. This mounting provides for free reciprocatory movement of the shaft and permits it to be accurately aligned with the flyer.

A pulley 38 is secured to the spindle 19 between the rearward bearing block 17 and the flyer, and is connected by a belt 39 to a pulley 40 mounted upon the end of the shaft 41 of a reduction gear unit 42, the base of which is secured to the longitudinal beams 11—11 by means of bolts 43. The other shaft 44 of the reduction gear unit is connected by a coupling 45 to an intermediate shaft 46 which is in turn connected by a coupling 47 to a cam shaft 48 mounted in suitable vertically adjustable ball-bearing units 49—49 secured to the legs 27—27 of the bobbin supporting stand, the legs having vertical slots 50—50 through which the cam shaft extends. A cam 51 is secured upon the cam shaft, its cam groove 52 being engaged by a roller 53 provided upon a shaft 54 secured to a collar 55 rigidly mounted upon the tubular shaft 32 by means of a set screw 56, the shaft 54 extending through a longitudinal slot 57 in the base of the bracket member 29. The cam groove 52 is so plotted that uniform reciprocating rectilinear motion is imparted to the shaft 54. In the respective ends of the tubular shaft 32 there are provided ball-bearing units 58 and 59 in which is rotatably engaged the rotatable bobbin spindle shaft 60, this shaft having upon its forwardly projecting reduced-diameter end a threaded stud 61 upon which the bobbin supporting stem 62 is engaged, and having secured upon its rearwardly projecting reduced-diameter end a drag pulley 63.

The stem 62 is provided with U-shaped spring members 64—64 engaged through slots 65—65 therein, for frictionally retaining upon the stem the tubular bobbin spool 66, the latter being in the form of a cylindrical tube formed of cardboard or other suitable material.

The drag means for engagement with the drag pulley 63 comprises a band member 67, which may be in the form of a fabric tape, and which has removably engaged upon its depending end weight members 68, of any suitable form to be readily engaged or disengaged, one convenient form being, for instance, a weight of C-shape, which enables it to be readily slipped on and off the tape. If desired, a receptacle may be suspended upon the end of the tape into which pennies or other suitable weights may be placed, as desired.

In operating the machine, a length of spun thread A is tied or otherwise secured to the spool 66 and threaded through one of the eyelets 26 and through the tubular spindle 19. Thereupon the motor is started, causing the flyer to rotate, the cam 50 being simultaneously turned through its pulley and gear connections with the spindle 19 to cause the shaft 32 to reciprocate inwardly and outwardly. This causes the bobbin spool to move into and out of the cone-shaped flyer, so that the spun thread is wound thereon from end to end as it is formed. The bobbin is rotated through the pull of the tensioned thread, imparted thereto by the rotation of the flyer, the drag created on the bobbin causing the flyer to rotate a relatively greater number of revolutions than the bobbin to thus cause the thread to wind on the bobbin. By increasing or decreasing the drag the relative winding speed is increased or diminished as desired, so that the desired twist and tension may be maintained by the operator. It is pointed out that at the start of the winding operation the relatively small diameter of the bobbin creates a relatively increased drag and greater tension on the thread, and as the diameter increases this drag and tension decreases. Hence, by adding weights to the drag band 67, a substantially uniform drag and tension may be maintained. The cone-shaped flyer maintains the thread extending therethrough in a substantially constant position and effectually prevents it from ballooning through centrifugal force. Consequently, there is no danger of a ballooning thread becoming entangled with other parts of the machine.

The speed of the motor is preferably controlled by a foot operated rheostat or variable resistance control unit indicated diagrammatically at 69. Thus, as the pedal of the control member is pressed, the speed is increased or diminished as desired.

In Fig. 6 there is illustrated a modified form of the invention in which the motor 20a is mounted upon a stand 15a in co-axial relation to the flyer, the tubular spindle 19a of the flyer constituting the shaft of the motor. The spindle and flyer are thus directly driven by the motor, without the necessity for the pulley or other drive means, and without the necessity for additional bearing supports for the spindle. The cam 50 for operating the bobbin is driven from the spindle 19a in the same manner as in the first embodiment of the invention.

In Fig. 7 there is illustrated another modified form of the invention, wherein a separate electric motor 70 is provided for driving the cam 50, the cam shaft 48 being provided with a spiral

gear 71 engaged by a spiral pinion 72 secured to the motor shaft. The starting and stopping and speed control of the motor 70 is synchronized with that of the motor 20a by connecting the two motors in parallel to the control unit 69.

I have illustrated and described preferred and satisfactory embodiments of the invention, but it will be understood that changes may be made therein, within the spirit and scope thereof, as defined in the appended claims.

