May 29, 1928. 1,671,425

J. A. HEANY

PROCESS AND APPARATUS FOR MAKING ASBESTOS YARN

Filed Aug. 1, 1925 2 Sheets-Sheet 1

Fig. 1.

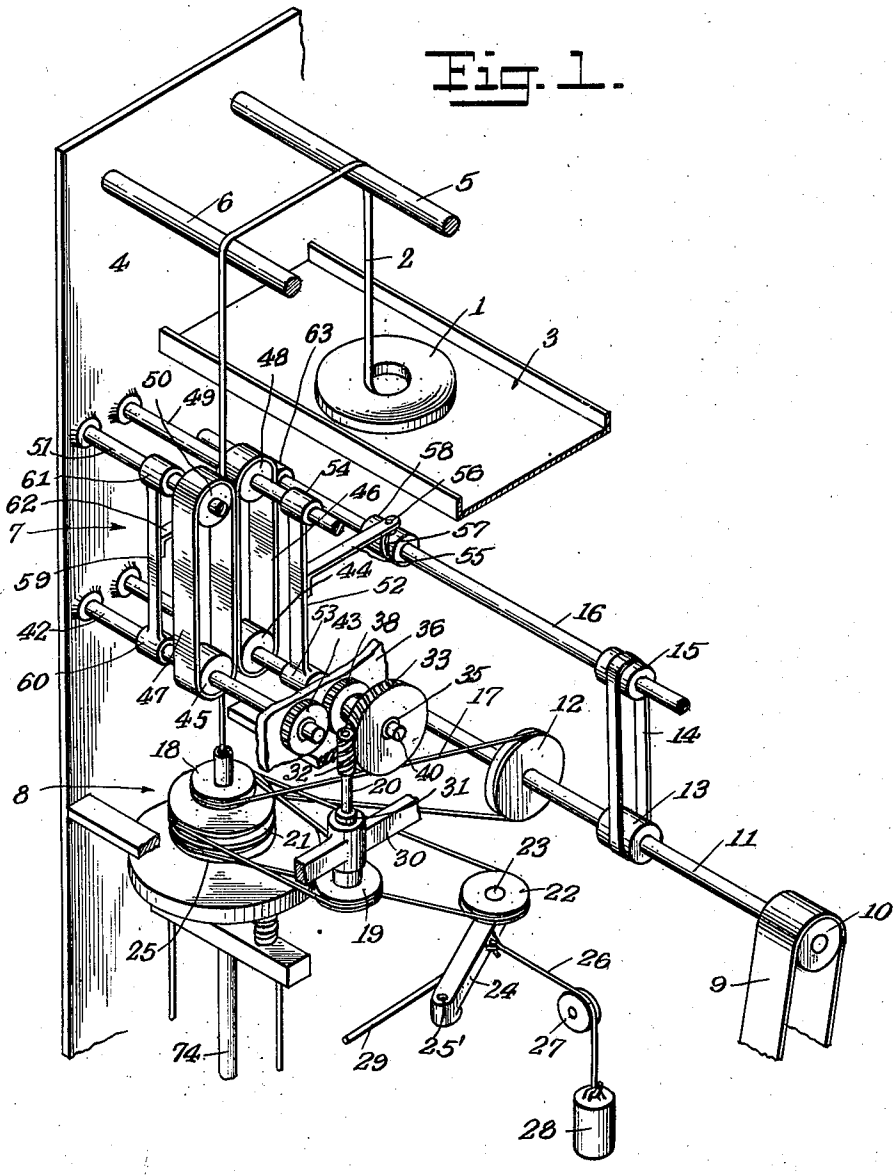
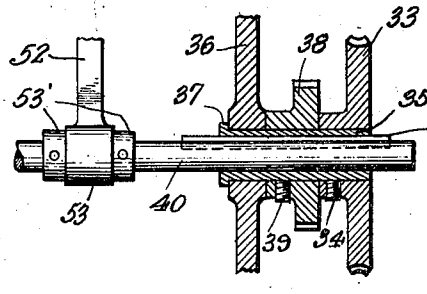


Fig. 2.



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Fig. 3.

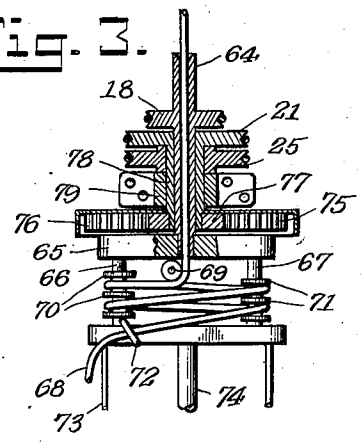


Fig. 5.

