

Oct. 7, 1947.

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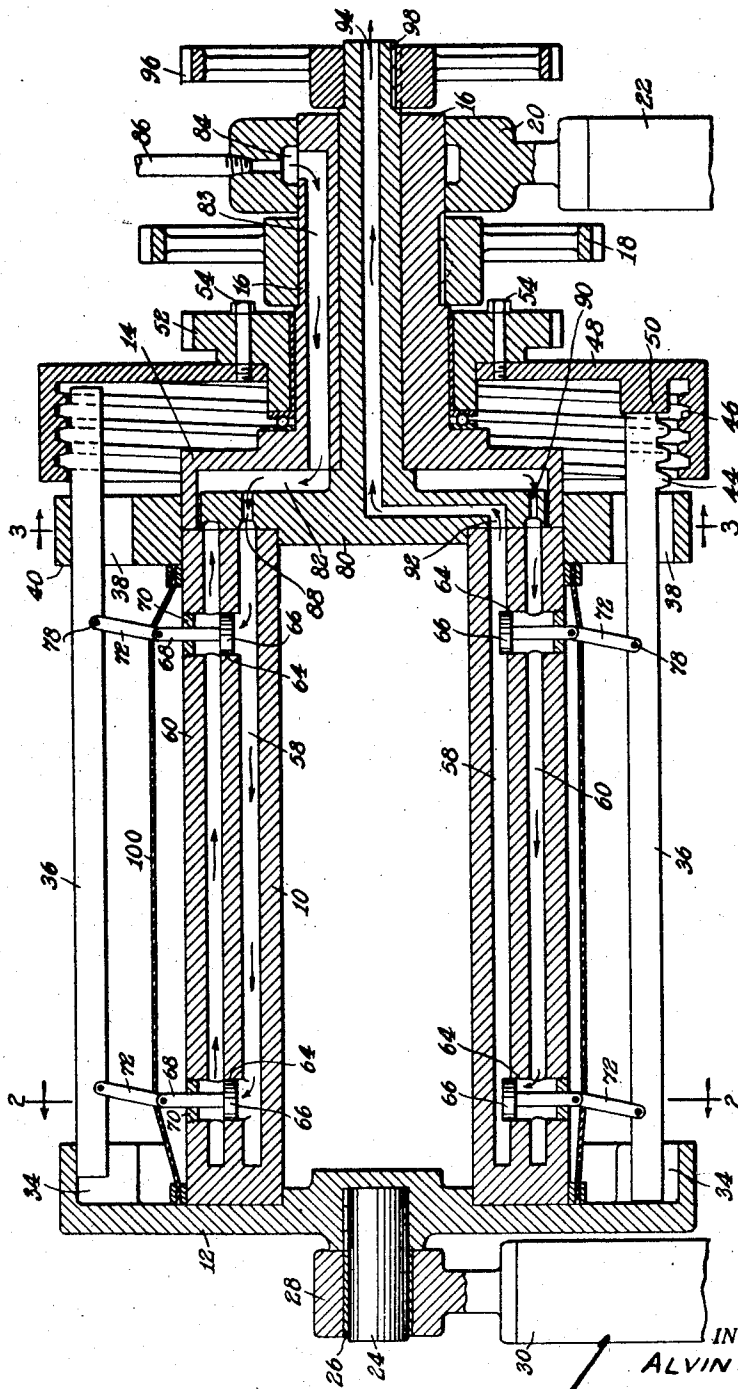
2,428,704

YARN-ADVANCING REEL

Filed Dec. 7, 1945

2 Sheets-Sheet 1

Fig. 1.



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2 Sheets-Sheet 2

Fig. 3.

