Feb. 17, 1953 R. W. STANLEY 2,628,410

THREAD STORAGE REEL

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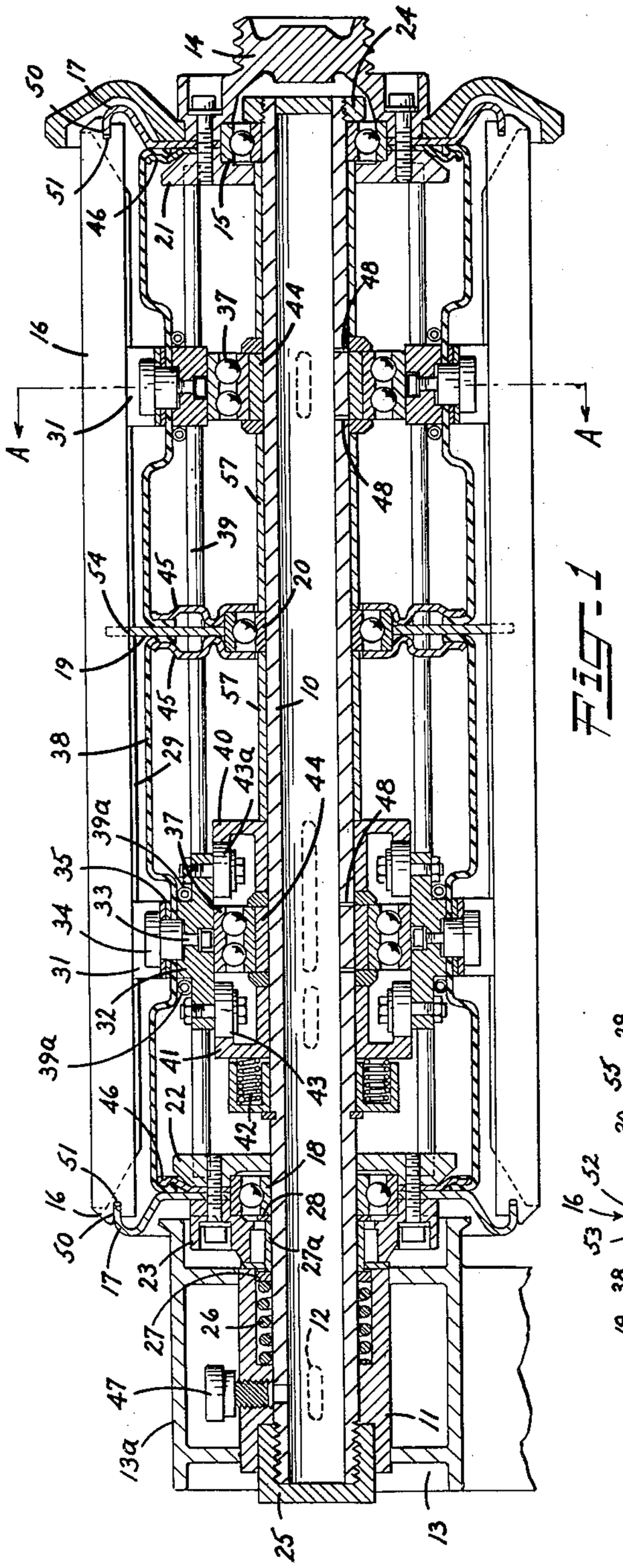

