Jan. 12, 1926. 1,569,487

T. HARRIS

ARTIFICIAL FILAMENT SPINNING FRAME

Filed August 27, 1925 3 Sheets-Sheet 1

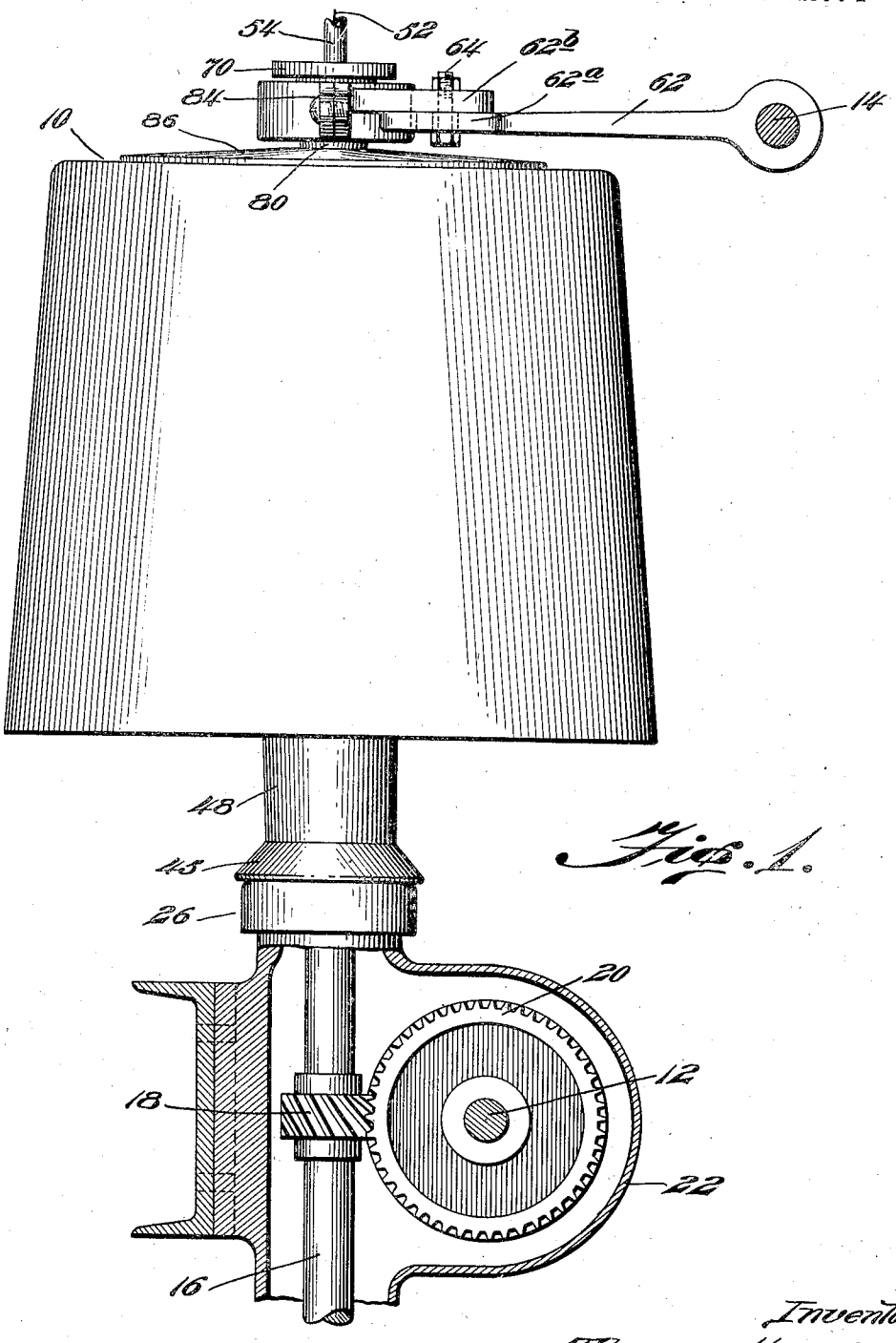


Fig. 1.

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Fig. 2.