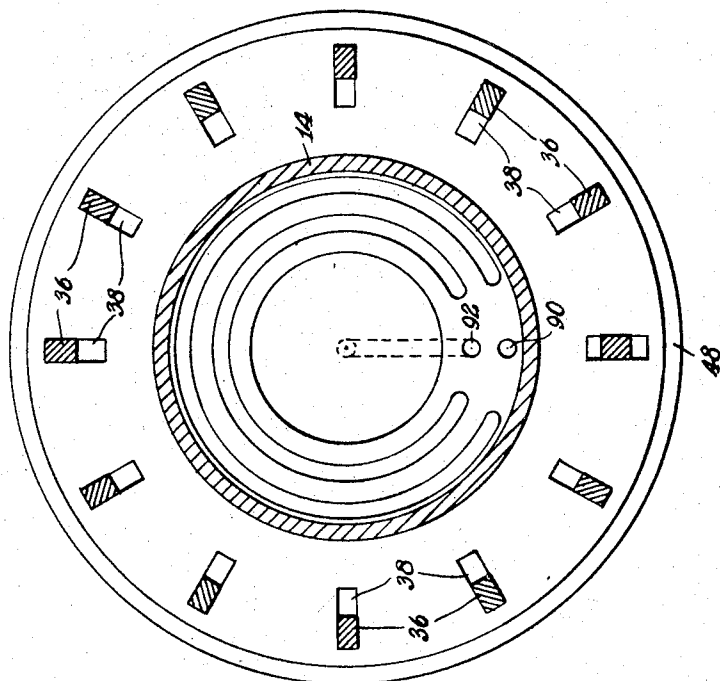
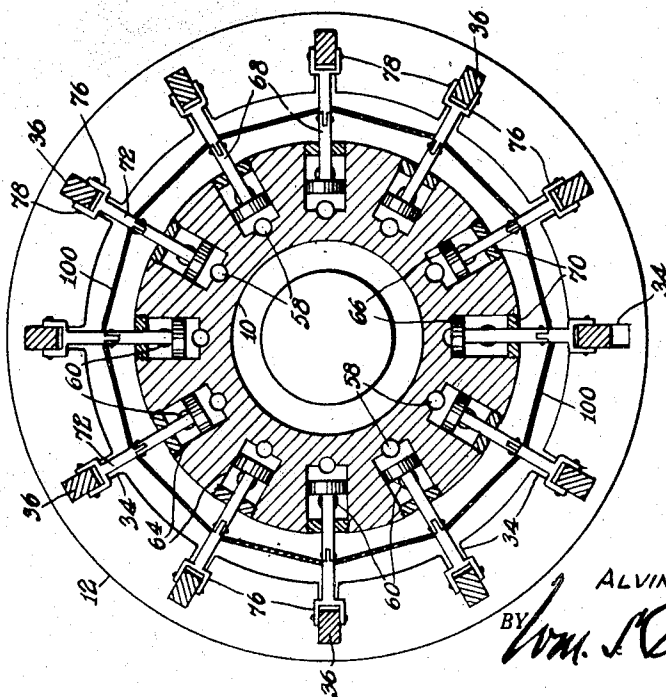


Fig. 2.



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2,428,704

YARN-ADVANCING REEL

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Application December 7, 1945, Serial No. 633,339

9 Claims. (Cl. 28—71.6)

1

This invention relates to an apparatus for advancing yarns. More particularly, it relates to a yarn-advancing reel for continuously and progressively advancing yarn in the form of a helix.

An object of this invention is to provide a new and improved yarn-advancing reel.

Another object of this invention is to provide a yarn-advancing reel which effectively and continuously advances a yarn along the length thereof.

A specific object of this invention is to provide a pneumatic advancing reel.

Other and additional objects will appear hereinafter.

The objects of the invention are accomplished, in general, by winding yarn in the form of a helix onto a rotary reel having a plurality of yarn-supporting bars, each of which bars is moved axially in the direction of the yarn travel over the reel, whereby the yarn carried thereby is progressively and continuously advanced over the reel and, when each bar reaches the limit of its axial movement in the direction of the yarn travel, it is retracted (moved radially inwardly) from the yarn and moved axially in a direction opposite to the yarn travel and radially outwardly to bring it into yarn-supporting position. The axial (longitudinal) movement is imparted to the yarn-supporting bars by a cam mechanism, hereinafter more fully explained. The radial movement of the bars is obtained by fluid-actuated pistons to which the yarn-carrying bars are connected. The actuation of the pistons, the rotation of the reel and the axial movements of the bars are in timed relationship to effect the operations in the desired sequence.

