Aug. 12, 1958 H. L. WOLFE 2,846,838

APPARATUS FOR UNTWISTING TEXTILE STRANDS

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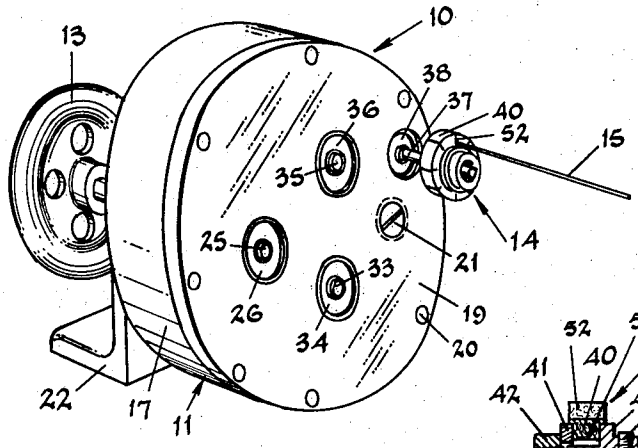


Fig. 1

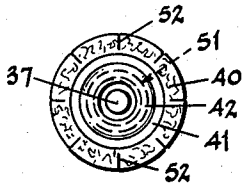


Fig. 4

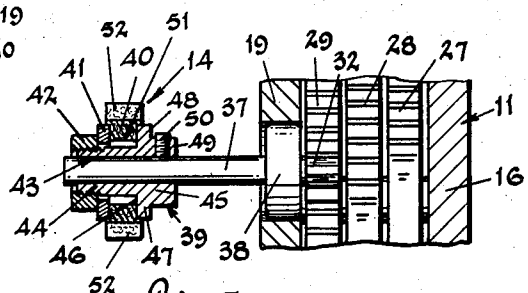


Fig. 5

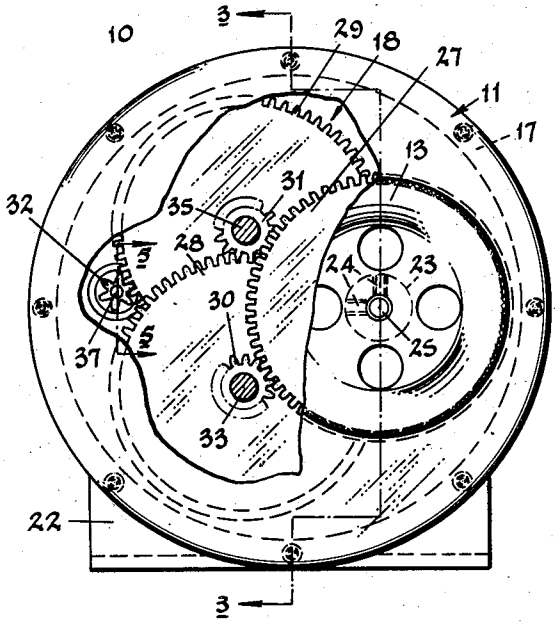


Fig. 2

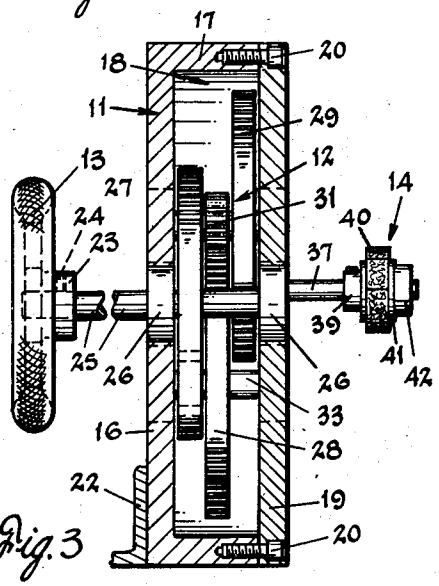


Fig. 3

INVENTOR.
Homer L. Wolfe
BY
Hobbe & Swope
ATTORNEYS

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APPARATUS FOR UNTWISTING TEXTILE STRANDS

Homer L. Wolfe, Parkersburg, W. Va., assignor to L-O-F Glass Fibers Company, Toledo, Ohio, a corporation of Ohio

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4 Claims. (Cl. 57—1)

This invention relates generally to the art of winding, and more particularly to improved apparatus for untwisting a previously twisted textile strand.