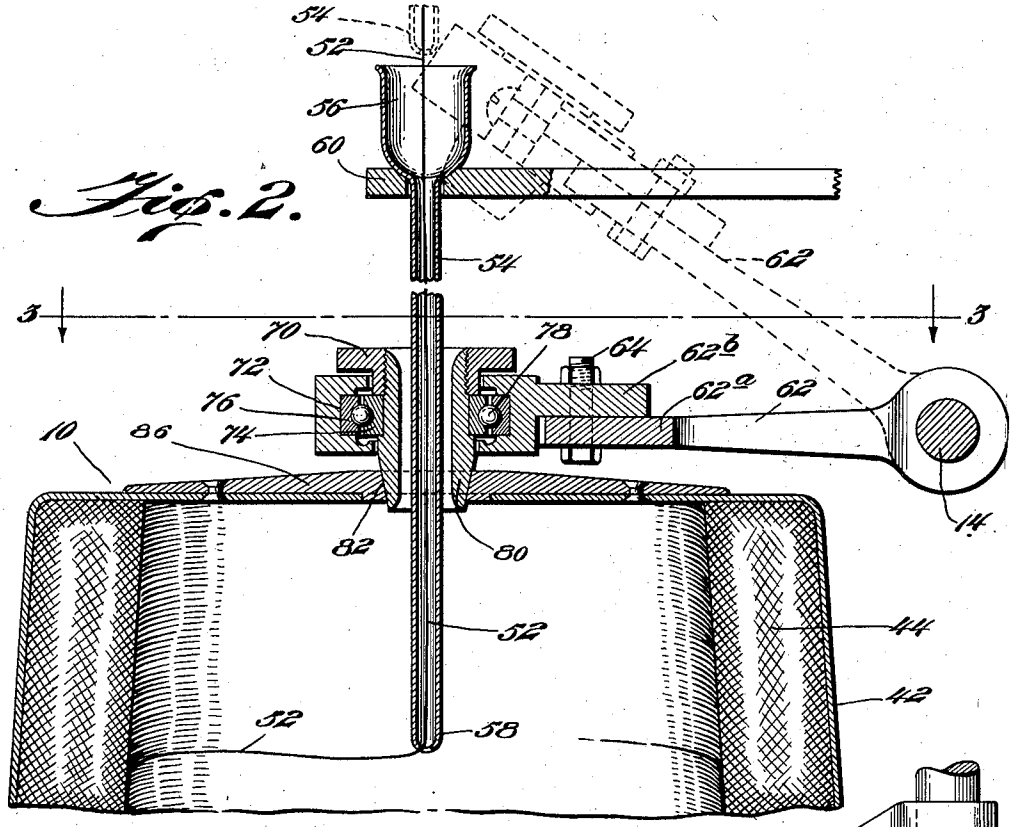
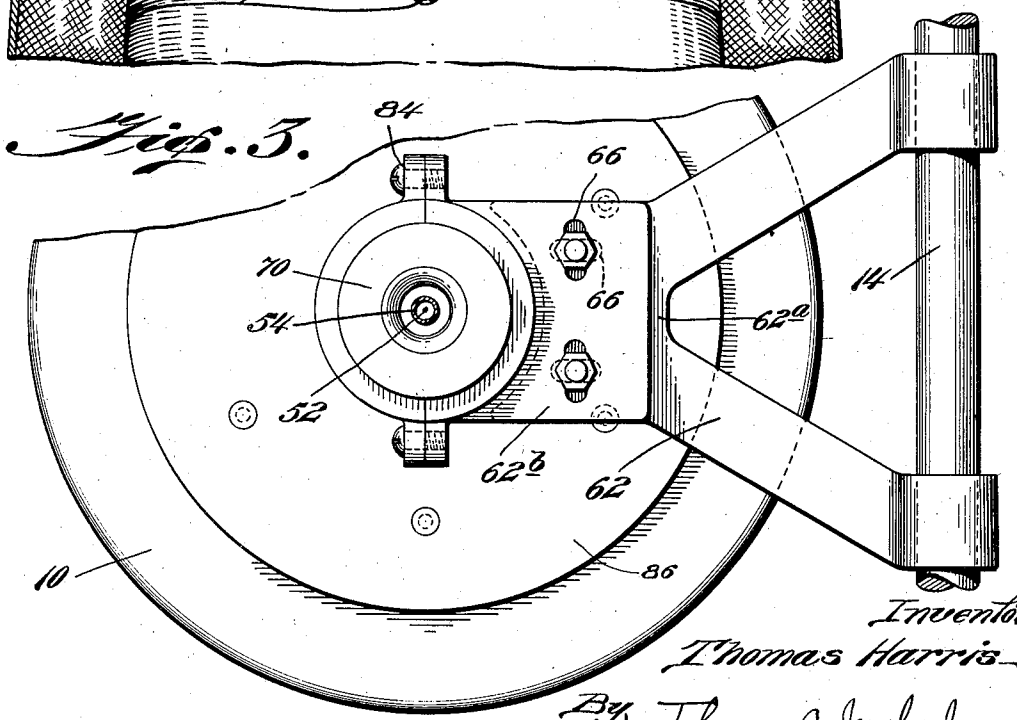


