Aug. 5, 1947. G. P. TORRENCE 2,425,136

THREAD ADVANCING REEL

Filed Nov. 4, 1944 2 Sheets-Sheet 1

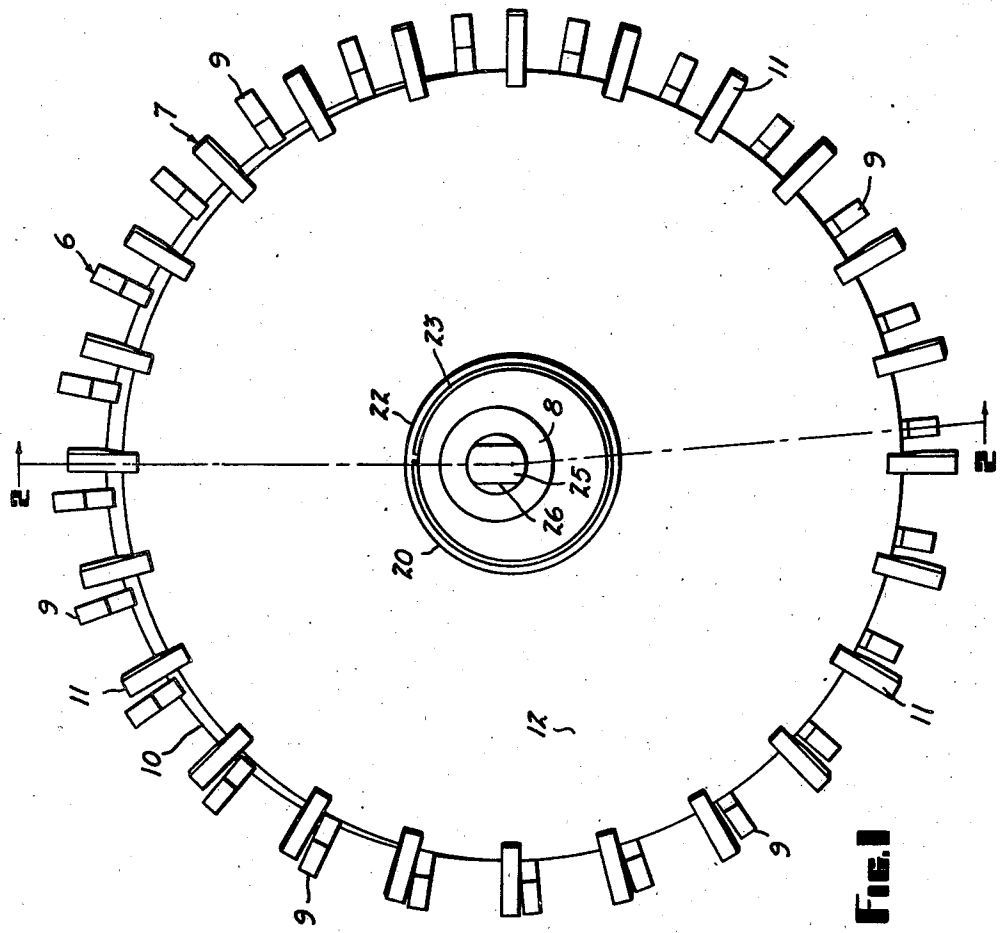

FIG. 1

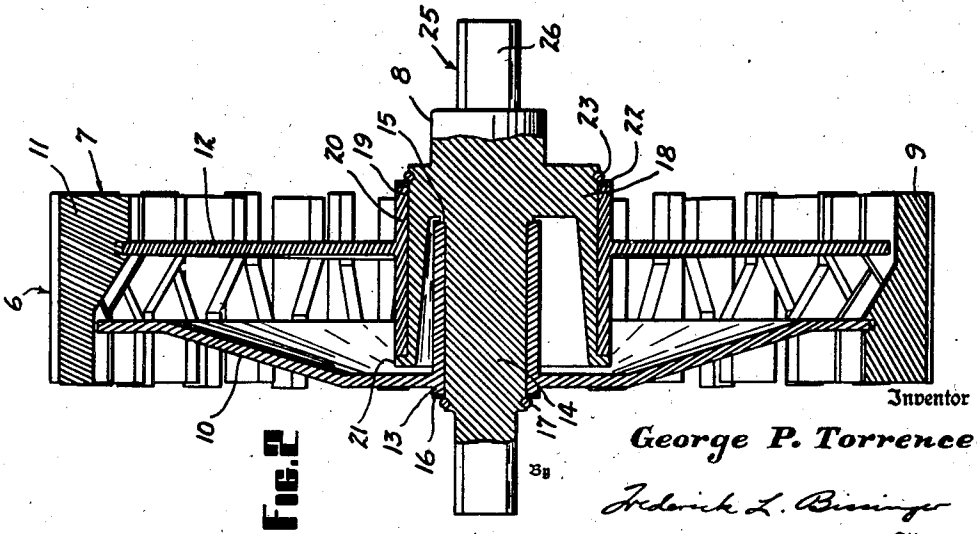

