Dec. 22, 1936. P. D. CANNON 2,064,821

ART OF SPINNING

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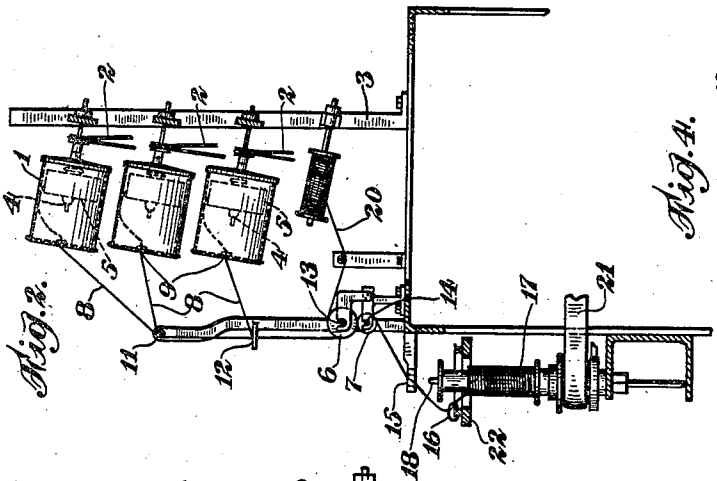


Fig. 2.

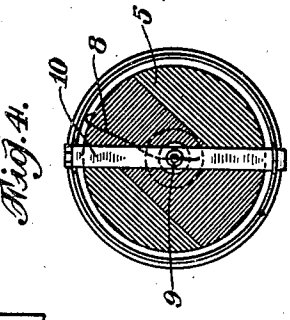


Fig. 4.

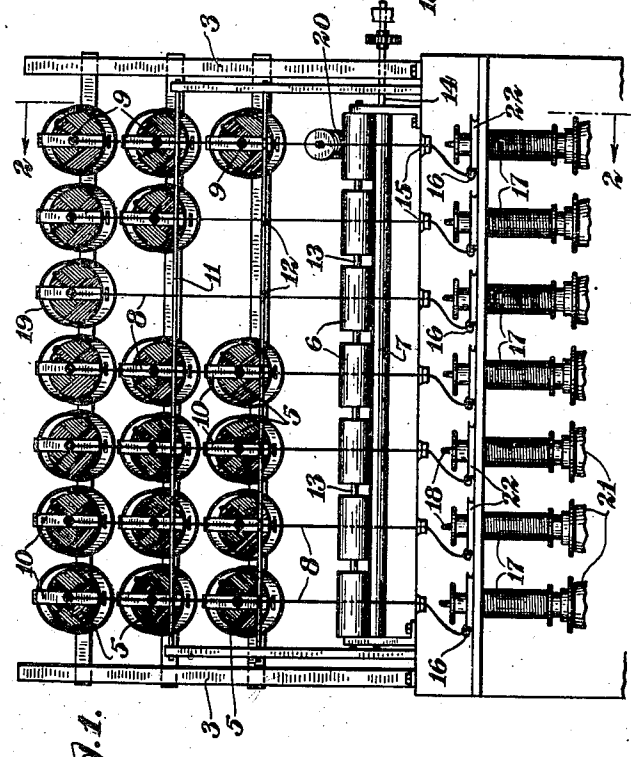


Fig. 1.

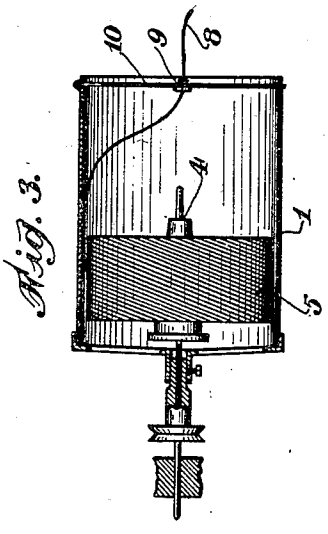


Fig. 3.

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ART OF SPINNING

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7 Claims. (Cl. 117—24)

This invention relates to the art of spinning and particularly to a method and machine for spinning short, difficultly spinnable fibers and forming either a single yarn or multiply yarn on one machine.

In conventional spinning of asbestos fibers, for example, the fibers to be spun are first formed into unspun or untwisted elongated masses or slivers, hereinafter referred to as roving. The roving is then formed into a self-sustaining unit or cheese. The roving is withdrawn from the cheese, by unrolling with friction drive, without spinning of the yarn, and is led to a rotating member or spindle and twisted at a point adjacent to the rotating member. The yarn may be led through a course of substantial length before being twisted or spun. Thus, in mule-spinning, the length of the course travelled by the incompletely spun strand may be as much as six feet. In spinning asbestos fibers by such methods, it has been found necessary to use a relatively long-fibered and expensive material, in order to minimize breakage of the strand before it is strengthened by twisting. Also, reenforcing wires are sometimes necessary.