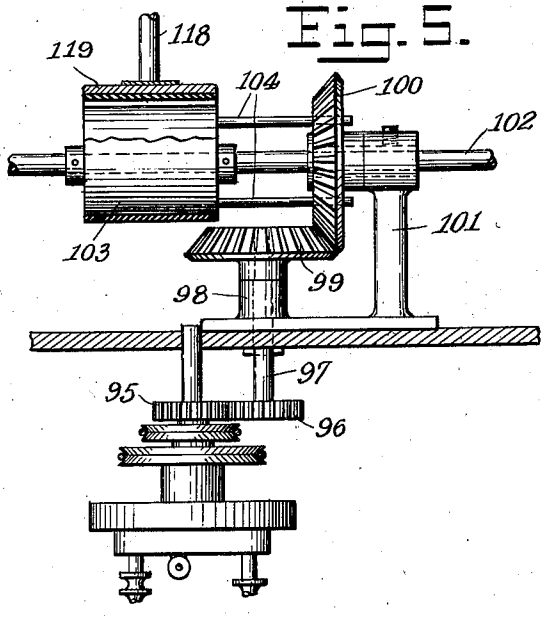
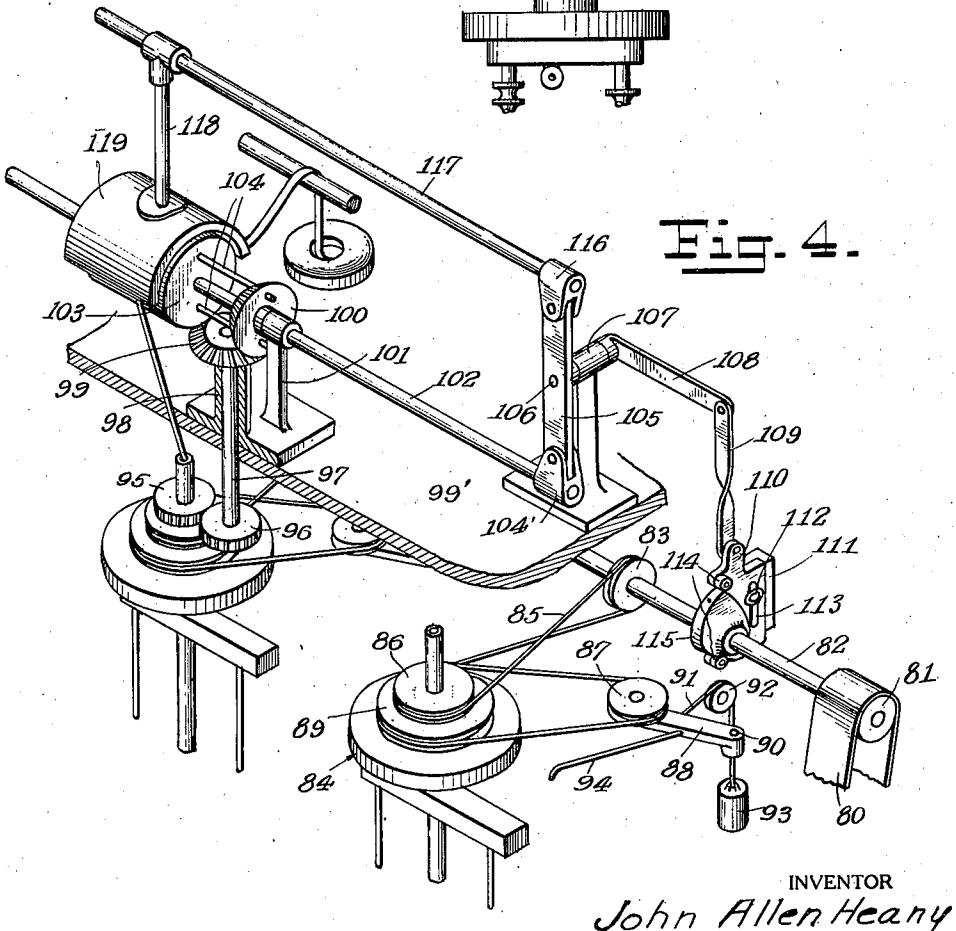


Fig. 4.



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UNITED STATES PATENT OFFICE.

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PROCESS AND APPARATUS FOR MAKING ASBESTOS YARN.