FIG. 2

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THREAD ADVANCING REEL

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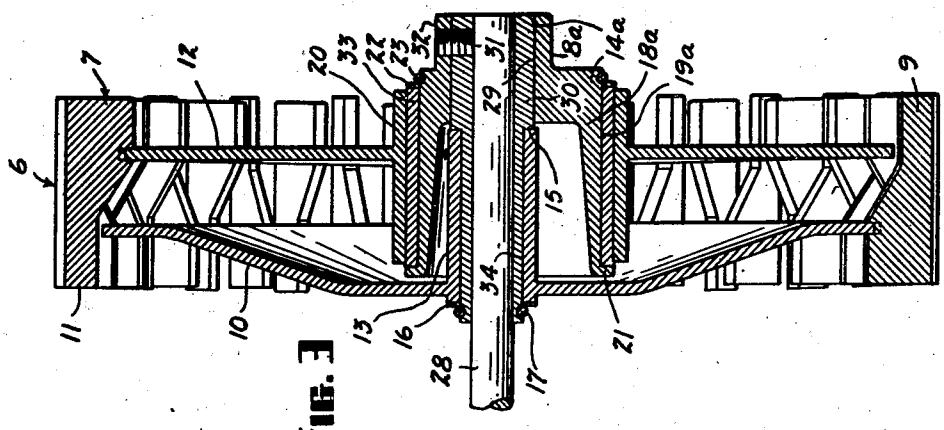

