July 16, 1946. R. W. STANLEY ET AL 2,404,005

THREAD-ADVANCING DEVICE

Filed June 1, 1945 2 Sheets-Sheet 1

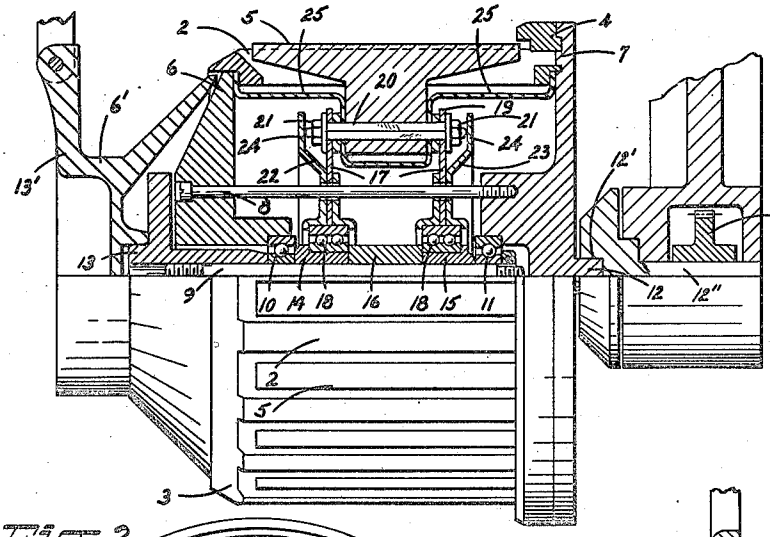


Fig. 1

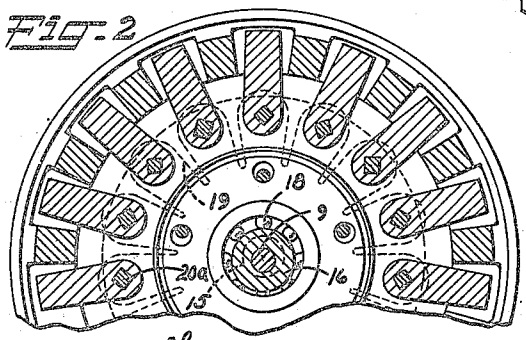


Fig. 2

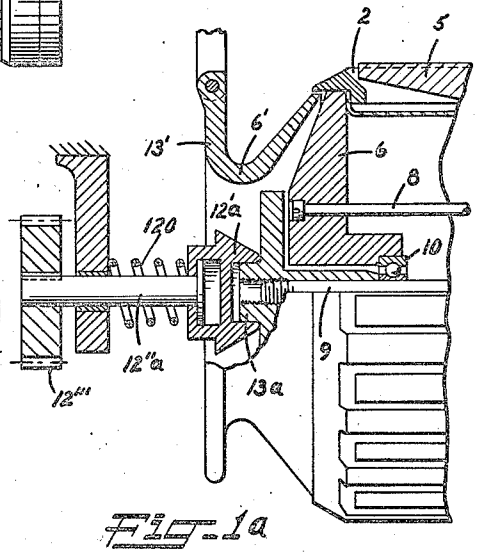


Fig. 1a

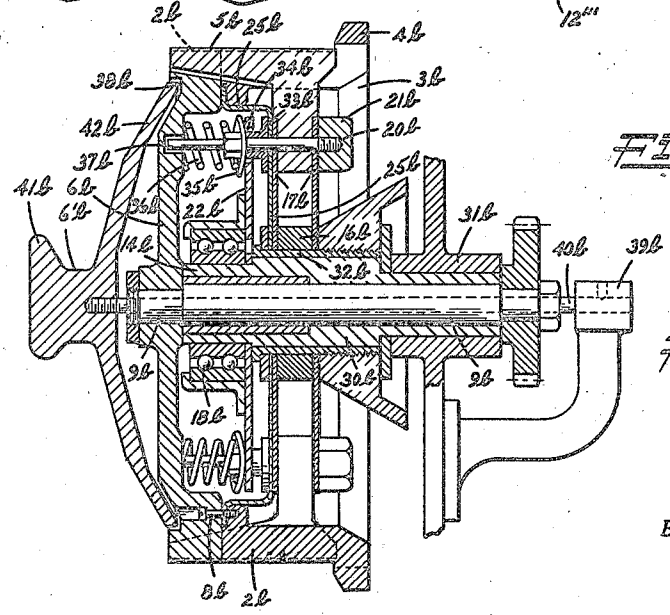


Fig. 3

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THREAD-ADVANCING DEVICE