The details and manner of practicing the invention will become clear from the following detailed description when taken in connection with the accompanying drawings forming a part of this specification, and wherein:

Figure 1 is a longitudinal section of a yarn-advancing reel embodying the principles of the invention;

Figure 2 is a section taken on the line 2—2 of Figure 1; and

Figure 3 is a section taken on the line 3—3 of Figure 1.

Referring now to the drawings wherein like reference numerals designate like parts, the reference numeral 10 designates a casting constituting the main supporting axle of the reel. One end of the axle 10 is appropriately secured to a flanged end plate 12, and the other end secured to a flanged end plate 14. The end plate 14 is pro-

2

vided with a hub 16 to which there is secured a main drive gear 18, which cooperates with an appropriately driven gear (not shown) to impart rotary motion to the reel. Hub 16 is rotatably mounted in a bearing 20 carried on a support 22 appropriately mounted in the machine, and flanged end plate 12 is secured to one end of a shaft 24 which is rotatably mounted in a sleeve 26 carried by a pillow block 28 which, in turn, is carried on a support 30 of the machine.

Flanged end plate 12 is provided with a plurality of slots 34 spaced circumferentially around and adjacent the outer periphery thereof. Yarn-carrying bars 36 are mounted in the apparatus, as hereinafter more fully explained, so that one end of each bar is respectively disposed in a slot 34 wherein it can move both axially and radially. Each bar 36 extends axially of the reel and passes through a slot 38 of a guide and retaining ring 40, which is secured to both main supporting axle 10 and the flange of end piece 14. Slot 38 also permits the respective yarn-carrying bar 36 extending therethrough to move axially and radially therein. The slots 34 and 38, in which a yarn-carrying bar 36 is positioned, are in alignment.

The end of each yarn-carrying bar 36 extending beyond the guide and retaining ring 40 is provided with screw thread segments 44, which are adapted to cooperate with an internal thread 46 on a flanged cam member 48. For reasons which will become apparent, flanged cam member 48 is provided with a receding cam 50. A gear 52 is secured by lag bolts 54 to cam member 48, and such gear 52 is driven by a cooperating driving gear (not shown) whereby member 48 rotates preferably at a speed different from that of the axle 10.

Main supporting axle 10 is provided with a plurality of pairs of tubes 58 and 60 which extend axially, as shown in Figure 1. In the form shown, one pair of tubes 58 and 60 cooperates with one yarn-supporting bar 36 respectively, as will now be explained.

Each pair of tubes 58 and 60 is connected by a pair of cylinders 64, in each of which a piston 66 is positioned. The piston rod 68 of each piston is slidably mounted in a cylinder head 70, and the free end of piston rod 68 is pivotally connected to one end of a link 72. The other end of link 72 is provided with a bifurcated member 76, in which bar 36 is positioned and secured by pins 78.

The free ends of each pair of tubes 58 and 60 terminate in close proximity to a rotary valve 80 which is positioned in a pressure chamber 82. Compressed air is supplied to the pressure cham-

ber 82 through a passage 83 which is connected to an air inlet 84, which in turn is connected to a conduit 86 leading to a suitable source of supply (not shown).

The valve 80 is provided with a port 88 which, when brought into position, permits air to enter tube 58, whereupon it will act on pistons 66 to raise the same. The upward movement of pistons 66 will, through links 72, move bars 36 radially upwardly, the upward movement being limited by the flange of the flanged end plate 12 and the top of the guide and retaining ring 40.

Valve 80 is also provided with another port 90 which, when brought into position, connects tube 60 with pressure chamber 82 so that air from the pressure chamber 82 will enter tube 60 and act on pistons 66 to depress the same, whereby bar 36 will be moved radially inwardly. The valve is also provided with a port 92, which is adapted to connect the tube 58 with exhaust 94 when port 90 is in communication with both pressure chamber 82 and tube 60. It is thus apparent that when the port 90 is in position to connect the pressure chamber 82 with the tube 60 and the tube 58 is connected through the port 92 to the exhaust 94, air from the pressure chamber 82 will act on the pistons 66 to move them radially inwardly, whereby the yarn-carrying bar will be moved radially inwardly and the air in tube 58 will be exhausted through exhaust 94. A gear 96, secured by a key 98 to the valve, cooperates with a driven gear (not shown) to impart rotary movement to the valve. It is thus apparent that the respective pistons 66 cooperating with a bar 36 will at predetermined periods be actuated to move said bar radially outwardly and inwardly.