The present invention comprises a method of spinning short asbestos fibers or the like at a point immediately adjacent to that at which the fibers, in the form of roving, are withdrawn from the cheese. Also, the invention comprises a method of forming a multiply yarn including a plurality of strands spun individually adjacent to the point of withdrawal from the cheese and then twisted together into the multiply yarn in one operation. Further, the invention comprises a machine for manufacturing the products described, including means for twisting the roving adjacent to the point of withdrawal from the cheese, means for leading one or a plurality of individual strands, so spun, in approximately parallel relationship to means for stopping the rotation of the spun strand or strands, and, when a plurality of strands are used, means for twisting the said strands with each other, in a direction opposite to that of the spin in the individual strands. The invention comprises also, first, spun asbestos yarn containing asbestos fibers that are shorter, on the average, than previously used in a self-sustaining yarn, that is, in the absence of wire-reenforcement or the like, and, second, spun asbestos yarn having not more than five twists to the linear inch of the individual strand.

The invention is illustrated in the drawing in which:

Fig. 1 shows a front view, partly diagrammatic, of a machine and assembly representing a preferred embodiment of the invention;

Fig. 2 shows a similar but side view taken on line 2—2 of Fig. 1 and partly in section;

Fig. 3 shows a longitudinal view, partly in section, of an apparatus used for rotating the self-sustaining unit of roving, with the unit in place; and

Fig. 4 shows an end view of the apparatus illustrated in Fig. 3.

In the various figures like reference characters denote like parts.

Thus, there are shown means for rotating a self-sustaining mass or unit of roving and leading it to a rotation-preventing point, comprising a can 1, provided with suitable driving mechanism, indicated generally at 2, and supported upon a framework 3. Inside the can there is a spindle and arbor assembly 4. Mounted upon the arbor is a cheese 5 of asbestos roving. Feeding and rotation-preventing means, including the top roll 6 and the lower or front roll 7, lead the strand 8 of asbestos, from the rotating cheese, through the guide 9, at the top of the can in the cross member 10, over the rod 11, and through a second guide or eyelet 12.

The guide 9 mounted at the top of the can and not substantially thereabove confines the ballooning of the roving inside the can. This minimizes the danger of breakage of the strand of difficultly spinnable fibers. The tendency to breakage of the strand is reduced also by the fact that the can or cylinder 1 surrounding the cheese is rotated synchronously therewith.

The can containing the cheese is rotated in such a direction, with respect to the direction of winding of the roving on the cheese, that the rotation alone would tend to tighten rather than unwind the roving. The said rolls 6 and 7, on the other hand, withdraw the roving from the cheese, in the form of a single strand, at a rate determined by the speed of rotation of the said rollers about their axes 13 and 14, respectively. The can 1 has a depth which is substantially greater than the cheese 5 placed therein, so that the can projects a substantial distance above the cheese, in the direction of withdrawal of the strand therefrom. During the rotation of the can and the withdrawal of roving, the ballooning of the latter is limited by the side walls of the can. Also, the friction of the yarn upon the walls of the can provides a desirable braking action particularly free from sudden variations and tendency to break a weak strand.

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Up to this point the strand withdrawn from the outside of the cheese or unit is permitted to move in a free course, that is, without restriction upon its movement except for the limitation of the ballooning and a minimum of friction as the strand contacts with the inside of the can or passes through the eyelet 9.

The yarn, which is now in spun condition, is led between the rotation-preventing and feeding rollers 6 and 7, through an eyelet 15, to the traveler 16, and wrapped around the spool 17, mounted upon the rotating spindle 18. The direction of the rotation of the spindle and spool may be opposite to that of the cheese, whereby additional spinning is imparted to the strand at a point between the rollers 6 and 7 and the spindle, at a point adjacent to the spindle.

An assembly suitable for such an operation in spinning a single strand is indicated in the vertical assembly including the single can 19 in Fig. 1.

When it is desired to form a finished yarn comprising a plurality of separately spun strands, there may be used a plurality of cans supplying spun strands to adjacent position on the said rollers 6 and 7. Such an assembly is illustrated in Fig. 1, in the positions in which 2 or 3 cans are arranged one above the other, and also in Fig. 2. As illustrated, the several cans are adapted to spin the roving to form individually spun strands, which are then led through the common eyelet 12 and between the rolls 6 and 7, the several strands passing through in proximity to each other and in approximately parallel relationship. If desired, there may also be led between the rolls, near the point stated, a strand or strands of other material, as, for example, a strand 20 of brass wire. In any case, the several plies or strands are led from the rolls 6 and 7 and twisted together in a direction opposite to that in the twist in the individually spun strands. Thus the several strands, extending side by side, are led through the eyelet 15, the traveler 16, and around the spool 17 mounted on the rotating spindle 18.

It will be understood that conventional equipment may be used in association with the features that are novel. Thus, usual driving and speed synchronizing or regulating means may be employed. For example, there may be used a belt 21 for driving the spindle, and conventional plates 22 provided with rings in which move the travelers 16.