In one method of producing yarn from glass fibers, a plurality of continuous glass filaments are drawn from a bushing supplied with molten glass. After being solidified, the filaments are brought together and grouped into a continuous strand which is then wound upon a cylindrical spool somewhat in the manner of a spool of household sewing thread. The spool of continuous strand is transferred to a rewind and twisting machine wherein the strand is twisted as it is transferred to another spool. The twisted strand is then plied with other strands to form a yarn having either a left or right hand twist.

In either the twisting or plying operation, the strands occasionally break due to excessive tension placed thereon by a malfunction of the machine or by a malfunction of the yarn during its passage through the guides and tensioner of the machine. Where a break occurs, it is necessary to splice the broken ends and then remove the break. Also, when a package is depleted, it is necessary to splice in the end of a new package in order to continue the operation.

When a break occurs or when it is necessary to splice in a new package, the ends to be joined must be untwisted so that the filaments of each end may be spliced to one another and the strand again formed as a continuous length. In many instances, the untwisting of the broken ends has been accomplished by hand and has been both difficult and time consuming.

Therefore, an important object of the invention is to provide improved apparatus for untwisting previously twisted textile strands.

Another object of the invention is to provide in such apparatus means for untwisting a strand in a rapid manner.

A further object of the invention is to provide apparatus for untwisting textile strands that is portable and easily handled.

Other objects and advantages of the invention will become more apparent during the course of the following description when taken in connection with the accompanying drawings.

In the drawings, wherein like numerals are employed to designate like parts throughout the same:

Fig. 1 is a perspective view of the improved apparatus of the invention;

Fig. 2 is an elevation view of the rear of the apparatus shown in Fig. 1;

Fig. 3 is a vertical section taken along the line 3—3 of Fig. 2;

Fig. 4 is a view of the strand engaging means of the apparatus; and

Fig. 5 is a fragmentary vertical section taken along the line 5—5 of Fig. 2.

With reference now to the drawings, and particularly Figs. 1 to 3, there is shown the improved yarn untwisting machine 10 built in accordance with the invention. The machine is compact in construction and, briefly

stated, comprises a gear box 11 containing a gear train 12, a hand actuated wheel 13 for supplying rotative power to the gear train, and a head assembly 14 which is driven by the gear train and which, as later described, grips a twisted strand 15 and untwists the same in a rapid and efficient manner.

The gear box 11 comprises a circular back wall 16 having an integrally formed rim portion 17 extending about the periphery thereof to form a cavity 18 within which the gear train 12 is housed. The cavity is closed by means of a circular cover plate 19 which is tightly secured to the rim portion 17 by a plurality of countersunk cap screws 20 and has a plugged opening 21 formed therein for introducing a lubricant to the gear train. A bracket 22 is secured to the back wall along the lower edge thereof to prevent rolling movement of the machine when supported on a given surface.

To afford a surface better adapted to be grasped, the hand wheel 13 is knurled about its outer periphery, and is provided with a drilled axial hub 23 having a pair of tapped holes 24 formed therein which receive set screws operative to secure said hub to a driving shaft 25. The shaft 25 extends into the gear box 11 and is supported by a pair of bearings 26 one of which is located in the back wall 16 and the other in the cover plate 19.

The gear train 12, which is entirely contained within the gear box 11, comprises three spur gears of relatively large diameter 27, 28 and 29, each of which has seventy-two teeth formed therein, and three other spur gears 30, 31 and 32 of relatively smaller diameter, the gears 30 and 31 having sixteen teeth each, and the gear 32 having six teeth. The gear 27, which acts as a pinion, is carried by the driving shaft 25 and is located within the cavity 18 adjacent to but spaced from the back wall 16. This gear engages and drives the gear 30 which is located in the same vertical plane and carried by a shaft 33 suitably supported at its opposite ends by bearings 34 located in the back wall and cover plate. Supported upon the shaft 33 and spaced inwardly from the gear 30, is the gear 28, which, due to having the same support shaft, rotates at the same number of R. P. M.'s as the gear 30. The gear 28 engages and drives the sixteen-toothed gear 31 which is carried by a shaft 35 similar to the shaft 33 and also having its opposite ends supported by bearings 36 located in the back wall and cover plate of the gear box. The shaft 35 also carries the seventy-two-toothed gear 29 which is spaced laterally from the gear 31 and located in the same vertical plane as the gear 32 which is driven thereby.