Fig. 3.



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Fig. 4.

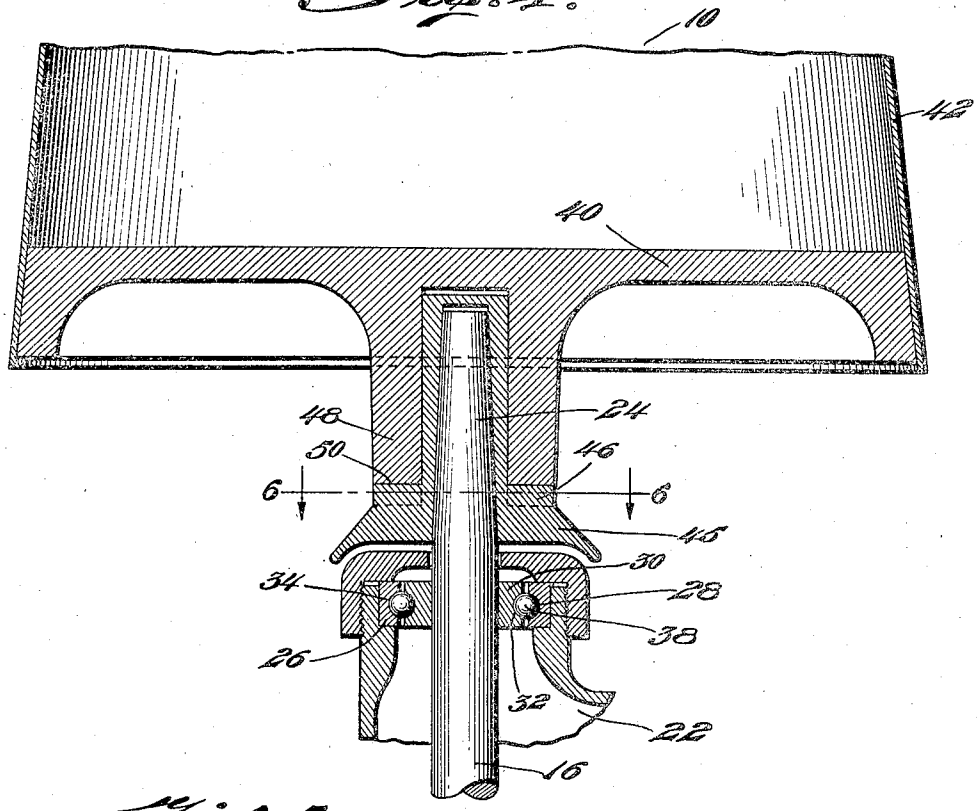


Fig. 5.

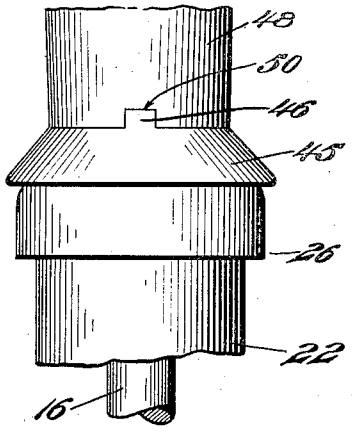
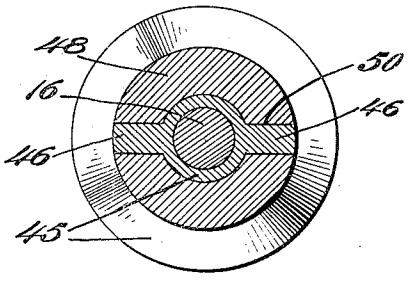


Fig. 6.