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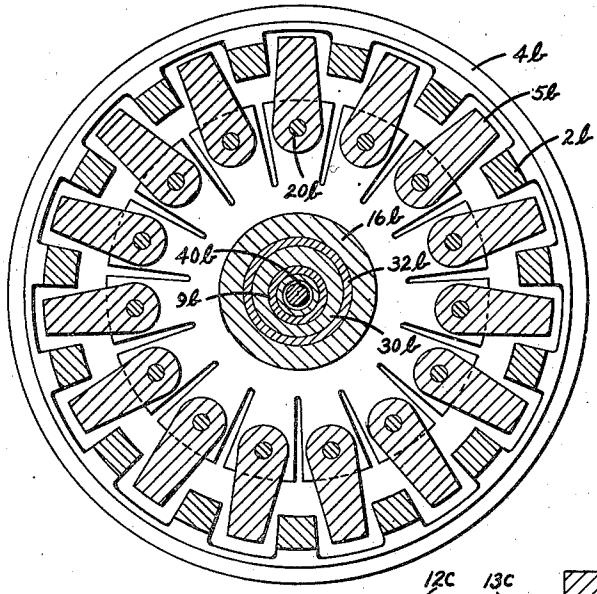
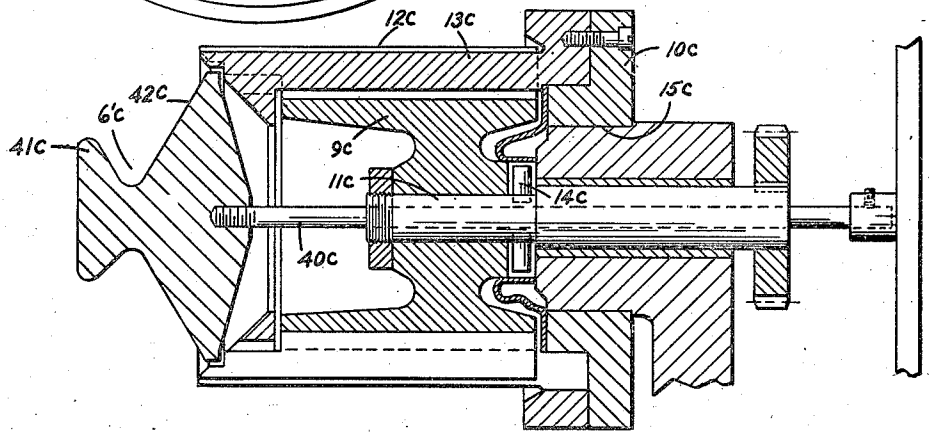


Fig. 4

Fig. 5



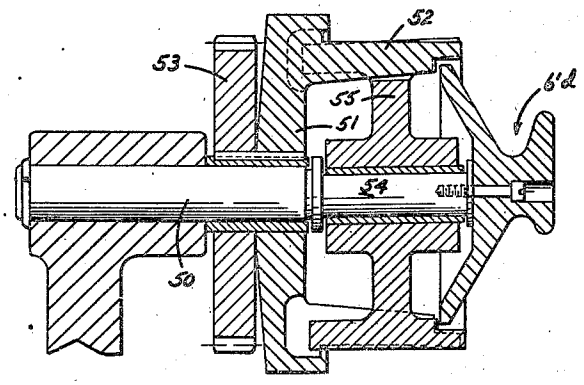


Fig. 6

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UNITED STATES PATENT OFFICE

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THREAD-ADVANCING DEVICE

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Application June 1, 1945, Serial No. 597,108