FIG. 1

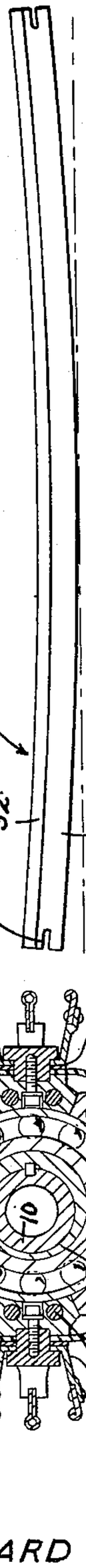

FIG. 3

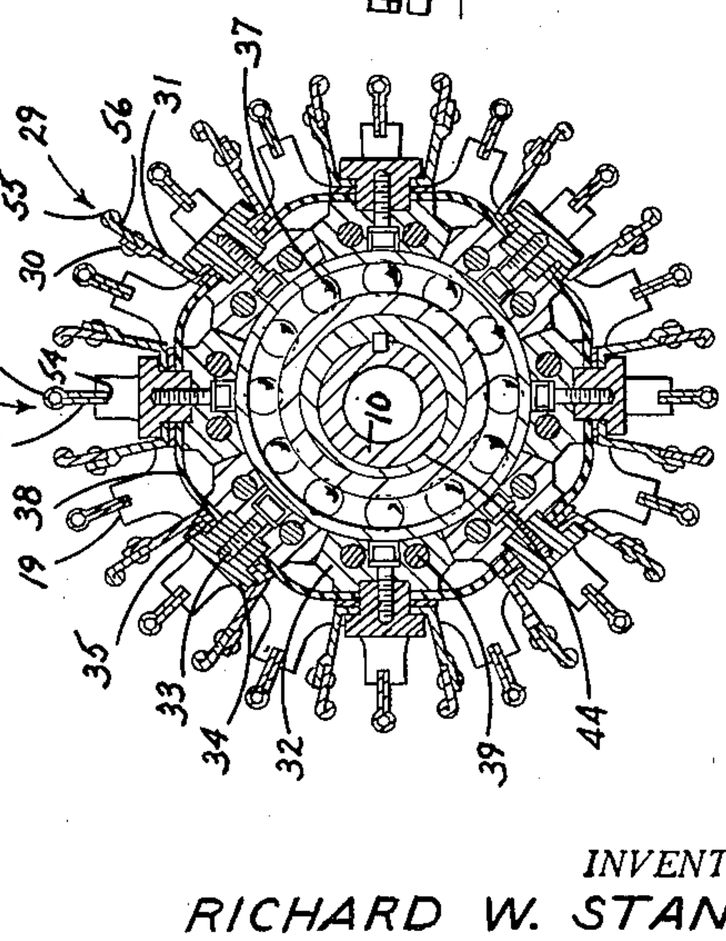

FIG. 2

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THREAD STORAGE REEL

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12 Claims. (Cl. 28—71.6)

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This invention relates to thread advancing reels for forming a thread store comprising a plurality of spaced turns of thread that are continually advanced in an axial direction along the periphery of the reel. The thread may be only stored on the reel or may be subjected to fluid treatment on the reel in the manner and for the purposes conventional in the art.

In thread advancing reels shown in the prior art, particularly where the reels were relatively long compared to their diameters, the reel often comprised a large number of moving parts and during their operation tended to become distorted due to temperature changes and the stresses to which they were subjected as well as to the wear of the parts. Often, as a result, the thread was not advanced at a uniform rate and a uniform spacing between the turns of thread on a reel was not maintained.

This invention has for its principal object, to provide a unitary form of thread advancing reel that overcomes disadvantages and objections found in reels of the prior art.

Another object of the invention is to provide a unitary form of thread advancing reel having a high degree of dimensional stability.

These and other objects and advantages of the invention will be apparent from the following description and accompanying drawing.

In the drawing

Figure 1 is a longitudinal sectional view of a form of thread advancing reel embodying this invention.

Figure 2 is a transverse sectional view of the form of thread advancing reel shown in Figure 1, the section being taken on the line A—A in Figure 1.

Figure 3 is a side elevational view of a fixed thread supporting bar member forming a part of this invention.

This invention may be used for handling yarn, filaments, tow, bands, ribbons and the like as well as thread and the term thread as used above and hereinafter is intended to be inclusive.

The invention in general comprises two circular cage-like members each comprising a plurality or set of longitudinally extending circumferentially spaced thread supporting bars that are mounted to rotate on parallel spaced apart or eccentric axes within the periphery of each of the cage-like members. The bars making up one cage-like member are positioned between the bars of the other cage-like member. The bars of one cage-like member are fixed and restrained from movement in an axial or longitudinal direction while means are provided for positively moving the bars of the other cage-like member in an axial direction to advance the turns of thread wound thereon. The thread supporting bars are so mounted in the cage members that they do not bow out due to the centrifugal force to which they are subjected during operation. Means are also provided to automatically compensate for wear or other dimensional changes of certain parts and to maintain the proper alignment and relation of the parts during operation.

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Referring to the embodiment of the invention shown in the drawings, reference character 10 indicates a hollow stationary shaft on which the reel is revolvably mounted and which serves as a support for the reel structure. As shown at the left of Figure 1 of the drawing, the shaft is fixed to the rectangular shaped support block 11 by the key 12 and the support block seats in and is prevented from turning by the out board support piece 13. The upper portion 13A of the support piece is removable and serves as a covering member for the support block The other end of the shaft 10 shown to the right of Figure 1 of the drawing is supported by the spindle supported driving nose 14 through the ball bearing assembly 15.

