

Dec. 10, 1935.

M. KRISSIEP ET AL

2,024,104

BRAIDING CARRIER

Filed April 25, 1934

2 Sheets-Sheet 1

FIG. 1.

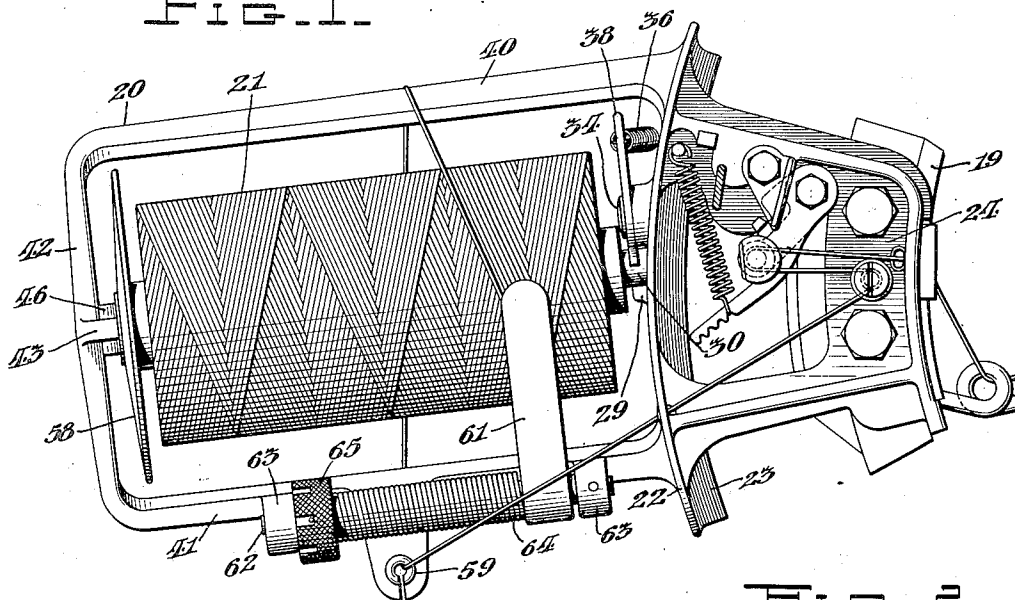


FIG. 2.

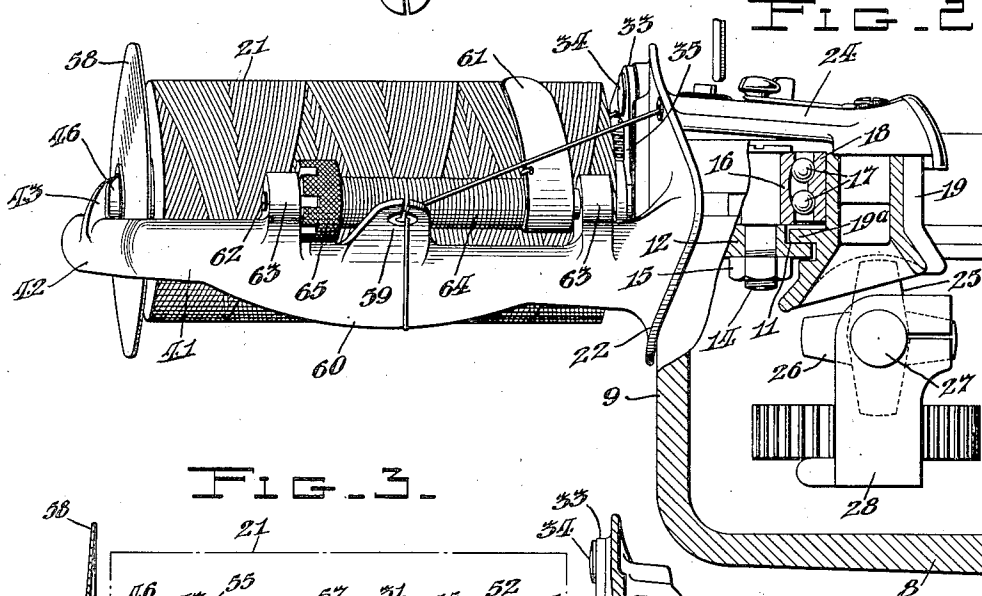
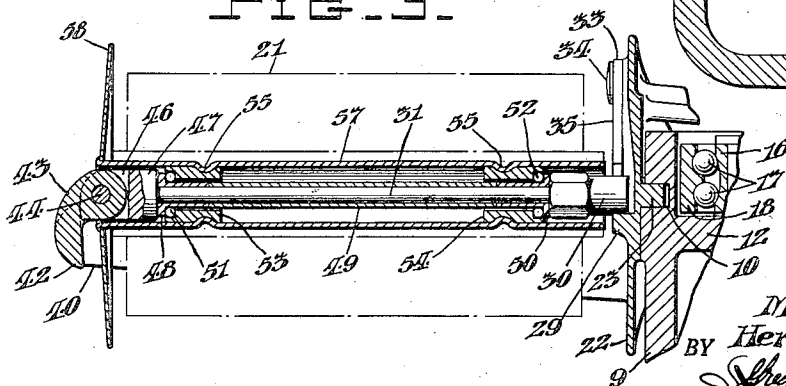