12 Claims. (Cl. 28—71.6)

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This invention relates to thread-advancing reels and is particularly concerned with a construction thereof in which a stationary thread-receiving surface is provided adjacent the discharge end of the reel. This application is a continuation-in-part of co-pending application Serial No. 508,174, filed October 29, 1943.

Thread-advancing reels have heretofore been of either of two general types. In one type, a driving shaft or other moving part has projected from both ends of the reel so that any accumulation of thread which was forced off the discharge end of the reel dropped upon the rotating shaft or other part and was both dangerous to remove and liable to tangle with the operating parts. In the latter event there resulted a messy condition and possible damage to the thread-advancing reel. It has also been proposed to so construct and mount such thread-advancing reels that one end, generally the thread discharge end, is entirely free, and in such constructions, any accumulation of thread at the discharge end merely drops from the reel. In some installations, such accumulated thread cannot drop from the thread-advancing reel without falling into other operating mechanisms which could thus be damaged or into baths which by splashing could become a menace to personal safety.

It is the primary object of the present invention to provide a thread-receiving surface adjacent the discharge end of thread-advancing reels. Such a surface serves to prevent any accumulation of thread discharge from tangling and damaging or interfering with operating parts and from falling into baths or operating mechanisms below. The surface also serves to store the accumulation out of the way until an operator has the time to remove it. Another object of the invention is to provide for varying the rapidity of thread-advancing action independently of the rate of rotation of the reel as a unit. Other objects and advantages of the invention will appear from the drawings and the description thereof.

In the drawings, illustrative of the invention—

Figure 1 is an elevation with the upper half in section of one embodiment of the invention;

Figure 1*a* is a view, similar to Figure 1, of the embodiment of Figure 1, but having a modified driving arrangement;

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

Figure 3 is a sectional elevation of another embodiment;

Figure 4 is a section on line IV—IV of Figure 3;

Figure 5 is a sectional elevation of a third embodiment; and

Figure 6 is a sectional elevation of a fourth embodiment.

Referring more particularly to the embodiment

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of Figures 1 and 2, the thread-receiving surface of the present invention is shown integrally formed upon the supporting member for one end of a double-end supported thread-advancing reel. As shown, the concentric set of longitudinally extending bar members 2 are constituted of a cylindrical cage-like member having a flange 4 at one end and an annular member 3 at the other end thereof and being appropriately slitted longitudinally to leave spaces alternating between the bars 2 within which the bars 5 of the other set may be actuated. The cylindrical cage may be clamped between end flanges or spiders 6 and 7 by suitable spaced cap screws 8. The system comprising the cylindrical cage and flanges 6 and 7 constitutes a housing which may have any axial length desired, and which may house the actuating mechanism for the other set of interdigitating bars 5. This housing is supported for rotation with respect to shaft 9 by means of suitable bearings 10 and 11. Flange 7 may be provided with a non-circular projection 12 which is adapted to fit a corresponding socket 12′ of a coupling upon the shaft 12″ which may be driven by the gear 12‴ keyed thereto. Secured to the shaft 9 is a suitable non-circular projection 13 adapted to be received by a corresponding recess in a normally stationary but retractable supporting element 13′. Alternatively, as shown in Figure 1*a*, a non-circular projection 13*a* may be engaged by a retractable coupling member 12′*a* to a shaft 12″*a* (analogous to 12′ and 12″) for driving the shaft 9 in a direction the same or opposite to the direction of rotation of projection 12 and the reel bars as a whole. Spring 120 normally urges the coupling 12′*a* into clutching engagement with the non-circular end of the projection 13*a* on shaft 9. As the occasion may demand, rotation of shaft 9 provides a means of modifying the pitch of the helical path followed by the thread about the reel and the rapidity of thread-advancing action without changing the speed of rotation of the reel as a whole. Normally, shaft 9 is maintained stationary as in Figure 1 unless this pitch modification is found necessary. If shaft 9 is rotated at an equivalent speed but in the opposite direction as that of projection 12, the pitch will be twice that obtained when shaft 9 is held stationary. If shaft 9 is rotated at half the speed and in the same direction as projection 12, the pitch obtained will be one-half that obtained when shaft 9 is held stationary.