The gear 32 which, as previously mentioned, has six teeth is carried at the iner end of a driven shaft 37 which is supported by a bearing 38 located in the cover plate. The opposite end of the shaft 37 extends through the bearing and supports the head assembly 14 which is adapted to engage and rotate the twisted strand 15 at a high rate of speed about the axis of the shaft 37.

As best seen in Fig. 5, the head assembly 14 comprises a support member 39, a flange 40 which engages the strand 15, an annular ring 41 for clamping the flange against the support member, and a circular nut 42 which exerts a thrust against the ring 41.

The support member 39 has an axial hole 43 extending therethrough for receiving the shaft 37 and comprises a body portion 44 and an integral head portion 45. The body portion is substantially cylindrical in shape and has its outer end threaded inwardly a limited distance to receive the nut 42. The opposite end of the body portion terminates at a vertical wall 46 forming one face surface of a peripheral ring 47 which comprises the rear of the head portion 45. The opposite face 48 of the ring terminates at a cylindrical portion 49 of larger diameter than the body portion 44 and which is tapped

intermediate its ends to receive a set screw **50** for locking the support member to the shaft **37**.

As seen in Figs. 4 and 5, the flange **40** is circular in shape and is provided with an axial hole **51** therethrough for receiving the body portion **44** of the support member **39**. As previously mentioned, the flange grips the strand to be untwisted. For this purpose, a plurality of radial slots **52** of lesser width than the strand **15** are provided at spaced intervals about the periphery of the flange and extend inwardly a limited distance therefrom. Since the side walls of the slots must exert a clamping action on the strand when gripped therebetween, the flange preferably is formed of a resilient non-abrasive material such as felt which not only will provide the gripping action but also will not injure the strand.

When the flange **40** is assembled with the support member **39**, the one side wall of the flange engages the vertical wall **46**. The opposite side wall of the flange is engaged by the annular ring **41**, and the circular nut **42** is then threaded over the end of the body portion and tightly clamps the flange between said ring and the wall **46** to position said flange for rotational movement within a plane normal to the axis of rotation of the shaft **37**.

In using the improved apparatus herein disclosed, the end of the strand **15** is placed in one of the radial slots **52** of the flange **40** which, because of its resilient composition, exerts a clamping force upon the strand. The machine operator then grasps the strand approximately twelve inches from its point of engagement with the flange and rotates the hand wheel **13** a sufficient distance to provide the required number of revolutions of the head to fully open the gripped strand between its point of engagement with the flange and the point at which it is grasped by the operator. Since the flange **40** is circular in shape and concentric with the shaft **37**, the path of rotation of the strand describes a cone of revolution and, therefore, the strand is not subjected to any uneven movement. Ordinarily, only a fractional revolution of the hand wheel will be required since the gear train will provide a multiplication factor of approximately 243:1. The same procedure is then followed with the other end of the broken strand (not shown). After the ends have been untwisted, the filaments in each are cut at staggered intervals. The filaments of the two ends are then secured to one another by means of a suitable adhesive or by tying and, since the respective filaments are cut in differing lengths, the resultant splice is relatively long and not readily noticeable.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred embodiment of the same, and various changes may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In apparatus for untwisting a previously twisted textile strand of given diameter by rotating the same in a direction opposite to the direction of twist, a gear train, a driving shaft for actuating said gear train, a hand wheel secured to said driving shaft for rotating the same, a driven shaft rotated by said gear train, and a head assembly secured to said driven shaft and mounted for rotation therewith, said head assembly including a flange positioned for rotation in a plane normal to the axis of rotation of said shaft and having formed therein a slot of less diameter than said strand within which the strand is retained while being untwisted.

2. In apparatus as defined in claim 1, wherein the flange is of circular shape and the slot extends inwardly from the periphery thereof a limited distance.

3. In apparatus as defined in claim 2, wherein the flange comprises a resilient non-abrasive material.

4. In an apparatus for untwisting a previously twisted textile strand of given diameter by rotating the strand in a direction opposite to the direction of twist, a shaft, means for rotating said shaft, a head assembly secured to an end of the shaft, said head assembly including a support member secured to the shaft, said support member comprising a cylindrical body portion having its one end threaded inwardly a limited distance, a peripheral ring spaced inwardly from said threaded portion, a diametrically slotted disk adapted to fit upon said cylindrical body portion and abut said peripheral ring, and means adapted to engage said threaded portion and clamp said disk against said ring.

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