FIG. 3.



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FIG. 4.

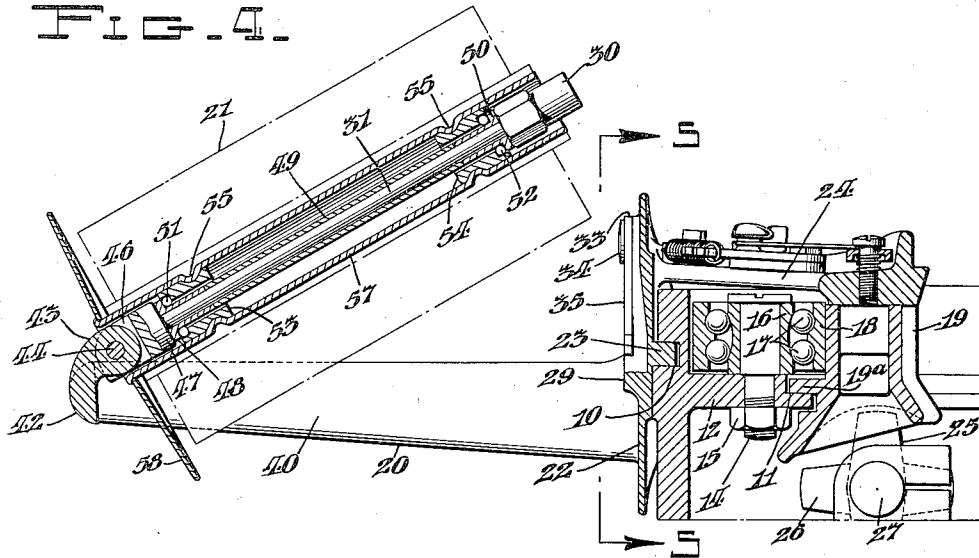


FIG. 6.