With equipment of the type described, there may be spun asbestos fibers of shorter length than can be spun satisfactorily by previously used methods or machinery. Thus, there may be spun self-sustaining strands of asbestos fibers of such average length that not more than approximately half by weight, say less than 65%, are retained on a 4-mesh screen in the standard asbestos screen test in which the screen and sample thereon are shaken for two minutes. The screen test of an asbestos that has been spun satisfactorily, either with or without a reenforcing wire, follows:

Screen	Percentage by weight
On 2-mesh	6
Through 2-mesh and on 4-mesh	37
Through 4-mesh and on 10-mesh	38
Through 10-mesh	19
Total	100

Asbestos yarn spun by my method and apparatus, from such relatively very short fibers, has a breaking strength that is approximately equal to that of standard asbestos yarn made from longer fibers by a conventional method and machine and of the same weight per thousand yards.

Furthermore, by the method and apparatus described, it is possible to accomplish the desired result of making a multiply strand containing strands that are individually slackly spun, whereas the finished multiply yarn product may be relatively tightly spun. Thus, it is possible by the present invention to provide individual strands with 4 to 5 twists per linear inch, as compared to 7 twists for mule-spun yarn of 10-cut type, that is, weighing 1 pound per 1,000 yards of length.

The details that have been given are for the purpose of illustration and not restriction, and many variations within the scope of the appended claims may be made without departing from the spirit and scope of the invention.

What I claim is:

1. The method of spinning asbestos fibers which comprises forming the fibers into roving, winding the roving into a self-sustaining unit adapted to permit withdrawal of the roving therefrom, rotating the unit, unwinding and withdrawing the roving from the rotating unit, confining the resulting ballooning of the roving to the inside of a cylinder surrounding the said unit and rotated synchronously therewith, and leading the strand in a course that is free and that permits spinning from a point immediately adjacent to the said unit to a point at which rotation of the strand is prevented.

2. The method of spinning asbestos fibers which comprises forming short asbestos fibers into roving, forming the roving into a self-sustaining unit, rotating the unit at a selected speed and withdrawing roving from the outside thereof in the form of a single rotating strand, confining the resulting ballooning of the roving to the inside of a cylinder surrounding the said unit and rotated synchronously therewith, leading the said strand to a spindle, and rotating the spindle in direction opposite that of the said unit, whereby the roving is subjected to spinning at a point immediately adjacent to the self-sustaining unit and the spun strand is subjected to additional spinning at a point adjacent to the rotating spindle.

3. In making a yarn comprising a plurality of separately spun and then twisted strands of asbestos fibers, the method which comprises spinning the strands individually and passing them to the rotation-preventing point as described in claim 1, drawing the separately spun strands from the said point in proximity and approximately parallel relationship to each other, and then twisting them together, the twisting being made in the opposite direction from that of the original spinning of the individual strands.

4. A machine, adapted for use in spinning fibers, comprising the combination of means for rotating a self-sustaining unit of roving and withdrawing roving from the outside thereof in a free course permitting spinning at a point immediately adjacent to the said unit, means disposed around the unit, adapted to be rotated synchronously therewith and extending substantially beyond the said unit, in the direction of withdrawal of roving therefrom, for limiting the ballooning of the roving and providing a frictional braking action thereon, and means remote from the said unit for restricting the rotation of the roving

5. A machine for spinning individually a plu-

rality of strands of fibrous material and then twisting together the several strands into a multiply yarn, the said machine including a plurality of combinations of means described in claim 4 for slackly spinning the individual strands, means each at a given point for preventing the rotation of the spun strands, means for drawing the several spun strands, through the rotation-preventing means, in proximity and in approximately parallel relationship to each other, and means for twisting tightly the several strands into multiply yarn in a direction opposite to that of the twist spun in the individual strands.

6. A machine, adapted for use in spinning roving of asbestos fibers and the like, comprising the combination of means for supporting and rotating a self-sustaining unit of the roving and withdrawing roving therefrom, a cylinder disposed around the roving, means for rotating the cylinder synchronously with the roving and a guide member located not substantially above the end of the said cylinder, for limiting the ballooning of the roving to the inside of the cylinder.

7. In making a wire-reenforced asbestos yarn, the method which comprises forming short asbestos fibers into roving, winding the roving into a self-sustaining unit adapted to permit withdrawal of the roving therefrom, rotating the unit, unwinding and withdrawing the roving from the rotating unit, the said unit being rotated upon an axis extending approximately parallel to the general direction of the withdrawal of the roving, to cause twisting of the roving substantially at the point of the said withdrawal, leading the strand in a course that is free and that permits spinning from a point immediately adjacent to the unit to a point at which rotation of the strand is prevented, leading a wire through the said point, and then twisting the wire and said strand together.

PHILLIP D. CANNON.