The sleeves 14 and 15 are mounted upon the shaft 9 and are suitably spaced by the ring 16. The sleeves 14 and 15 have external cylindrical surfaces whose axes are askew and eccentric to the axis of shaft 9 but parallel to each other. Upon each of the sleeves, a resilient spider member 17 is mounted, preferably by means of ball bearings 16. These spiders 17 are of a resilient

material, preferably of thin spring metal, and have individual radially extending members 19 between opposed pairs of which, the bars 5 are secured by suitable means, such as by the non-circular rod 20 embedded within depending portions of the bars 5 and the nuts 21. Skew plates 22 and 23 are also carried by the bearings 18 and have outer flanged portions 24 which bear against the ends of the rods 20.

When it is desired to protect the main operating parts from any possibility of clogging and corrosion when the reel is used for subjecting the filamentary material to liquids, a flexible sealing membrane 25, such as of rubber or synthetic rubruber, may be secured to the outer portion of the resilient supporting means for the non-concentric bars and to the ends of the concentric cylindrical cage as shown.

As shown, the annular member 3 projects beyond the flange 6 and overhangs the outer rim of a stationary member 6', which is integral with or affixed to the support 13'. The outer peripheral surface of the member 6' preferably slopes inwardly from its outer rim to a generally cylindrical portion, which serves to hold any accumulation of thread formed after breakage of the thread being handled by the reel or during lacing up of the reel or any machine comprising the reel. Occasionally, stray filaments also tend to gather on this member 6'. The collecting member 6' has a surface of sufficient axial extent to provide adequate storage space and ready access for the operator to remove the accumulated filaments or threads at his convenience without danger of injury to his hands, and without the necessity either of stopping the reel or of giving it immediate attention when the above-mentioned emergencies arise.

In operation, the skew plate flanges 24 cause substantial axial motion of the bars 5, such motion being imparted individually to each of the bars 5 by virtue of the individual resilient projecting members 19. By virtue of the eccentricity of the resilient supporting means and the bars 5, the axial to and fro motion of the bars imparted by the skew plates is combined with a radial component of motion which alternately causes first the protrusion of the bars 5 outside the periphery of bars 2 and then their recession within that periphery, thereby resulting in the advancing of the thread axially of the reel.

Referring to Figures 3 and 4, an application of the invention to another form of reel is shown. The concentric set of bar members 2b are formed by suitably slotting radially an integral cylindrical cage member 3b having an outwardly extending flange 4b. The member 3b is secured by cap screws 8b to the supporting flange 6b whose hub is secured and keyed to the end of a hollow shaft 9b. The shaft is mounted for rotation within a stationary sleeve 30b suitably secured within a supporting bearing 31b. The end of the sleeve 30b adjacent the hub of flange 6b has a peripheral surface 14b which is eccentric and askew with respect to the axis of shaft 9b and carries a skew plate 22b on a ball bearing 18b. A bushing 32b is carried by an adjacent peripheral surface of the sleeve 30b, which surface is eccentric but not askew with respect to the axis of shaft 9b, the amount of eccentricity being substantially the same as that of the surface 14b.