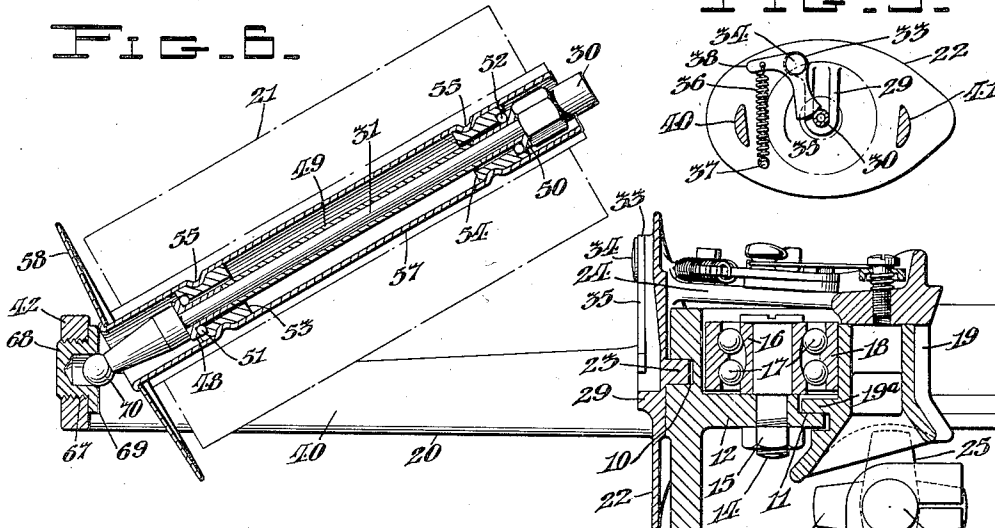
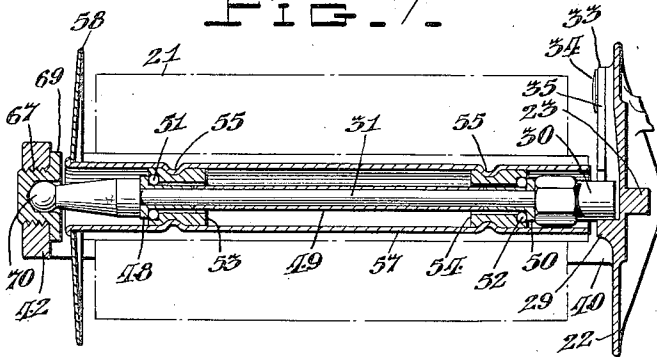


FIG. 7.



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BRAIDING CARRIER

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Application April 25, 1934, Serial No. 722,244

19 Claims. (Cl. 96—15)

This invention relates to braiding and like machines, and particularly to carriers for the yarn packages thereof.

Altho, having certain applications and uses, in its various features, other than in braiding machines, or in braiding machines of the high-speed rotary-type, the invention is primarily intended for the more modern super-speed braid-
ers, in which the package spindles are disposed in horizontal planes, or planes radial to the axis of rotation of the package carriers. In such machines, the centrifugal forces are so great as to tend to dislocate all of the parts, and to cause radial thrust resistance and friction between
relatively movable elements, which cause fracture of the machine structure, thread breakage, interruption of service and other objections.

It is, accordingly, an object of the invention to overcome such objections and to compensate for the radial thrust effect on the spindles and other parts, as will hereinafter more clearly appear.

Also, in such machines, as heretofore constructed, the carriers were limited to certain of the relatively lower ranges of the so-called high speeds such that, if operated above such ranges, the spindles jumped, or tended to jump, out of the bearings thereof.

It is, therefore, another object of the invention to overcome this objection and to ensure that the spindles will stay in place under all conditions.

Further, in such machines, the spindles and packages are not ordinarily so readily accessible for removal and replacement as in the slower-speed machines, in which they are freely exposed at convenient angles and only lightly held by small snap-wire or other fasteners.

It therefore is a further object of the invention to overcome this objection, and to do so irrespective of any added difficulty in effecting the result imposed by the other features of the invention, such as more securely holding the packages in place, and overcoming the adverse effects of centrifugal force.

Other objects include reducing noise, preventing service interruption, minimizing variations in the yarn tension as the yarn is unwound from the packages, facilitating manipulation, ensuring a better product, and providing a device that shall be simple and durable in construction, economical to manufacture, and effective in its operation.

With these and other objects in view, which will become apparent from the following de-

tailed description of the illustrative embodiments of the invention shown in the accompanying drawings, the invention resides in the novel elements of construction, devices, and combination of parts in cooperative relationship, as herein-
after more particularly pointed out in the claims.

In the drawings:

Figure 1 is a top plan view of a yarn-carrier of the invention,

Fig. 2 is a side view, partially in elevation and partially in section, of the structure of Fig. 1, and of a portion of a high-speed rotary braiding machine in which the carrier is disposed,

Fig. 3 is a side view of the device of Figs. 1 and 2, mostly in section in the vertical plane of the package axis, but having parts in elevation; parts being removed, and the yarn package itself being shown in operative position by broken lines,

Fig. 4 is a view, similar to Fig. 3, of the structure thereof and of parts shown in Fig. 2, with the spindle and associated elements in position for removing and replacing the yarn package,

Fig. 5 is a detail view, on a reduced scale, taken substantially along the line 5—5 of Fig. 4,

Fig. 6 is a view, similar to Fig. 4, showing a carrier of modified form embodying the invention, and

Fig. 7 is a view, similar to Fig. 3, of the carrier structure of Fig. 6.