The cage-like member having the set of fixed thread supporting bars comprises a plurality of longitudinally extending thread supporting bars 16 that are fixed at each end to the disk-like members 17. The longitudinally extending flange-like portion 50 of each disk-like member extends into a slot 51 formed in the end of each bar member. The disk-like members are mounted for rotation about the axis of the shaft 10 on the ball bearing assemblies 15 and 18. The bar members are radially supported between their ends by the disk-like member 19 that is mounted on the ball bearing assembly 20 to rotate about the axis of the shaft 10. If desired a plurality of longitudinally spaced disk-like members and bearing assemblies may be used.

The bar members 16 as shown are made from a relatively thin strip of resilient metal that may be flexed, shaped to form a thread contacting portion 52 approximately circular in cross section and side portions positioned in side by side relation to form a stem-like member 53 that seats in radial slots 54 in the periphery of the disk-like member 19. The thread supporting bars 16 before being fixed to the disk-like members 17, as shown in Figure 3, are bowed out or are arcuate with the portion that contacts the thread concave and the outer extremity of the stem

portion convex. When the bar members are assembled the end portions are moved inwardly and the bars are sprung into place with the slots in the ends engaging the flange portion of the disk-like members 17. The bars are supported between their ends by the disk-like member 19. The bars when assembled are straight and always under stress pressing radially inwardly against the disk-like member 19 with a force greater than any centrifugal force to which they would be subjected during use and thereby resist any centrifugal force encountered during operation that would otherwise cause them to bow out.

The disk members 17 are pressed toward each other by spring means and maintain the thread supporting bars under compression but permit the bars to expand or contract in a longitudinal direction because of wear or temperature changes. The disk-like member 17 and the sealing member clamping plate 46 at the right of the reel as shown in Figure 1 of the drawing are clamped between the annular retaining means 21 and the driving nose 14 that engage the outer race of the ball bearing assembly member 15. The lock nut 24 on the end of the shaft 10 serves as a shoulder or abutment for the ball bearing assembly 15. The disk-like member 17 and the sealing member clamping plate 46 at the left of the reel are clamped between the annular retaining means 22 and 23 that engage the ball bearing assembly 18 and are urged to the right toward the other disk-like member by the coil spring 26 mounted on the shaft 10. The spring abuts a shoulder on the support block 11 that is keyed to slide along the shaft 10 and the support block engages the clamping nut 25 that positively seats against the end of the shaft 10. The spring 26 exerts its force on the disk-like member 17 at the left of the reel through the series of parts on the shaft 10, namely the collar 27, sleeve 27*a*, ring 28 and the ball bearing assembly 18. This arrangement maintains the relation of the bars to the other parts of the reel and prevents any looseness developing between the disks and the bar members without subjecting the bars to excessive stress.

The other cage member having the thread supporting bars that are movable in an axial direction comprises the thread supporting bars 29 that are made from relatively thin metal to form a rounded thread supporting portion 55 and a flat attaching portion 56. The bar members are mounted in pairs by rivets or the like 30 on the yoke pieces 31 which are spaced apart along the bar members. The pairs of movable bar members are positioned in the reel with a stationary bar member between them and extend through cut out portions in the periphery of the disk-like member 19. The yoke pieces are attached to the endwise slideable bearing shoes 32 by means of the screws 33 and clamp pieces 34. A washer 35 completes the shoe attachment to the yoke piece. The bearing shoes are mounted to slide longitudinally on the outer races of the longitudinally spaced ball bearing assemblies 37. Although only two sets of bearing shoes and ball bearing assembly supports are shown it is contemplated that a greater number of them, longitudinally spaced along the reel, may be used. The under surface of the bearing shoes are concave with the same radius of curvature as the outer periphery of the outer race and when the bearing shoes are mounted on the bearing race the adjacent side portions of adjacent bearing shoes are in contact and serve as bearing surfaces and guide