FIG. 3

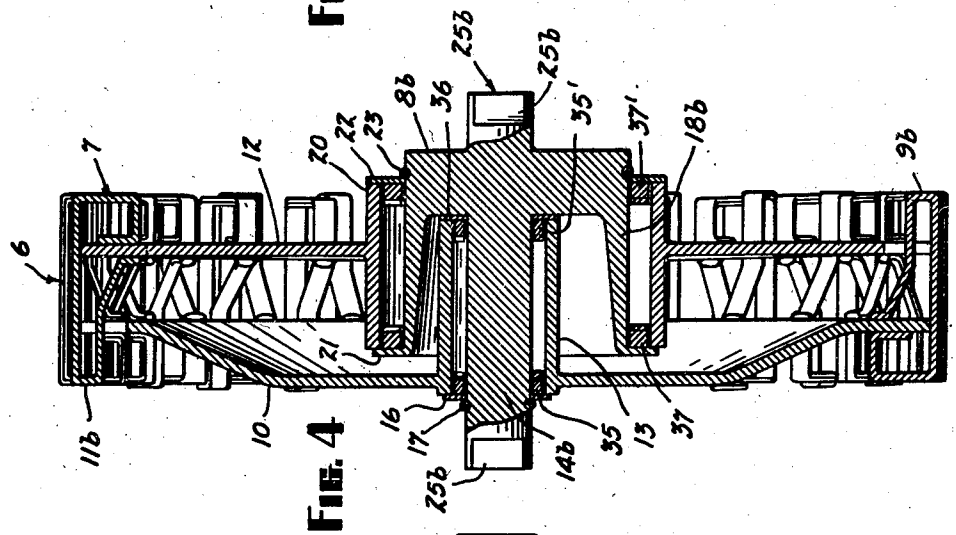

FIG. 4

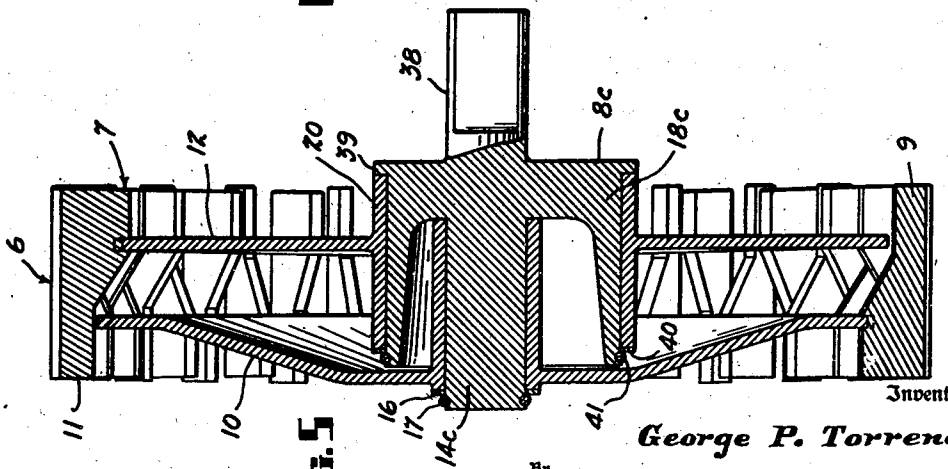

FIG. 5

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UNITED STATES PATENT OFFICE

2,425,136

THREAD-ADVANCING REEL

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Application November 4, 1944, Serial No. 561,942

8 Claims. (Cl. 28—71.7)

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This invention relates to thread-advancing reels and, more particularly, it relates to new and improved means for supporting such reels.

Thread-advancing reels of the type shown and described, for example, in the Knebusch Patent No. 2,210,914 are made up of at least two sets of interleaved or interdigitating bar members which define the thread-bearing periphery of the reels. The sets of bar members are mounted on axes which are offset and inclined with respect to one another. Due to the action of the bar members, the reels will axially advance thread which is being collected thereon. For convenience, these reels will be referred to merely as "thread-advancing reels." It is to be understood, however, that such reels may also be employed in handling tapes, bands, cables, strips or wire.

Processing operations may be performed on the thread or threadlike material while it is being advanced on the reels. Some processing operations cause the thread to shrink, thus creating tension on the bar members of the reel. The reels may also be used to subject the thread to a stretching operation by using two successive reels operating at different peripheral speeds. The stretching of the thread will also impose tension on the bar members.

Where the tensions developed become sufficiently great, it sometimes happens that the thread-supporting bar members are forced out of proper alignment so that they no longer serve effectively to advance the thread along the periphery of the reel. The tensions imposed on the bar members are, of course, transmitted to the bearings and bearing surfaces upon which the bar members are mounted for rotation. The forces which tend to misalign the bar members may thus also cause the bearing members to bind and thus interfere with effective operation of the thread-advancing reel.

This invention provides a novel means for rotatably supporting the bar members of the reel which substantially eliminates the difficulties referred to above. In accordance with the invention, the novel supporting means comprises two generally cylindrical surfaces having their axes offset and inclined with respect to each other and which are so disposed that one substantially completely encompasses the other. Advantageously, the cylindrical surfaces are substantially coextensive with the thread-bearing periphery of the reel.

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The invention will be more fully described by reference to the following drawings in which:

Figure 1 represents an end elevation of a bilaterally supported thread-advancing reel embodying the invention;

Figure 2 is a sectional elevation of the reel of Figure 1 as seen from line 2—2 thereof;

Figure 3 is a cross section of a reel which corresponds generally to that of the reel of Figures 1 and 2 except that the reel is unilaterally supported;

Figure 4 is similar to Figure 2 but illustrates certain modifications in the reel structure and the use of antifriction bearings;

Figure 5 represents an additional emodiment of the invention as applied to a unilaterally supported thread-advancing reel.