Application filed August 1, 1925. Serial No. 47,423.

This invention relates to the manufacture of yarns and more particularly to a method of and apparatus for making yarns from strips of material such as paper.

In making yarns from short fibered and non-coherent material, such for example, as short asbestos fiber, it has been customary to mix the short fibers with longer fibers of other material and to form rovings from which the yarns are made. In many cases the presence of fibers of different material in the finished yarn is undesirable. To avoid the use of such different material to assist in forming the yarn it has been proposed to form the short fibers into a paper-like strip made of sufficient strength to form the yarn from one or more of these strips with or without one or more reinforcing or binding filaments. Preferably the strip is formed with a binder which is such as to be easily loosened as, for example, by moistening so that the paper-like material may be formed or moulded during the process of manufacture. Furthermore, such paper-like strip of non-coherent fibers is of low tensile strength and it is therefore desirable to feed the strip at low tension and to form it as soon as possible into a strand of greater strength than the original strip and thereby avoid breakage during the later steps of manufacture.

An object of the invention is to provide improved and effective means for forming yarns, particularly from such kinds of material as referred to above.

An important object of the present invention is to provide novel and improved mechanism for readily and efficiently rubbing and twisting strands of material as specified above.

Another object of the invention is to provide new and improved means for subjecting a strand to successive operations of rubbing and twisting in forming a yarn.

A further object of the invention is to provide combined rubbing and twisting mechanism of compact arrangement and adapted for combination and operation in sets of such units.

Other objects of the invention are to provide improved means for reciprocating the cooperating rubbing elements between which the strand or strip passes, to provide novel and advantageous means for actuating the twister and the feeding part of the rubbing mechanism, to provide means whereby the twisting mechanism and the advancing means of the rubbing mechanism may easily be thrown out of action, and to provide a new and improved method of making yarn.

Other objects and advantages will hereinafter appear as brought out in the specification and appended claims.

In the drawings:

Figure 1 is a diagrammatic perspective view illustrating one embodiment of the invention.

Figure 2 is a sectional view showing details of the means for driving the rubbing mechanism;

Figure 3 is a sectional view showing the construction of the twister;

Figure 4 is a diagrammatic perspective view of a second embodiment of the invention; and

Figure 5 is a view, partly in section, showing the driving connection between the twister and the rubbing device.

While the mechanism is suitable for use with other material it is especially adapted for forming coreless yarns from paper-like strips of short fibered material, such as asbestos, held together by a binder which may be loosened by moistening the material.

Referring to Figure 1, a roll, 1, of paper strip 2 is placed in a tray 3 supported at its ends on standards 4 of a frame, only one of such standards being shown. From the roll 1 the paper strip 2 is passed upwardly to a guide or rod 5 supported in the standards and over said guide to a second guide 6 from which the strip passes to a rubbing device 7, where it is formed into a round strand, and then to a twisting device 8 where the strand is given a twist and wound on a spool (not shown). To obtain the best results, the paper strip 2 may be moistened before subjecting it to the rubbing operation and this may be effected by moistening the roll 1 before it is placed in the tray 3.

Power for actuating the rubbing device 7 and the twister 8 may be supplied by means of a belt 9 to a pulley 10 fixed on a shaft 11 extending across the machine and having fixed thereon a pulley 12 from which is driven the twister 8 and the rotary parts of the rubber 7. The shaft 11 is also provided with a pulley 13 fixed thereon and connected by means of a belt 14 with a pul-

ley 15 fixed on a shaft 16 through which the reciprocating parts of the rubbing device 7 are actuated.

Power is transmitted from the pulley 12 by means of a cord or belt 17 which passes from the upper part of the pulley 12 to and around a pulley 18 of the twister, from the pulley 18 to and around a pulley 19 on a shaft 20, journaled in a fixed part of the frame, from the pulley 19 around a second pulley 21 of the twister, from the pulley 21 of the twister to an idle pulley 22 carried by a pivot 23 on a control arm 24, and from the pulley 22 around an idle pulley 25 on the twister back to the pulley 12.

The arm 24 is mounted to swing about a pivot 25′ and is normally held in position to tension the cord or belt 17 by means of a flexible member 26 secured at one end to the arm 24 and extending therefrom over a pulley 27, the other end thereof being connected with a suitable weight 28. Projecting from the arm 24 towards the front of the machine is an arm or handle 29 by means of which the tension of the belt 17 may be relieved when desired.