means for adjacent shoes. The bearing shoes are each mounted to also slide on the pair of aligning rods 39 that are positioned at their ends in slots in the retaining members 21 and 22 and extend through approximately radial slots in the disk-like member 19 and seal clamping plates 45 that permit eccentric movement. The bearing shoes are held against the outer races of the ball bearing assemblies 37 by the garter springs (39*a*) that engage the aligning rods. The aligning rods also serve as a drive connection between the movable bars and the retaining member 21 that is clamped to the driving nose 14. The bearing assemblies 37 are mounted on the eccentric bushings 44 fixed to the stationary shaft 10. The diameters of the two circular sets of thread supporting bar members are the same with the eccentricity of the sets the same as that of the bushings 44. The bearing shoes of the set at the left end of the reel as shown in Figure 1 of the drawing are longer than the bearing shoes of the other set. The cam follower rollers 43 and 43*a* are rotatably mounted adjacent the ends of each of said longer bearing shoes and engage the cam face of the cam members 40 and 41. The cam members are circular and are non-rotatably and eccentrically mounted on the shaft 10. The eccentricity of the cam members is the same as that of the bearing bushings 44 so that the cam rollers that move in a circular path eccentric to the shaft 10 will always be in engagement with the cam faces. The cam surfaces are such that the movable thread supporting bars will be positively moved in one direction when they are projecting beyond the periphery of the other cage member and will be positively moved longitudinally in the other direction when they are within the periphery of the other cage member. The cam member 41 is mounted to slide along the shaft 10 and is urged toward the other cam member 40 by the spring means 42. With this arrangement the follower rollers are always in engagement with the cam faces so that any wear of the cam faces or follower rollers is compensated and play or lost motion is avoided.

The ball bearing assemblies are held in spaced apart relation on the stationary shaft 10 by means of suitable collar members and spacing sleeves 57.

Sealing means are provided for preventing the entrance of corrosive liquids or vapors to the inner part of the reel comprising the sleeve-like members 38 of flexible, corrosion resistant synthetic rubber, plastic or other material. The sleeve members are clamped in fluid tight relation to adjacent parts of the reel within the thread supporting bars. Sleeve-like sealing members are clamped at one end to the thread bar supporting disk-like members 17 by means of the annular clamping plates 46. The sleeve-like members are clamped at their other ends between the bearing shoes and the washers on the yoke pieces.

The thread supporting bars and supporting pieces outside of the sealing means are of corrosion resistant material or may be coated with corrosion resistant material.

The parts that slide or rotate on other parts such as the bearing shoes 32, retainer disks 21 and 22, may be of self-lubricating oil impregnated bronze. Means are provided for further lubricating the parts forming bearing surfaces comprising the oil cup 47 by means of which oil may be introduced into the hollow shaft 10 and the oil

outlets 48 positioned along the shaft adjacent the ends of the eccentric bearings 44.

In the operation of the embodiment of the invention described, the driving nose member is coupled to a driving member by a screw thread or other suitable coupling means. The driving nose positively rotates the non-reciprocable thread supporting bars through the disk member 17 and the reciprocable thread supporting bars through the aligning rods 39. The bars in the two sets move in separate circular paths one eccentric to the other. The reciprocable thread supporting bars comprising one of the cage members are beyond the circular path of the other set of bars for a portion of their revolution and for the rest of their revolution are within the path of the other set of bars. The reciprocable bars are positively moved axially of the reel by the stationary cam members as the bars rotate. The cam surfaces are of such conformation that the reciprocable thread supporting bars are positively moved in the direction it is desired to advance the thread on the reel when the reciprocable thread supporting bars are outside of the path of movement of the other sets of bars. The reciprocal bars are positively retracted longitudinally of the reel by the cam members while the reciprocable bar members are inside the path of movement of the other set of bar members.

The arrangement of the parts of this reel provides a construction that is rigid and is of particular value in relatively long reels. The thread supporting bars are supported intermediate their ends and are under inwardly directed stresses that oppose the stresses induced by centrifugal force. The thread supporting bars are also subjected to longitudinal stresses that prevent their becoming loose during operation and permit changes in length due to temperature changes.

While a preferred embodiment of the invention has been shown and described, it is to be understood that this was by way of illustration and that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A thread advancing reel comprising a generally cylindrical cage-like member mounted to rotate about an axis thereof and having a plurality of longitudinally extending thread supporting bars of resilient material the end portions of which when not subjected to stress extend radially outwardly along their length, and means pressing said end portions radially inwardly and maintaining said thread supporting bars under stress parallel to the axis of said cage-like member.

2. A thread advancing reel comprising a generally cylindrical cage-like member mounted to rotate about an axis thereof and having a plurality of thread supporting bars of resilient material, the end portions of which when not subjected to stress extend radially outwardly along their length, and means pressing said end portions radially inwardly supporting and maintaining said thread supporting bars under stress parallel to the axis of said cage-like member.

3. A thread advancing reel comprising a generally cylindrical cage-like member mounted to rotate about an axis thereof and having a plurality of longitudinally extending thread supporting bars of resilient material the end portions of which when not subjected to stress extend radially outwardly along their length, means supporting and pressing said end portions radially inwardly and means positioned between the ends of said thread supporting bars supporting the bars, said bars being maintained under stress parallel to the axis of said cage-like member and exerting stresses inwardly against the supporting means positioned between the ends of said thread supporting bars.