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Patented Jan. 12, 1926. 1,569,487

UNITED STATES PATENT OFFICE.

THOMAS HARRIS, OF WOONSOCKET, RHODE ISLAND.

ARTIFICIAL FILAMENT SPINNING FRAME.

Application filed August 27, 1925. Serial No. 52,765.

To all whom it may concern:

Be it known that THOMAS HARRIS, a citizen in the United States, residing at Woonsocket, in the county of Providence and State of Rhode Island, has invented certain new and useful Improvements in Artificial Filament Spinning Frames, of which the following is a specification.

My invention relates to improvements in machines for spinning strands of artificial fibres, filaments or the like and comprises in combination means to center and support the upper ends of the spinning boxes thereof during the spinning process.

After the fibre, or filament has been formed in the spinneret or other machine in the usual manner, it is led through a glass tube and spun into a cheese inside of a rotating spinning box. A plurality of spinning boxes are normally mounted on a frame generally similar to a cotton spinning frame and are suitably simultaneously driven. Hitherto as no supports have been provided for the upper ends of the spinning boxes they have had to be frictionally driven for if positively driven and allowed to be brought to full speed at once, being top heavy they would wobble severely and tend to fly off. Thus it has been necessary to employ a friction drive to ease the starting up of the machine. Due to the slippage of the friction drive these machines have been very inefficient, the spinning boxes being driven at varying speeds less than full speed a great portion of the time, and thus not imparting the desired amount of twist per unit length to the filament. By centering and supporting the upper ends of the spinning boxes, I permit a positive drive therefor to be used, thereby eliminating the necessity for a friction drive with its consequent loss of efficiency and permitting the machines to be brought to full speed almost at once and continuously run without slipping. As I preferably also clamp down the upper ends of the rotating spinning boxes I provide means to center and support them so they will not wobble or fly off in use. The type of spinning machines to which my invention relates is admittedly the best type of machine for spinning artificial silk but prior to my invention this type of machine has generally been considered inefficient and actually dangerous to the workmen.

Employing my invention, the spinning boxes may be rotated at a greater speed than formerly, thereby giving a greater amount of twist per unit length to the filament than hitherto thought possible, thus greatly increasing the strength of the spun filament.

Employing my invention the size of the spinning boxes themselves may be increased. In actual practice I have doubled the diameter of the spnning boxes thereby many times increasing their volume. A further difficulty in employing machines of this type has been the long time spent in and the labor cost of frequent doffing. As I greatly increase the size of the spinning box and decrease the frequency of doffing the labor cost of operation is much cut down. Hitherto due to the small size of the spinning box the artificial silk or other fibre had to be knotted between each run, thus providing a large number of objectionable knots in the finished yarn. Employing my invention the number of necessary knots and the labor cost of knotting are greatly decreased, and the finished product greatly improved.

As I provide means to accurately align and hold in centered position the spinning boxes rotating at a high speed it is obvious that the yarn will be distributed evenly on the cheese as the radial distance of the guiding tube from the edge of the cheese is always constant. Hitherto with wobbly spinning boxes this radius has been apt to vary, thereby producing objectionable kinks in the yarn.

These and such other objects as may hereinafter appear will be best understood from a description of one embodiment thereof such as is shown in the accompanying drawings.

In the drawings, Fig. 1 is a side elevation of a spinning box employing my invention and including the driving means thereof.

Fig. 2 is a sectional view of the upper end of the spinning box with my invention attached, the raised position of the supporting arm and rotating collar being shown in dotted lines.

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2.

Fig. 4 is a sectional view of the base of the spinning box illustrating in detail the positive drive I preferably employ.

Fig. 5 is a detailed side elevation illustrating the positive drive connection between the spindle and spinning box.

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 4.