Referring to Figs. 1 to 5, a main carrier support 8, of substantially drum or cup-shape having an upright perimetral side wall 9, is adapted for high-speed rotation about the vertical axis of the cup, or of its perimeter 9. As shown in Fig. 3, the perimeter 9 has an annular exterior groove 10, and, as indicated in Fig. 2, has an interior rabbet groove 11 on a ledge 12, which carries vertical studs 14, held by nuts 15, and surrounded by ball-bearing elements 16, 17 and 18; the assembly, including the parts 14 to 18, being one of several like bearing units disposed about the ledge 12.

A frame 20, constituting one of several like frames spaced about the perimeter 9 of the main support 8, each for directly supporting a yarn package 21, comprises a radially-inner base end 22, in the form of a curved plate or shield having a tongue 23 slidably fitting the groove 10. A top extension 24 of the plate 22 projects radially inwardly therefrom, over the top of the perimeter 9, to support a member 19, having a bearing portion 19a for sliding movement in the rabbet groove 11. The radially-inner end of the frame 20, as better seen in Fig. 4, is therefore of inverted substantially U-shape, in radial vertical

plane section, embracing the perimeter 9 and the ledge 12 between the grooves 10 and 11, on which the frame 20 moves, as a unit, in one direction, while the support 8 moves in the opposite direction.

A flier 25, not particularly germane to this invention, operates through the step-by-step rotation of lugs 26 offset along a shaft 27, to permit passage of yarns between the member 19 and the shaft 27, while maintaining a positive drive connection between the frame 20, of which the member 19 constitutes a part, and a member 28 connected to the main driving element of the carriers.

A seat or bearing 29, of substantially U-shape, see particularly Fig. 5, is provided on the radially-outwardly-facing side of the plate 22 for receiving an end element 30 on a spindle rod or core member 31. A dog 33, pivoted on a pin 34, has a latch arm 35 for releasably holding the spindle end 30, and is held by a spring 36 extending between a pin 37 on the plate 22 and an arm 38 of the dog.

The frame 20 further comprises a portion of substantially U-shape, in a horizontal plane, Figs. 1 and 2, having the inner or free ends of its legs 40 and 41 preferably integrally joined to the plate 22, and its outer closed end 42 provided with a pivot-bearing projection 43 for a pin 44, Figs. 3 and 4.

The spindle rod 31 has a bifurcate or clevis end 46 embracing the projection or eye 43, and a cylindrical thrust bearing portion 47 for co-operation with an outer flanged end 48 of a sleeve 49 surrounding the rod 31 and having a like flange 50 at its inner end; the flanges 48 and 50 constituting ball races for bearing balls 51 and 52, which are held thereto by sleeves 53 and 54. The sleeves 53 and 54 have outer perimetral grooves for the reception of annular portions 55 bent inwardly from a rotatable spindle sleeve 57, to which a disc 58 is secured for backing the package 21. The element 30, at the inner end of the spindle rod 31, is a combined nut and bearing element for holding the rotatable sleeve 57 on the rod and seating the device as a unit on the bearing 29.

The arm 40 is finished to arcuate contour at its outer face and upper and lower edges, as seen in Fig. 5, whereby to constitute an easy-sliding yarn guide for a length of yarn from the package 21, as better seen in Fig. 1. As viewed in Figs. 1 and 2, an eyelet or yarn guide 59 projects laterally from the frame leg 41 above the center of a lower arcuate yarn-guide portion 60. A damper or brake element 61 for the yarn package 21 is mounted on a pin 62, extending between apertured lugs 63 on the leg 41 of the frame 20, and is biased to damping position by a spring 64, which surrounds the pin 62 and is adjustable by a nut 65.

In operation, the parts assume the positions shown in Figs. 1 to 3, inclusive, in which the axes of the packages 21 and the spindle parts lie in a substantially horizontal plane and extend substantially radially to the axis of rotation of the frames 20. In these positions, the parts are best adapted to withstand displacing tendencies by centrifugal force thereon, but there is a very strong radially outward force along the spindles, which, in devices prior to the invention, broke off the spindle retaining means at the outer ends thereof.