The pulley 19 is secured to the lower end of the shaft 20 which is journaled in a bracket 30 and held from downward movement by a collar 31 fixed thereon and engaging the upper surface of the bracket 30. Fixed on the shaft 20 is a worm 32 meshing with a worm gear 33 of which the hub is secured by means of a set screw 34 to a sleeve 35 journaled in a member 36 of the frame, sleeve 35 being held against movement in one direction by a flange 37 which engages one side of the member 36. Between the gear 33 and the member 36 the sleeve 35 carries a gear 38 which is fixed thereto by means of a set screw 39. The hub of the gear 39 also engages one side of the member 36 and in connection with the flange 37 prevents longitudinal movement of the sleeve 35 in the member 36. Passing through the sleeve 35 is a shaft 40 which is also journaled in a fixed part of the machine, here shown as the standard 4 at the left of the Figure 1. This shaft 40 is mounted for longitudinal reciprocation with reference to the sleeve 35, and is connected thereto for rotation by means of a key 41 seated in a longitudinal slot in the shaft 40 and extending into a corresponding slot extending the whole length of the sleeve 35.

Provision is also made of a shaft 42 mounted for longitudinal movement and having a driving connection with a gear 43 retained in position against the side of the member 36 and in mesh with the gear 38. The shafts 40 and 42 are provided with adjacent pulleys 44 and 45 respectively around which pass rubbing belts or aprons 46 and 47 respectively, the upper end of the belt 46 being supported by a pulley 48 fixed on a reciprocable shaft 49 and the belt 47 being supported at its upper end by a pulley 50 fixed on a reciprocable shaft 51. The belts 46 and 47 in addition to being driven in such a way as to feed the paper strip 2 downward therebetween to the twister are also utilized to rub the strip transversely and form it into a rounded strand. To this end provision is made of means for actuating the shafts 42 and 51 together in one direction while shafts 40 and 49 are moved in the opposite direction. For this purpose, use is made of a bracket 52 having at its ends sleeves 53 and 54 in which the shafts 40 and 49 are journaled, the shafts being held against longitudinal movement in these sleeves by any suitable means such as collars 53 fixed on the shafts at opposite ends of the sleeves. Extending rearwardly from the bracket 52 is arm 55 carrying a follower 56 which projects into a cam slot in a member 58 fixed on the shaft 16.

The shafts 42 and 51 are controlled by means of a second bracket 59 having at its ends sleeves 60 and 61 to receive respectively the shafts 42 and 51 which are rotatable therein but which are held against longitudinal movement therein. Extending rearwardly from the bracket 59 is an arm 62 which is connected by means, not shown, to a cam member 63 corresponding to the member 58 but having such a cam slot that when the bracket 52 is moved in one direction the bracket 59 is moved in the opposite direction.

The pulley 18 of the twister is fixed to a sleeve 64 through which the rounded strand passes from the rubbing apparatus 7. Fixed on the lower end of the sleeve 64 is a member 65 in which are journaled shafts 66 and 67 by means of which the twisted strand 68 is drawn through the twister to be wound on a spool not shown. Mounted on member 65 is a roller 69 around which the strand is guided from the bottom of the sleeve 64 to the shaft 65 between two discs 70 thereon. The strand is then passed from the shaft 66 to the shaft 65 between two discs 71 thereon, back to the shaft 66 between the second and third discs 70 thereon, then to the shaft 65 between the second and third discs 71, and then through a loop 72. From the loop 72 the strand passes through a loop (not shown), on the lower end of the flyer arm 73 and is wound on a spool (not shown) carried by a shaft 74 and given a reciprocating movement in the usual manner in order to obtain winding from end to end thereof.

Shafts 65 and 66 are used to draw the strand downwardly through the sleeve 64 and for this purpose are provided at their upper ends with gears 75 and 76 both meshing with the gear 77 on the lower end of the sleeve 78 carrying at its upper end the pul-

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ley 21. The sleeve 78 is mounted in a bracket 79 and is limited in its downward movement by the idle pulley 25 resting on the bracket and supporting the pulley 21. It will be seen that by mounting the idle pulley 25 in this manner a very compact arrangement is obtained.

It should be understood that, although Figure 1 shows means for rubbing and twisting only one paper strip, any desired number of such operating units could be arranged side by side across the machine.