4. A thread advancing reel comprising a generally cylindrical cage-like member mounted to rotate about an axis thereof and having a plurality of longitudinally extending thread supporting bars of resilient material the end portions of which when not subjected to stress extend radially outwardly along their lengths, means pressing said end portions radially inwardly and maintaining said bars under stress parallel to the axis of said cage-like member including compressed resilient means subjecting the thread supporting bars to compressive stresses acting longitudinally of the thread supporting bars.

5. A thread advancing reel comprising a generally cylindrical cage-like member mounted to rotate about an axis thereof having a plurality of longitudinally extending thread supporting bars of resilient material the end portions of which when not subjected to stress extend radially outwardly along their length, means pressing said end portions radially inwardly, means positioned between the ends of said thread supporting bars supporting the bars, said bars being maintained under stress parallel to the axis of said cage-like member and exerting stresses inwardly against said supporting means, and compressed resilient means subjecting the thread supporting bars to compressive stresses acting longitudinally of the thread supporting bars.

6. A thread supporting bar comprising a longitudinally extending member of resilient material having a longitudinally extending portion for contacting a thread and a stem-like supporting portion, the end portions of the thread supporting bar extending longitudinally and inclined in opposite directions with the thread contacting portion generally concave in a longitudinal direction said thread supporting bar being capable of being flexed and maintained under stress with the thread contacting portion extending in a straight line.

7. A thread supporting bar comprising a longitudinally extending member of resilient material having a longitudinally extending portion for contacting a thread and a longitudinally extending stem-like supporting portion, the end portions of the thread supporting bar extending longitudinally and inclined in opposite directions with the thread contacting portion generally concave in a longitudinal direction and with the supporting portion generally convex in a longitudinal direction said thread supporting bar being capable of being flexed and maintained under stress with the thread contacting portion extending in a straight line.

8. A thread advancing reel comprising a cage-like member having a plurality of longitudinally extending thread supporting bars, bearing shoes, positioned in side by side relation, fixed to the thread supporting bars, means for supporting said bearing shoes on which said bearing shoes are adapted to slide, said bearing shoes having bearing surfaces that are in engagement with bearing surfaces on adjacent bearing shoes and means for moving said thread supporting bars in a longitudinal direction.

9. A thread advancing reel comprising a cage-like member having a plurality of longitudinally

extending thread supporting bars, bearing shoes positioned in side by side relation, fixed to the thread supporting bars, means for supporting said bearing shoes on which said bearing shoes are adapted to slide, said bearing shoes having bearing surfaces that are in engagement with bearing surfaces on adjacent bearing shoes, means extending through said bearing shoes for aligning and guiding said bearing shoes, and means for moving said thread supporting bars and bearing shoes in a longitudinal direction.

10. A thread advancing reel comprising a cage-like member having a plurality of longitudinally extending thread supporting bars, bearing shoes, positioned in side by side relation, fixed to the thread supporting bars, means for supporting said bearing shoes on which said bearing shoes are adapted to slide, means for retaining said bearing shoes on said supporting means, said bearing shoes having bearing surfaces that are in engagement with bearing surfaces on adjacent bearing shoes, means extending through said bearing shoes for aligning and guiding said bearing shoes, and means for moving said thread supporting bars and bearing shoes in a longitudinal direction.

11. A thread advancing reel comprising a cage-like member having a plurality of longitudinally extending thread supporting bars, bearing shoes, positioned in side by side relation, fixed to the thread supporting bars, means for supporting said bearing shoes on which said bearing shoes are adapted to slide, said bearing shoes having bearing surfaces that are in engagement with bearing surfaces on adjacent bearing shoes, means extending through said bearing shoes for aligning and guiding said bearing shoes, means for moving said thread supporting bars and bearing shoes in a longitudinal direction, and

driving means engaging the means for guiding and aligning extending through the bearing shoes for moving said thread supporting bars in a path about an axis of the cage-like member.

12. A thread advancing reel comprising a first cage-like member having a plurality of longitudinally extending thread supporting bars, means for supporting the bars, said bars exerting a force inwardly against the supporting means, a second cage-like member having a plurality of longitudinally extending thread supporting bars positioned between the bars of the first cage-like member, bearing shoes positioned in side-by-side relation fixed to the thread supporting bars of the second cage-like member, means for supporting said bearing shoes on which said bearing shoes are adapted to slide, said bearing shoes having bearing surfaces that are in engagement with bearing surfaces on adjacent bearing shoes, and means for moving said thread supporting bars of the second cage-like member in a longitudinal direction.

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