As shown in Figures 1 and 2, the thread-advancing reel comprises substantially rigid reel members 6 and 7. Concentric reel member 6, so called because it is mounted concentrically with respect to the axis of supporting member 8, has a thread-bearing periphery formed of a plurality of bar members 9. Bar members 9, secured to and spaced circumferentially about a generally circular dished web plate 10, extend substantially parallel to the axis of rotation of reel member 6. Reel member 7, referred to as the eccentric member by reason of its eccentric mounting with respect to the axis of supporting member 8, is provided with a thread-bearing periphery comprising a plurality of bar members 11 secured to disk 12.

Reel members 6 and 7 are so mounted that they occupy substantially the same space, bar members 9 and 11 being alternately disposed in interdigitating relation. As indicated, reel members 6 and 7 are mounted for rotation about axes which are offset and inclined with respect to each other. These reel members cooperate during rotation of the reel to advance thread along the thread-bearing periphery of the reel from one end thereof toward the other in the manner described in detail in Knebusch Patent 2,210,914. In operation, the reel illustrated in Figures 1 and 2 is impositively rotated by the pull of the thread, the two members being driven one from the other by bar to bar contact.

Hub 13 which is advantageously formed integrally with web plate 10 of the concentric reel member 6 is rotatably mounted about the internal cylindrical portion 14 of supporting member 8. A shoulder 15 is provided at one end of the cylindrical portion 14. A retainer ring 16 is placed against hub 13 and is held in position by a snap ring 17 to prevent axial displacement of concentric reel member 6 on the cylindrical portion 14 of the supporting member 8.

Forming part of the supporting member 8 is an eccentric mounting portion 18 having a bearing surface 19 about which hub 20 of the eccentric reel member 7 is rotatably mounted. Hub 20, like hub 13 of reel member 6, is advantageously formed integrally with disk 12 of the eccentric reel member 7 and is prevented from axial displacement by the radially extending flange 21 on one end of bearing surface 19. Hub 20 is held against displacement by flange 21 and by the retainer ring 22 and snap ring 23.

The bearing surface 19 of supporting member 8 is machined to provide an axis that is both offset laterally and inclined with respect to the axis of the cylindrical portion 14. Eccentric reel member 7 is mounted concentrically of the bearing surface 19, thereby effecting an offset and inclined relation between the reel members 6 and 7. Thus, it is apparent from the construction of the supporting member 8 that the hub or bearing 13 of reel member 6 rotates substantially entirely within the hub or bearing 20 of the eccentric reel member.

The generally telescopic arrangement of mounting portion 18 and of cylindrical portion 14 of supporting member 8 provides bearing surfaces about which reel members 6 and 7 are rotatably mounted that are substantially coextensive with the thread-bearing portions of bar members 9 and 11. Moreover, dished web plate 10 and disk 12 of reel members 6 and 7, respectively, are themselves in substantially close proximity, and they support their respective bar members 9 and 11 from a point substantially intermediate the ends of the said bar members. By virtue of this construction, substantially full support is provided for the bar members thus virtually eliminating the springing action on the reel members 6 and 7 and the binding action on the respective bearings due to the tension of the thread being advanced on the reel.

For purposes of operation, the reel is supported on stubs 25 formed integrally with supporting member 8. Stubs 25 have flat surfaces 26 to prevent rotation of the supporting member 8 and are adapted to register with a correspondingly shaped slot in a receiving yoke, bracket, or other suitable means (not shown) for suspending the reel in an operating relation to the equipment with which it is to be used.

The supporting structure contemplated by the present invention is also capable of being so constructed as to be readily demountable for the purpose of altering the arrangement of the reel members to fit any of a number of varied conditions. Due to the nature of the processing operations to be performed on the thread while it is on the reel and due to characteristics of the thread itself, it is frequently desirable to change the pitch of the helical path formed by the thread as it advances along the reel periphery. It is possible with a supporting structure of a demountable character, by the substitution of appropriate parts, to adjust the relation of the reel members to each other so as to vary the pitch of the thread turns and, therefore, the length of the thread stored upon the reel. To accomplish this purpose, a cantilever type device such as is illustrated by Figure 3 may be used with advantage. This device differs from that hereinbefore described in respect of the fact that supporting member 8*a*, instead of being unitary as in the case of member 8 of the reel of Figures 1 and 2, is made up of cylindrical member 14*a* and an eccentric mounting member 18*a*. As before, concentric reel member 6 is mounted concentrically of and in freely rotatable relation to cylindrical member 14*a* while eccentric reel member 7 is similarly disposed about the bearing surface 19*a* of mounting member 18*a*.