A pair of spaced flexible and resilient spiders 17b fit about the bushing and are held in proper axial relation with respect thereto by suitable washers or rings, such as 16b. The flexible spiders

are secured to either side of the inwardly extending portions of the movable bar members 5b by means of the bolts 20b and nuts 21b. Upon each of the bolts 20b is mounted a collar 33b which extends through an aperture 34b in the skew plate 22b. Between each of the collars 33b and the corresponding head of the bolt, there is a washer 35b against which a spring 36b is arranged to press, a pin 37b projecting from the head of the bolt 20b serving to guide the spring and to prevent its dislocation. A flexible sealing membrane 25b is arranged to protect the working parts against the entrance of corrosive or abrasive materials.

The flange 6b is undercut annularly at 38b and a stationary support 39b carries a rod 40b fixedly secured thereto and projecting through the bore of the hollow shaft 9b. The end of the rod 40b carries a stationary member 6'b which comprises a generally annular neck portion for supporting discharged thread accumulations from the reel. The neck surface connects and gradually merges with a knob 41b and a generally conical portion 42b the outer edge of which extends partially into the undercut groove at 38b.

In operation, the reel of Figures 3 and 4 is similar to the other shows, the only difference being that the springs 36b serve to assure that the bolts 20b with their bar members 5b follow the movements of the skew plate 22b.

The invention, as shown in Figure 5, is applied to a form of cantilever reel which comprises two generally cylindrical members 9c and 10c. Member 9c which may be termed the "concentric member," is mounted concentrically upon and for rotation with the hollow drive shaft 11c as by pins 14c and has a periphery comprised of a plurality of bar members 12c. Member 10c which may be termed the "eccentric member," is rotatably mounted on bearing 15c with its axis slightly offset from and inclined to that of member 9c and has a periphery comprising a plurality of bar members 13c disposed alternately to bar members 12c of concentric member 9c.

As in the embodiment of Figures 3 and 4, the thread-receiving member 6'c carried by rod 40c extending through the shaft 11c has a neck portion joining a knob 41c and a sloped conical portion 42c the outer edge of which projects under the ends of the reel bars.

In the embodiment of Figure 6, a stationary stub shaft 50 rotatably supports a concentric reel member 51 having spaced bars 52, a gear 53 secured to the hub of the member 51 serving as a driving connection. The stub shaft 50 carries a projecting shaft 54 which rotatably carries the reel member 55 on an axis both eccentric and inclined to the axis of reel member 51. Eccentric reel member 55 has spaced bar members interdigitating between those of the concentric reel member 52. Secured to the end of the projecting shaft 54 is the stationary thread-receiving member 6'd similar in construction and arrangement to that of the embodiments of Figures 3, 4 and 5.

While the lengths of the thread-advancing reels shown in Figures 1 to 6 are of the same order of size as their diameter, the present invention may be applied to reels of any length regardless of their diameter. Thus, it may be applied to reels adapted to continuously produce and process with liquids, artificial filaments of viscose, cuprammonium cellulose, casein, and so on, in which a plurality of, and if desired, all of the necessary liquid after-treatment steps may be applied upon a single long reel.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. Apparatus for handling continuous strands of filamentary material comprising a thread-storing, thread-advancing reel, means for rotating the strand-carrying surface thereof, and a generally ring-shaped strand-receiving surface adjacent the discharge end of the reel, the ring-shaped surface having a smaller diameter than the strand-carrying surface of the thread-advancing reel.

2. Apparatus for handling continuous strands of filamentary material comprising a thread-storing, thread-advancing reel, means for rotating the strand-carrying surface thereof, and a stationary generally ring-shaped strand-receiving surface adjacent the discharge end of the reel, the ring-shaped surface having a smaller diameter than the strand-carrying surface of the thread-advancing reel.

3. Apparatus for handling continuous strands of filamentary material comprising a thread-storing, thread-advancing reel having a cage-like strand-carrying surface, means for rotating the strand-carrying surface, and a member having a flared strand-receiving surface adjacent and extending back of and within a portion of the discharge end of the surface of the reel.