According to the embodiment of the invention illustrated in Figures 4 and 5, power is supplied by means of a belt 80 to a pulley 81 on a shaft 82 on which are fixed one or more pulleys 83 for driving corresponding twisters 84 by means of cords or belts 85. In each case the belt 85 passes from the top of the pulley 83 around a pulley 86 mounted on an inner sleeve of the twister, then to a pulley 87 carried by a controlling arm 88, and finally around the pulley 89 on the outer sleeve of the twister back to the lower side of the pulley 83. The arm 88 is mounted to swing about a pivot 90 and the belt 85 is normally maintained at the proper tension by means of a cord 91 secured to the arm 88 and passing over a pulley 92, the lower end of the cord 91 being attached to a suitable weight 93. Projecting forwardly from the arm 88 is a handle 94 which may be used to swing the arm 88 to a position to release the tension on the belt 85.

The twister 84 is essentially the same as the twister 8 of the first embodiment but instead of having the idle pulley 25, is provided with a gear 95 secured to the pulley 86 and meshing with a gear 96 on the lower end of a shaft 97 mounted in a bracket 98 on a transverse frame member 99'. Fixed to the upper end of the shaft 97 is a bevel gear 99 meshing with a bevel gear 100 mounted for rotation in the bracket 101 but held against movement along its axis. Slidably mounted in the bevel gear 100 is a shaft 102 having thereon a drum 103 (preferably leather-covered) movable with the shaft 102 in its longitudinal movement but rotatable from the bevel gear 100 by means of pins 104 fixed in the bevel gear 100 and slidable in the drum 103.

At its right hand end (Figure 4) shaft 102 is pivotally connected by means of a member 104' with a lever 105 secured to a shaft 106 journaled in a bracket 107. At the other side of the bracket 107 from the lever 105, the shaft 106 is provided with an arm 108 connected by a substantially vertical link 109 with a member 110 mounted for reciprocation in a guide 111, being held in engagement therewith by a suitable member such as a bolt 112 passing through a slot 113 in the member 110 and secured to the guide 111. Projecting laterally from the slide 110 are two cam followers 114 which engage a cam 115 mounted on the shaft 82. At its upper end the lever 105 is connected by means of a member 116 with a reciprocable shaft 117 which is connected in turn by means of an arm 118 with a concave rubbing member 119 cooperating with the rubbing drum 103.

While I have disclosed herein preferred means for carrying out my invention, I wish it to be understood that I do not limit myself to the structure and arrangement shown and described herein but that various modifications and variations may be used without departing from the spirit of my invention.

Having thus described my invention, I claim:

1. In a machine of the class described, a twister comprising a twisting pulley and an adjacent feeding pulley mounted to turn about the axis of the twister, an idler pulley mounted adjacent the twisting and feeding pulleys to turn about the same axis, a driving pulley, a second idler pulley, a flexible band passing around all of said pulleys, and band tightening means connected with said idler pulley.

2. In a machine of the class described, a twister comprising a twisting pulley and a feeding pulley both mounted to turn about the axis of the twister, an idler pulley mounted adjacent the twisting and feeding pulleys to turn about the same axis, a driving pulley, a second idler pulley, and a flexible band passing about all of said pulleys.

3. In a machine of the class described, a twister comprising a twisting pulley and an adjacent feeding pulley both mounted to turn about the axis of the twister, a driving pulley, rub mechanism including a pulley for operating a part thereof, and a flexible band passing around all of said pulleys.

4. In apparatus of the class described, rub mechanism actuable by a worm gear; a worm cooperating with said worm gear; a shaft carrying said worm; a pulley on said shaft; a twister comprising feeding and driving pulleys; a main driving pulley; and a driving band extending around all of said pulleys.

5. In apparatus for making yarn, condensing means including a pair of elements between which a strand to be condensed is passed, a twister arranged to receive the condensed strand directly from the condensing means, and means actuated by the twister to effect a feeding movement of one of said elements.

6. In apparatus for making yarn, condensing means including a pair of elements between which a strand to be condensed is passed, a twister arranged to receive the condensed strand directly from the condensing means, and means actuated by the twister to

effect a feeding movement of one of said elements, and separate means for effecting a relative movement of transverse reciprocation between said elements.

7. In apparatus for making yarn, a twister, condensing means including advancing means and transverse rubbing means, actuating means common to the twister and said advancing means, and separate actuating means for the transverse rubbing means.

8. In apparatus for making yarn, a twister, condensing means including advancing means and transverse rubbing means, actuating means common to the twister and said advancing means, separate actuating means for the transverse rubbing means, and means for rendering said common actuating means ineffective.

9. In apparatus for making yarn, condensing means including two cooperating rubbing elements, means for reciprocating one of said rubbing elements transversely of a strand passing through the condensing means, means for rotating one of said elements including a pulley connected therewith, a twister comprising a twisting pulley and a feeding pulley, a driving pulley, and connecting means including a flexible band passed around all of the pulleys therefrom.