Cylindrical member 14*a* is mounted upon a unilaterally supported stationary shaft 28 which extends therethrough. Bearing surface 19*a* of mounting member 18*a* is so machined that its axis is inclined with respect to that of shaft 28. At the same time, the axis of bore 29 of mounting member 18*a* which engages sleeve 30 of the cylindrical member 14*a* is offset laterally with respect to the axis of the bearing surface 34 of the cylindrical member 14*a*. Setscrew 31 threaded through hub portion 32 of mounting member 18*a* and sleeve 30 of cylindrical member 14*a* secures composite supporting member 8*a* to shaft 28.

Hub 13 of concentric reel member 6, which is rotatably mounted on cylindrical member 14*a*, is restrained from axial displacement at one end by shoulder 15 of sleeve 30. Retainer ring 16 and snap ring 17 at the end of hub 13 prevent the displacement of reel member 6 at the other end. Bearing means such, for example, as sleeve bearing 33, retained by a press fit or other suitable means, may be provided in hub 20 of the eccentric reel member 7. The axial displacement of eccentric reel member 7 is prevented, as in the case of the device of Figures 1 and 2, by means of a flange 21 at one end of hub 20 and a retainer ring 22 backed by a snap ring 23.

The built-up construction of supporting member 8*a* of the device of Figure 3 affords greater flexibility in adapting the reel to varying conditions. By removing setscrew 31, the mounting member 18*a* may be removed and a similar part substituted which has been machined to different specifications so as to alter the offset and inclined relationship of the axes of the two reel members 6 and 7. In this fashion, the number and pitch of the thread turns on the periphery of the reel may be changed to suit any specific set of conditions.

The reel of Figure 4 is provided with a unitary supporting member 8*b* similar to member 8 of the reel of Figures 1 and 2, but the reel members 6 and 7 are mounted for rotation with respect to said supporting member on antifriction bearings. Concentric reel member 6 is mounted on cylindrical portion 14*b* of supporting member 8*b* on bearings 35, 35' which advantageously may take the form of antifriction roller bearings. Retainer ring 36 is provided at the innermost end of hub 13 of member 6 to provide a bearing surface therefor. As in the previously described embodiments of the invention, retainer ring 16 and snap ring 17 serve to position member 6 in proper axial relation on cylindrical portion 14*b* of supporting member 8*b*.

Eccentric member 7 is similarly rotatably supported about eccentric mounting portion 18*b* by means of suitable antifriction roller bearings 37, 37' which are inserted in hub 20 of the eccentric

member 7. A flange 21 and a retainer ring 22 backed by snap ring 23 serve, as before, to position eccentric member 7 in proper axial relation to eccentric mounting 18b of supporting member 8b. Stubs 25b are provided on supporting member 8b to support the reel from a suitable yoke (not shown) in operating relation to a treating bath.

The reel of Figure 4 is particularly adapted to be positioned with at least a part of its periphery immersed in a treating bath. Bar members 9b and 11b of reel members 6 and 7, respectively, are advantageously formed of strip material in the manner illustrated in order that splash and turbulence of the treating bath into which the reel periphery dips may be minimized.

Like the reel illustrated in Figure 3, the device of Figure 5 is adapted to be supported from one end only by means of stub 38. The structure of this reel differs from those previously described in that reel members 6 and 7 are mounted on supporting member 8c in such fashion that they may be disassembled from the free or unsupported end of said member 8c without removing the reel from its mounting.

Eccentric reel member 7 of this reel has its hub 20 freely rotatably mounted upon eccentric mounting portion 18c of supporting member 8c being prevented from axial movement with respect thereto by flange 39, retainer ring 40 and snap ring 41. Concentric reel member 6 is positioned axially of cylindrical portion 14c of supporting member 8c by means of retainer ring 16 and snap ring 17.