What is claimed is:

1. In a high-speed hand-fed spinning machine, a supporting stand, a tubular flyer spindle rotatably mounted on said stand for rotation about a horizontal axis, a motor for driving said spindle, a flyer carried upon said spindle, a bobbin support mounted upon said stand, a horizontally disposed reciprocating bobbin shaft carried by said support in co-axial relation with said flyer spindle, and a bobbin supporting stem rotatably carried by said reciprocating shaft in co-axial relation with said flyer spindle and adapted through reciprocation of such shaft to move to and fro with respect to said flyer spindle and flyer.

2. In a high-speed hand-fed spinning machine, having a supporting stand, a tubular flyer spindle rotatably mounted on said stand for rotation about a horizontal axis, a motor for driving said spindle, a flyer carried upon said spindle, and a bobbin support mounted upon said stand, a horizontally disposed tubular reciprocating bobbin shaft carried by said support in co-axial relation with said flyer spindle, a bobbin spindle rotatably carried within said reciprocating shaft in co-axial relation with said flyer spindle and adapted through reciprocation of such shaft to move to and fro with respect to said flyer spindle and flyer, and a bobbin supporting stem carried upon the forward end of said bobbin spindle.

3. In a high-speed hand-fed spinning machine, having a supporting stand, a tubular flyer spindle rotatably mounted on said stand for rotation about a horizontal axis, a motor for driving said spindle, a flyer carried upon said spindle, and a bobbin support mounted upon said stand, a reciprocating bobbin shaft carried by said support in co-axial relation with said flyer spindle, radially adjustable anti-friction roller means supporting said shaft, and a bobbin supporting stem rotatably carried by said reciprocating shaft in co-axial relation with said flyer spindle and adapted through reciprocation of such shaft to move to and fro with respect to said flyer spindle and flyer.

4. In a high-speed hand-fed spinning machine, having a supporting stand, a tubular flyer spindle rotatably mounted on said stand for rotating about a horizontal axis, a motor for driving said spindle, a flyer carried upon said spindle, and a bobbin support mounted upon said stand, a tubular reciprocating bobbin shaft carried by said support in co-axial relation with said flyer spindle, anti-friction bearing units carried within said reciprocating shaft, a bobbin spindle rotatably supported by said bearing units of said reciprocating shaft in co-axial relation with said flyer spindle and adapted through reciprocation of such shaft to move to and fro with respect to said flyer spindle and flyer, and a bobbin supporting stem carried upon the forward end of said bobbin spindle.

5. In a high-speed hand-fed spinning machine, a supporting stand, a motor, a tubular flyer spindle constituting the shaft of said motor, a flyer carried upon said spindle, a bobbin support mounted upon said stand, a reciprocating bobbin shaft carried by said support in co-axial relation with said flyer spindle, and a bobbin supporting stem rotatably carried by said reciprocating shaft in co-axial relation with said flyer spindle and adapted through reciprocation of such shaft to move to and fro with respect to said flyer spindle and flyer.

6. In a high-speed hand-fed spinning machine, a supporting stand, a motor, a tubular flyer spindle constituting the shaft of said motor, a flyer carried upon said spindle, a bobbin support mounted upon said stand, a reciprocating bobbin shaft carried by said support in co-axial relation with said flyer spindle, actuating means for reciprocating said shaft, means driven by said motor for driving said actuating means, and a bobbin supporting stem rotatably carried by said reciprocating shaft in co-axial relation with said flyer spindle and adapted through reciprocation of such shaft to move to and fro with respect to said flyer spindle and flyer.

7. In a high-speed hand-fed spinning machine, a supporting stand, a motor, a tubular flyer spindle constituting the shaft of said motor, a flyer carried upon said spindle, a bobbin support mounted upon said stand, a reciprocating bobbin shaft carried by said support in co-axial relation with said flyer spindle, actuating means for reciprocating said shaft, a second motor for driving said actuating means, and a bobbin supporting stem rotatably carried by said reciprocating shaft in co-axial relation with said flyer spindle and adapted through reciprocation of such shaft to move to and fro with respect to said flyer spindle and flyer.

8. In a high-speed hand-fed spinning machine, a supporting stand, a motor, a tubular flyer spindle constituting the shaft of said motor, a flyer carried upon said spindle, a bobbin support mounted upon said stand, a reciprocating bobbin shaft carried by said support in co-axial relation with said flyer spindle, actuating means for reciprocating said shaft, a second motor for driving said actuating means, a single control means connected to said two motors, and a bobbin supporting stem rotatably carried by said reciprocating shaft in co-axial relation with said flyer spindle and adapted through reciprocation of such shaft to move to and fro with respect to said flyer spindle and flyer.

9. The invention as defined in claim 1, further characterized by frictional drag means associated with said stem adapted to resist its rotational movement.

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