10. In a machine of the class described, a twister comprising a twisting pulley and a feeding pulley mounted to turn about the axis of the twister, a driving pulley and a connection between said driving pulley and the twister and feeding pulleys comprising a single band passing around all of said pulleys.

11. In a machine of the class described, a twister comprising a twisting pulley and an adjacent feeding pulley mounted to turn about the axis of the twister, an idle pulley mounted adjacent the twisting and feeding pulleys to turn about the same axis, a driving pulley, and a connection between said driving pulley and said twisting and feeding pulleys comprising a flexible band passing around all of said pulleys.

12. In apparatus of the class described, a twister comprising a twisting pulley and a feeding pulley, a condenser comprising advancing means and rubbing means, means for actuating the twisting and feeding pulleys and the advancing means including a connection between the twisting pulley and the advancing means, and means for actuating the rubbing means.

13. In apparatus of the class described, a vertical twister, rubbing belts immediately above said twister to deliver a strand thereto, a tray to support strip rolls immediately at the rear of the rubbing belts, and guiding means to receive the strip from the roll and deliver it downwardly to the rubbing belts.

14. In apparatus for making yarn, twisting means, and condensing means adapted to feed a strand to the twisting means and comprising a reciprocable shaft, a sleeve in which said shaft is slidable and which has an annular collar engaging one side of a member through which said sleeve projects, and means including a gear fixed on the projecting part of said sleeve for actuating said sleeve from said twister and for preventing longitudinal movement of said sleeve.

15. In apparatus for making yarn, a driving shaft, a compact unit comprising a condenser and a twister, and driving connections between the shaft and the condenser and twister of such unit, of such a character that a plurality of such units may be arranged along said shaft to be driven thereby.

16. In apparatus for making yarn, a driving shaft, a compact unit comprising a condenser, a twister and a support for a roll of paper strip to be fed to the twister, and means for connecting said shaft with the driven parts of such unit in such a manner that a plurality of such units may be arranged along said shaft to be driven thereby.

17. In apparatus of the character described, a twister comprising a twisting pulley, a twisting sleeve fixed thereto, a feeding pulley, a feeding pulley sleeve enclosing said twisting sleeve, and an idle pulley on the twisting sleeve.

18. In apparatus of the character described, a twister comprising a twisting pulley, a twisting sleeve fixed thereto, a feeding pulley, a feeding pulley sleeve enclosing said twisting sleeve, an idle pulley loosely mounted on said feeding pulley sleeve, a driving pulley, and a driving band extending around all of said pulleys to drive the twisting sleeve and the feeding sleeve.

19. In apparatus of the character described, condensing means including a continuous belt, belt-supporting means including two parallel shafts about which the belt passes, and means for reciprocating said shafts including a bracket in which said shafts are journaled, means to hold said shafts against longitudinal movement in said bracket, and means to reciprocate said bracket.

20. In apparatus of the character described, condensing means including a continuous belt, belt-supporting means including two parallel shafts about which the belt passes, and means for reciprocating said shafts including a member in which said shafts are journaled means to hold said shafts against longitudinal movement in said member, a follower fixed to said member, and cam means to cooperate with said follower and actuate said member.

21. In apparatus of the character described, condensing means including a continuous belt, belt-supporting means includ-

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ing two parallel shafts about which the belt passes. and means for reciprocating said shafts including a member in which said shafts are journaled, means to hold said shafts against longitudinal movement in said member, a follower fixed to said member, a shaft parallel to said parallel shafts and a cam on said shaft, to cooperate with said follower.

22. In a machine of the character described, a twister comprising an inner twisting sleeve through which a strand to be twisted passes and an outer feeding sleeve, means to actuate said sleeves, a rubbing device to act on the strand before it passes to the twister and including an actuating shaft, and means to actuate said shaft from one of said sleeves.

23. A method of making yarn which consists in moistening a paper like strip supplying the moistened strip substantially without drag and with a slight twist, rubbing said twisted strip transversely to form a strand, and twisting the strand, beginning at the point where the rubbing ends, to form a yarn.

24. A method of making yarn which consists in loosening the binder in a paper like strip formed with a binder, rubbing said strip transversely while the binder is in loosened condition and twisting the strand thus formed, beginning at the point where the rubbing ends, to form a yarn.

In testimony whereof, I affix my signature.

JOHN ALLEN HEANY.

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