It will be apparent from all of the above-described reel structures that due to the telescopic arrangement of bearing surface 19 of eccentric mounting portion 18 and cylindrical portion 14 of supporting member 8, the bearing surfaces of the two reel members 6 and 7 are substantially coextensive with the thread-bearing portions of bar members 9 and 11. Moreover, dished web plate 10 and disk 12 of reel members 6 and 7, respectively, support their respective bar members 9 and 11 at a point substantially intermediate the ends of the bar members. By virtue of this arrangement rigid support for the bar members is furnished, substantially eliminating the springing of the thread-supporting members of reel members 6 and 7 as well as the binding of the reel member bearings.

Although designed for impositive rotation, the reels of the several illustrated embodiments of the invention may, if desired, be reconstructed so as to be positively driven and not dependent upon the pull of the thread for rotation. This may be done by modifying the reels to incorporate means as a ring gear on either the plate 10 or disk 12 of the reel members 6 or 7. Also, if desired, instead of the bar to bar contact between the bar members 9 and 11, a gear drive of the type shown in the Knebusch Patent No. 2,056,197 may be employed.

I claim:

1. Means for rotatably supporting a thread-advancing reel, the thread-bearing periphery of which is defined by two interdigitating sets of bar members, said means comprising two generally cylindrical hub members so disposed that one substantially completely encompasses the other, said hub members having their axes offset and inclined with respect to each other and supporting said sets of bar members in rotatable relation thereto.

2. Means for rotatably supporting a thread-advancing reel, the thread-bearing periphery of which is defined by two interdigitating sets of bar members, said means comprising an arbor supported from both ends thereof, and two generally cylindrical hub members associated with said arbor so disposed that one substantially completely encompasses the other, said hub members having their axes offset and inclined with respect to each other and supporting said sets of bar members in rotatable relation thereto.

3. Means for rotatably supporting a thread-advancing reel, the thread-bearing periphery of which is defined by two interdigitating sets of bar members, said means comprising an arbor supported from one end only thereof, and two generally cylindrical hub members associated with said arbor so disposed that one substantially completely encompasses the other, said hub members having their axes offset and inclined with respect to each other and supporting said sets of bar members in rotatable relation thereto.

4. Means for rotatably supporting a thread-advancing reel, the thread-bearing periphery of which is defined by two interdigitating sets of bar members, said means comprising two generally cylindrical hub members, each of which supports a set of bar members in rotatable relation thereto, said hub members having their axes offset and inclined with respect to each other and being substantially coextensive with the thread-bearing periphery of the reel.

5. Means for rotatably supporting a thread-advancing reel, the thread-bearing periphery of which is defined by two interdigitating sets of bar members, said means comprising an arbor supported from both ends thereof, and two generally cylindrical hub members associated with said arbor, each of which supports a set of bar members in rotatable relation thereto, said hub members having their axes offset and inclined with respect to each other and being substantially coextensive with the thread-bearing periphery of the reel.

6. Means for rotatably supporting a thread-advancing reel, the thread-bearing periphery of which is defined by two interdigitating sets of bar members, said means comprising an arbor supported from one end only thereof, two generally cylindrical hub members associated with said arbor, each of which supports a set of bar members in rotatable relation thereto, said hub members having their axes offset and inclined with respect to each other and being substantially coextensive with the thread-bearing periphery of the reel.

7. Means for rotatably supporting a thread-advancing reel, the thread-bearing periphery of which is defined by two interdigitating sets of bar members, said means comprising first hub bearing means upon which is mounted one of said sets of bar members, and second hub bearing means upon which the other of said sets of bar members is supported in offset and inclined relation to the first-mentioned set of bar members, both of said bearing means being substantially coextensive with the thread-bearing periphery of the reel.

8. Means for rotatably supporting a thread-advancing reel, the thread-bearing periphery of which is defined by two interdigitating sets of bar members, said means comprising two generally cylindrical surfaces associated with said arbor so disposed that one substantially completely encompasses the other, said surfaces having their axes offset and inclined with respect to each other,

antifriction bearings for each of said surfaces, bar member supporting means mounted on said surfaces, the bar member supporting means having bar member supporting portions positioned relative each other at a distance so that the length of the bar members extending beyond the supporting portions is no greater than the length of the bar members between said supporting portions.

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