In the drawings, wherein like characters of reference indicate like parts throughout, I show one rotating spinning box 10 of the plurality normally employed on this type of spinning frame, with its suitable rotating means and the means I employ to center and support the upper end thereof. It is obvious however, that the plurality of spinning boxes 10 are mounted on the frame and are all simultaneously driven in similar fashion from a common driving shaft 12 which extends longitudinally of the frame and that the means for centering and supporting the upper ends of each rotating spinning box are suitably pivoted to a common shaft 14 which is preferably the usual side bar of the spinning frame. Though it is obvious that a plurality of these spinning boxes are normally simultaneously driven in the frame, in the specification and claims I will refer to one spinning box 10 only. The spindle 16 extends vertically upwards from the frame of the machine, and has the spiral gear 18 for driving purposes mounted thereon, which is driven by the spiral gear 20 suitably mounted on the driving shaft 12, which as explained is common to the driving elements of all the spindles on the frame. The lower end of the spindle may be suitably enclosed within the housing 22. The upper end 24 of the rotating spindle, (Fig. 4) is suitably centered on the frame by means of the bearing 26. Though any type of bearing 26 may be employed I preferably employ the ball race 28, which as shown comprises the usual collar 30 firmly secured to the upper end 24 of the rotating spindle 16 having the circumferential ball receiving channel 32 on the periphery thereof, the cooperating ball receiving channel 34 on the interior of the bearing 26, and the balls 38 mounted in the usual fashion within said channels 32 and 34 to permit revolution of the spindle 16 therein.

The usual spinning box 10 is mounted on the upper end of the rotating spindle 16. This comprises the usual base 40 and detachable cover 42. As usual the spinning box 10 is of substantially cylindrical shape and is preferably slightly upwardly tapered so that the cover 42 may be readily removed from the base 40 thereof to permit withdrawal of the cheese 44.

As stated previously the main feature of my invention is, in combination, means to center, support and align the upper ends of the rotating spinning boxes so that the size of the boxes 10 may be greatly increased as well as the speed of revolution thereof. In combination with said means I preferably employ a positive drive for said rotating spinning box 10, though it is obvious that a frictional drive with its loss of efficiency still may be employed if desired. To form a positive drive connection between said rotating spindle 16 and spinning box 10 I preferably secure the collar 45 to the upper end 24 of the rotating spindle 16 and I preferably provide the upper edge of said collar 45 with the upwardly extending splines 46, (Fig. 5). I provide the base 40 of said spinning box within the sleeve 48 projecting downwardly from the center thereof and I provide on the lower end of said sleeve the grooves 50 to receive the splines 46 of said spindle collar 45 therein to secure a positive drive of said spinning box.

As stated the filament 52 is suitably formed as usual in the spinneret or in the plurality of spinnerets and is brought to the guide tube 54, (Fig. 2). The filament 52 is led through the cup 56 on the upper end of the guide tube 54, projects through the lower end 58 thereof, and is spun and radially wound into the cheese 44 formed from the outside inwards within the spinning box 10. The spinning tube 54 is non-rotatably held by the support 60. The plurality of tubes 54 and the supports 60 are vertically reciprocated or traversed up and down by the usual means not shown, to suitably wind the spun filament 52 up and down within the spinning box 10 to form the cheese 44. As stated the chief feature of my invention comprises in combination means attached to said machine to center and support the upper ends of said rotating spinning boxes to secure them against vertical and horizontal movement. The preferred embodiment of this means is as follows. On the side bar 14 of the machine frame, I mount the plurality of supporting arms 62 suitably spaced thereon so that there will be one for each spinning box. If desired for adjustment as shown said arms 62 may comprise the two arms 62^a and 62^b longitudinally and transversely relatively adjustable by means of the bolts 64 in the longitudinal and transverse slots 66 thereof. On the outer end of said arm 62 I rotatably mount in any suitable fashion the rotatable collar 70. Though any means may be provided to suitably mount said rotating collar 70 on the end of said supporting arm 62 I preferably employ the ball race 72, which comprises the cooperating complementary peripheral channels 74 and 76 on the collar 70 and outer end of the arm 62 having the rotating balls 78 therein.