A diaphragm 100 is appropriately secured to the reel to protect the parts shielded thereby.

In operation, air is introduced through the conduit 86 to the pressure chamber 82. All of the tubes 58, except that at the lowermost position in the reel, at this time are connected to port 88, with the result that pistons 66 actuated by the air will be forced upwardly whereby the bars 36 will be moved radially outwardly so that thread segments 44 will be in cooperative relationship with advancing thread 46 of the cam member 48. A yarn is drawn onto and wound in a helix on the reel to a point where it is drawn off the reel. The main drive gear 18, the cam drive gear 52 and the valve gear 96 are actuated to rotate the parts of the reel respectively driven thereby. During rotation of the reel and cam member 48 at different speeds, each yarn-carrying bar is moved axially (to the left as viewed in Figure 1) whereby the yarn carried thereby is progressively and continuously advanced over the length of the reel to the point of discharge. When a yarn-carrying bar 36 reaches the limit of its yarn-advancing movement, valve 80 has been rotated to a position to reverse the air pressure on the pistons and actuate them to move such bar radially inwardly. In other words, at this time further delivery of air through port 88 to the tube 58 is interrupted, and port 90 has been brought in alignment with tube 60 whereby air from the pressure chamber 82 is introduced into tube 60, with the result that pistons 66 will be moved radially inwardly and bar 36 will be similarly moved radially inwardly and out of contact with the yarn. When the valve is in this position, port 92 connects tube 58 with exhaust 94 whereby the air in tube 58 will be exhausted. At the moment thread segments 44 disengage thread 46, cam 50 engages the end of the bar 36 and moves it axially in the direction opposite to the yarn

travel to a point where the air pressure is again reversed and the bar again is forced radially outwardly to begin its advancement cycle.

The gears 18, 52 and 96 are driven at such rates that the parts operated thereby will be moved in timed relationship to perform the respective functions in the sequence described.

In the embodiment herein specifically described, only one bar is returned at a time. Such construction is particularly suitable in a reel where the yarn-carrying surface of the bars is straight, since it reduces wear of the parts but makes each advancing cycle long and extend over one or more revolutions of the reel. However, if the reel is of a type which is designed to stretch the yarns or relax their tension at desired points by means of tapered bars, it is desirable to have more than one bar returning from the yarn sheet so as to reduce the advancing cycle to very short intervals or, in other words, increase the frequency to several advancing cycles per revolution of the reel in order to minimize sudden tension variations at a tapered part of the reel. Thus, in general, the invention is not restricted as to the number of bars returned at one time and the times therefor.

As shown by the description, pneumatic pistons are preferred. However, the invention is not restricted thereto. The pistons can be actuated by any fluid, either pneumatic or hydraulic, as desired.

The invention is not restricted to the use of two pistons with each supporting bar, as hereinbefore described. Any number of pistons cooperating with each bar can be used.

The invention is applicable to yarn composed of continuous filaments, staple fibers, rope, ribbons, and other similar articles of continuous length.

Since it is obvious that many changes and modifications can be made in the above-described details without departing from the nature and spirit of the invention, it is to be understood that the invention is not to be limited thereto except as set forth in the appended claims.

I claim:

1. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel, means to rotate said reel, a plurality of yarn-contacting bars arranged circumferentially of the reel, pneumatic-actuated means directly connected to each of said bars and adapted to move each of said bars radially into and out of yarn-contacting position, means to control the actuation of said pneumatic-actuated means at predetermined times to move each of said bars radially in the desired direction, means to move each of said bars when in yarn-contacting position axially in the direction of yarn travel across said reel, and means to move each of said bars in the direction opposite to the yarn travel.

2. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel, means to rotate said reel, a plurality of yarn-contacting bars arranged circumferentially of the reel, means including a piston to move said bars radially into and out of yarn-contacting position, means to move each of the bars when in yarn-contacting position axially in the direction of the yarn travel, and means to actuate said piston at predetermined times to move each of said bars radially out of yarn-contacting position and into yarn-contacting position respectively.

3. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel, means to rotate said reel, a plurality of

5

yarn-contacting bars arranged circumferentially of the reel, means including a piston to move said bars radially into and out of yarn-contacting position, means to move each of the bars when in yarn-contacting position axially in the direction of the yarn travel, and a rotating valve to actuate said piston at predetermined times to move each of said bars radially out of yarn-contacting position and into yarn-contacting position respectively.

4. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel, means to rotate said reel, a plurality of yarn-contacting bars arranged circumferentially of the reel, means including a piston to move said bars radially into and out of yarn-contacting position, means to move each of the bars when in yarn-contacting position axially in the direction of the yarn travel, means to actuate said piston at predetermined times to move each of said bars radially out of yarn-contacting position and into yarn-contacting position respectively, and means to move said bars when out of yarn-contacting position axially in the direction opposite to the yarn travel.

5. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel, means to rotate said reel, a plurality of yarn-contacting bars arranged circumferentially of the reel, means including a piston to move said bars radially into and out of yarn-contacting position, means to move each of the bars when in yarn-contacting position axially in the direction of the yarn travel, a rotating valve to actuate said piston at predetermined times to move each of said bars radially out of yarn-contacting position and into yarn-contacting position respectively, and means to move said bars when out of yarn contacting position axially in the direction opposite to the yarn travel.

6. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel, means to rotate said reel, a plurality of yarn-contacting bars arranged circumferentially of the reel, means including a piston to move said bars radially into and out of yarn-contacting position, each of said bars having screw thread segments at one end thereof, a member having a thread adapted to be engaged by the screw thread segments of each bar when said bar is in yarn-contacting position whereby said bar will be moved axially in the direction of the yarn travel, means to actuate said piston at predetermined times to move each of said bars radially out of yarn-contacting position and into yarn-contacting position respectively, and means to move each of said bars axially in the direction opposite to the yarn travel when said bar is out of yarn-contacting position.

7. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel, means to rotate said reel, a plurality of yarn-contacting bars arranged circumferentially of the reel, means including a piston to move said bars radially into and out of yarn-contacting position, each of said bars having screw thread segments at one end thereof, a member having a

6

thread adapted to be engaged by the screw thread segments of each bar when said bar is in yarn-contacting position whereby said bar will be moved axially in the direction of the yarn travel, means to actuate said piston at predetermined times to move each of said bars radially out of yarn-contacting position and into yarn-contacting position respectively, and cam means to move each of said bars axially in the direction opposite to the yarn travel when said bar is out of yarn-contacting position.

8. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel, means to rotate said reel, a plurality of yarn-contacting bars arranged circumferentially of the reel, means including a piston to move said bars radially into and out of yarn-contacting position, each of said bars having screw thread segments at one end thereof, a member having an internal thread adapted to be engaged by the screw thread segments of each bar when said bar is in yarn-contacting position whereby said bar will be moved axially in the direction of the yarn travel, means to actuate said piston at predetermined times to move each of said bars radially out of yarn-contacting position and into yarn-contacting position respectively, and cam means to move each of said bars axially in the direction opposite to the yarn travel as soon as the thread segments thereof disengage said internal thread.

9. In an apparatus for continuously advancing yarn and the like in the form of a helix, a reel having a main supporting axle, a plurality of yarn-contacting bars arranged circumferentially of said reel, means to rotate said reel about the center axis of said axle, a plurality of pairs of radially extending cylinders in said axle, a piston slidably positioned in each of said cylinders, said axle being provided with a plurality of pairs of passages, one pair of said passages being connected respectively to one pair of said cylinders so that upon supply of pressure fluid to either of said passages the other of said passages will constitute an exhaust and the pistons in said cylinders will be moved radially of said reel, means connecting the piston rod of a pair of said pistons to one bar whereby upon movement of said pistons the bar connected thereto will be correspondingly moved, means to supply fluid pressure, and a rotary valve controlling at predetermined times the admission of said fluid pressure to and the exhaust from each pair of cylinders through said passages whereby the bar connected to the pistons in said cylinders will be moved radially into and out of yarn-contacting position in accordance with the movement of said pistons.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,378,211	Furness	June 12, 1945
2,313,140	Furness	Mar. 9, 1943