4. Apparatus for handling continuous strands of filamentary material comprising a thread-storing, thread-advancing reel having a cage-like strand-carrying surface, means for rotating the strand-carrying surface, and a stationary member having a flared strand-receiving surface adjacent and extending back of and within a portion of the discharge end of the surface of the reel.

5. Apparatus for handling continuous strands of filamentary material comprising a thread-storing, thread-advancing reel supported adjacent only that end from which it normally advances thread, means for rotating the strand-carrying surface thereof, and a stationary generally ring-shaped strand-receiving surface adjacent the discharge end of the reel, the ring-shaped surface having a smaller diameter than the strand-carrying surface of the thread-advancing reel.

6. Apparatus for handling continuous strands of filamentary material comprising a thread-storing, thread-advancing reel, means for rotating the strand-carrying surface thereof, and a stationary generally ring-shaped strand-receiving surface adjacent the discharge end of the reel, the ring-shaped surface having a smaller diameter than the strand-carrying surface of the thread-advancing reel, said ring-shaped surface comprising a flared portion having its extreme edge positioned back of and within a portion of the discharge end of the surface of the reel.

7. Apparatus for handling strands of filamentary material comprising a thread-storing, thread-advancing reel having a strand-carrying surface, said reel being supported from one end only, means for imparting thread-advancing motion away from the supported end of the reel, and a stationary member terminating in a knob and having an annular strand-receiving portion projecting from the discharge end of the reel.

8. Apparatus for handling strands of filamentary material comprising a thread-storing, thread-advancing reel having a strand-carrying surface, said reel being supported from one end only, means for imparting thread-advancing motion away from the supported end of the reel, and a stationary member terminating in a knob and having an annular strand-receiving portion projecting from the discharge end of the reel, said member comprising a flared portion having its extreme edge positioned back of and within a portion of the discharge end of the surface of the reel.

9. Apparatus for handling strands of filamentary material comprising a thread-storing, thread-advancing reel having a plurality of interdigitating bars forming a strand-carrying surface, said reel being supported from one end only, means for rotating the bars, means for imparting relative motion to the bars to effect thread-advancing motion away from the supported end of the reel, and a stationary member terminating in a knob and having an annular strand-receiving portion projecting from the discharge end of the reel.

10. Apparatus for handling strands of filamentary material comprising a thread-storing, thread-advancing reel having a plurality of interdigitating bars forming a strand-carrying surface, said reel being supported from one end only, means for rotating the bars, means for imparting relative motion to the bars to effect thread-advancing motion away from the supported end of the reel, and a stationary member terminating in a knob and having an annular strand-receiving portion projecting from the discharge end of the reel, said member comprising a flared portion having its extreme edge positioned back of and within a portion of the discharge end of the surface of the reel.

11. Reel mechanism for handling strands and the like comprising two sets of annularly arranged, longitudinally extending bars, the bars of one set alternating with those of the other, means for simultaneously rotating the bars of the two sets as a unit, means for imparting relative motion between the bars of the two sets to effect advancing motion of the strand endwise of the reel comprising a rotatable shaft having concentric bearing means for one set of bars and having fixed thereto eccentric bearing means for the other set of bars, a stationary generally ring-shaped strand-receiving surface adjacent the discharge end of the device, and means for rotating the shaft comprising a coupling member disposed concentrically within the ring-shaped strand-receiving surface.

12. Reel mechanism for handling strands and the like comprising two sets of annularly arranged, longitudinally extending bars, the bars of one set alternating with those of the other, means for simultaneously rotating the bars of the two sets as a unit, means for imparting relative motion between the bars of the two sets to effect advancing motion of the strand endwise of the reel comprising a rotatable shaft having concentric bearing means for one set of bars and having fixed thereto eccentric bearing means for the other set of bars, a retractable stationary generally ring-shaped strand-receiving surface adjacent the discharge end of the device, and means for rotating the shaft comprising a retractable coupling member disposed concentrically within the ring-shaped strand-receiving surface.

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