It is obvious that the vertically reciprocal non-rotating guide tube 54 may reciprocate up and down and be contained within the rotating collar 70. To clamp the rotating collar 70 within the rotating spinning box 10

to secure said rotating spinning box against vertical and horizontal movement I preferably downwardly taper the lower end 80 of said rotating collar 70 and I provide in the center of the top of the cover 42 of the rotating spinning box 10 the complementary downwardly tapered hole 82. It is obvious that the tapered lower end 80 of the collar 70 securely fitting within the tapered hole 82 in the top of the cover of the spinning box 10 may revolve therewith and that the collar 70 suitably revolubly mounted as explained on the arm 62, clamps down and supports the upper end of the rotating spinning box 10. I preferably provide the outer end of the arm 62 with the detachable half bearing 84 which may be readily removed if desired. The weighted reinforcing disc 86 may be attached to the top of the cover 42 of the spinning box 10, if desired.

After the cheese 44 has been spun to the desired size, in order to doff, it is merely necessary to reciprocate the guide tube 54 to its uppermost position as shown in dotted lines in Fig. 2 and to raise the rotating collar 70 away from the upper end of the rotating spinning box 10 thereby giving room to remove the cover 42 of the spinning box away from the base 40 thereof to permit withdrawal of the cheese 44. After the cheese 44 has been removed, the cover 42 is replaced, the pivoted arm 62 swung down until the tapered lower end 80 of the rotating collar 70 compactly registers in the cooperating tapered hole 82 in the upper end of the spinning box 10 to securely clamp down said spinning box 10 when after the machine is started up the end 52 is again fed through the reciprocating tube 54 and a new cheese 44 is spun as usual.

It is obvious that by providing means to center and support the upper end of the rotating spinning box that I have eliminated the kinkly yarn formed by wobbly spinning boxes, that I have permitted a positive drive to be employed, that I have made possible a greater twist to be imparted to the yarn, that I have permitted a much larger box to be employed, thus eliminating the large number of knots formerly necessary, and the cost of frequent doffing.

It is understood that my invention is not limited to the specific embodiment shown and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What I claim as new and desire to secure as Letters Patent is:

1. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle, a spinning box revolved thereby, means to positively engage said spinning box with said spindle to secure a positive drive thereof and means attached to said machine independently of said spindle to center and support the upper end of said rotating spinning box.

2. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle, a spinning box revolved thereby, and means attached to said machine independently of said spindle to center and support the upper end of said rotating spinning box.

3. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle, a spinning box revolved thereby, means to positively engage said spinning box with said spindle to secure a positive drive thereof and means attached to said machine to support the upper end of said rotating spinning box.

4. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle, a spinning box revolved thereby and means attached to said machine to support the upper end of said rotating spinning box.

5. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle mounted by means of a ball race on a bearing on the machine frame having a collar thereon with upwardly extending splines, a spinning box of substantially cylindrical shape upwardly tapered having a sleeve projecting downwardly from the center of the base thereof having grooves on the lower end thereof to receive the splines of said spindle collar to secure a positive drive of said spinning box and a downwardly tapered hole in the center of the top thereof, means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a downwardly tapered lower end adapted to register in said tapered hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm by means of a ball race and a vertically reciprocal yarn guide tube projecting through said rotating collar within said spinning box.

6. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle having a collar thereon with upwardly extending splines, a spinning box of substantially cylindrical shape upwardly tapered having a sleeve projecting downwardly from the center of the base thereof having grooves on the lower end thereof to receive the splines of said spindle collar to secure a positive drive of said spinning box and a downwardly tapered hole in the center of the top thereof, means attached to said

machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a downwardly tapered lower end adapted to register in said tapered hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm and a vertically reciprocal yarn guide tube projecting through said rotating collar within said spinning box.

7. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle mounted by means of a ball race on a bearing on the machine frame, a spinning box of substantially cylindrical shape upwardly tapered having a downwardly tapered hole in the center of the top thereof rotated thereby, means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a downwardly tapered lower end adapted to register in said tapered hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm by means of a ball race and a vertically reciprocal yarn guide tube projecting through said rotating collar within said spinning box.

8. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle mounted by means of a ball race on a bearing on the machine frame having a collar thereon with upwardly extending splines, a spinning box of substantially cylindrical shape upwardly tapered having a sleeve projecting downwardly from the center of the base thereof having grooves on the lower end thereof to receive the splines of said spindle collar to secure a positive drive of said spinning box and a hole in the center of the top thereof, means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a lower end adapted to register in said hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm by means of a ball race and a vertically reciprocal yarn guide tube projecting through said rotating collar within said spinning box.

9. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle mounted by means of a ball race on a bearing on the machine frame having a collar thereon with upwardly extending splines, a spinning box of substantially cylindrical shape upwardly tapered having a sleeve projecting downwardly from the center of the base thereof having grooves on the lower end thereof to receive the splines of said spindle collar to secure a positive drive of said spinning box and a downwardly tapered hole in the center of the top thereof, and means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a downwardly tapered lower end adapted to register in said hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm by means of a ball race.

10. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle, a spinning box of substantially cylindrical shape upwardly tapered having a downwardly tapered hole in the center of the top thereof rotated thereby, means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a downwardly tapered lower end adapted to register in said tapered hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm and a vertically reciprocal yarn guide tube projecting through said rotating collar within said spinning box.

11. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle having a collar thereon with upwardly extending splines, a spinning box of substantially cylindrical shape upwardly tapered having a sleeve projecting downwardly from the center of the base thereof having grooves on the lower end thereof to receive the splines of said spindle collar to secure a positive drive of said spinning box and a downwardly tapered hole in the center of the top thereof, and means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a downwardly tapered lower end adapted to register in said tapered hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm.

12. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle having a collar thereon with upwardly extending splines, a spinning box of substantially cylindrical shape upwardly

tapered having a sleeve projecting downwardly from the center of the base thereof having grooves on the lower end thereof to receive the splines of said spindle collar to secure a positive drive of said spinning box and a hole in the center of the top thereof, means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a lower end adapted to register in said hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm and a vertically reciprocal yarn guide tube projecting through said rotating collar within said spinning box.

13. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle mounted by means of a ball race on a bearing on the machine frame, a spinning box of substantially cylindrical shape upwardly tapered having a hole in the center of the top thereof rotated thereby, means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a lower end adapted to register in said hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm by means of a ball race and a vertically reciprocal yarn guide tube projecting through said rotating collar within said spinning box.

14. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle mounted by means of a ball race on a bearing on the machine frame, a spinning box of substantially cylindrical shape upwardly tapered having a downwardly tapered hole in the center of the top thereof rotated thereby, and means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a lower end adapted to register in said tapered hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm by means of a ball race.

15. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle mounted by means of a ball race on a bearing on the machine frame having a collar thereon with upwardly extending splines, a spinning box of substantially cylindrical shape upwardly tapered having a sleeve projecting downwardly from the center of the base thereof having grooves on the lower end thereof to receive the splines of said spindle collar to secure a positive drive of said spinning box and a hole in the center of the top thereof, and means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a lower end adapted to register in said hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm by means of a ball race.

16. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle, a spinning box of substantially cylindrical shape upwardly tapered having a hole in the center of the top thereof rotated thereby, means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a lower end adapted to register in said hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm and a vertically reciprocal yarn guide tube projecting through said rotating collar within said spinning box.

17. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle, a spinning box of substantially cylindrical shape upwardly tapered, having a downwardly tapered hole in the center of the top thereof rotated thereby, and means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a downwardly tapered lower end adapted to register in said tapered hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm.

18. In a machine for producing a yarn from a strand of artificial fibre, filament or the like, the combination of a rotating spindle mounted by means of a ball race on a bearing on the machine frame, a spinning box of substantially cylindrical shape upwardly tapered having a hole in the center of the top thereof rotated thereby, and means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a lower end adapted to register in said hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm by means of a ball race.

19. In a machine for producing a yarn

from a strand of artificial fibre, filament or the like, the combination of a rotating spindle, a spinning box of substantially cylindrical shape upwardly tapered having a hole in the center of the top thereof rotated thereby, and means attached to said machine to center and support the upper end of said rotating spinning box comprising an arm pivoted to a portion of the machine and a collar having a lower end adapted to register in said hole in said spinning box to secure said spinning box against vertical and horizontal movement revolubly mounted on said pivoted arm.

In testimony whereof I affix my signature.

THOMAS HARRIS.