The present device is, therefore, especially reinforced against such injury, by the size, weight, material, shape and location of the frames 20, wherein a relatively heavy casting, preferably of iron, has its legs 40 and 41, and its closed end

42, about the packages close to the center, and in the planes, thereof, whereby to resist the radial thrust loads of the packages in substantially the most effective manner, without subjecting any parts of the frames 20 to undue bending moment caused by said loads.

The combined thrust and radial bearing character of the anti-friction bearings between the rods 31 and the sleeves 57 also assists in distributing the thrust loads to effectively oppose them and to provide for effective turning of the packages on the spindles. The permanent positive connection effected, by the pin 44, and the releasable positive connection effected by the latch dog 33 between the rod 31 and the frame 20, prevent the packages from jumping out of the frames under the high-speed strains to which they are subjected, but permit the very convenient and substantially instantaneous release of the spindle ends 30 for moving the packages to the position indicated in Fig. 4, in which they may readily be slipped off the ends of the spindles for replacement.

The arcuate yarn-guide portion 60, which is preferably drawn about an axis substantially normal to a plane of the axis of the package 21, is designed to compensate for movement of the yarn between the eyelet 59 and the constantly-changing inner-end or take-off point of the yarn; tending to lengthen the yarn between the guide 60 and the take-off point, as the latter approaches its center position, and tending to shorten the yarn between these points, as the take-off point approaches its extreme position at the ends of the package. These tendencies are opposed to the natural tendency of the yarn which tendency would be allowed full play, if the guide 60 were straight along the underside of the frame to cause more disturbance and inequality in the tension system. The guide is also positioned to hold the take-off yarn length clear of the package, whereby to prevent lateral rolling or dragging of this length on the package, and the arcuate shape urges the yarn to move along the package against a tendency by the package to hold it back, and as opposed to the neutral effect of a straight-line guide.

In the preferred form of Figs. 6 and 7, in which corresponding parts are designated by corresponding reference characters, the parts are substantially identical throughout to those of Figs. 1 to 5, except at the radially outer ends of the frames 20, or at the left ends as viewed in the drawings.

In this form, the closed end 42 of the U-shaped frame, instead of having the projection or eye 43 of the above-described form, has a radial aperture and interior screw threads 67 for the reception of a cooperating exteriorly screw-threaded plug or insert 68 of substantially cup or socket-shape having a laterally-outwardly projecting inner end flange or shoulder 69; the socket being inserted, closed-end out, in the portion 42, with the flange or shoulder 69 against the radially-inner side of the portion 42. This construction, in which the insert 68 is preferably of harder or better wearing metal than the frame, locks the insert against the strong centrifugal load force of the spindle and the package.

Also, the radially-outer end of the spindle rod 31, instead of having the bifurcated clevis pivot end fixed to the frame as by the pin 44 of the previous figures, is provided with a head 70 having a constricted neck and removably fitting the socket member 68. The head 70, preferably con-

structured as a ball, normally cooperates with the socket 68, as in a plug and socket joint, in which the plug head 70 is not removable laterally from the socket. This feature, in cooperation with the latch dog 33, at the other end of the spindle, prevents the spindle and package from jumping out of position under high-speed operation and directs the centrifugal load force toward a position of great strength and ability to resist it.

When the latch dog 33 is released, the package and spindle are pivoted about the ball-end 70, as in a ball-and-socket joint, to the position of parts illustrated in Fig. 6, wherefrom the package and the spindle may be removed as a unit.

The term U-shape is intended to designate any frame structure such as that shown, or its equivalent, as an element of the combination and for the purposes set forth, wherein for convenience, or in view of variable factors of space consideration and operation, the bracket 20, to which such term applies, may depart from the purely U-shape indicated, such as having its legs or the top edges of its legs lowered or a leg disposed beneath the package, or the structure otherwise modified such that the outer end of the spindle is practically as well braced against the centrifugal load by means exterior to the spindle, as distinguished from a sole support extending from the plate 22 through the package. The other elements are also capable of like modification and recombination, in which subcombination features may be employed in either or both of exteriorly and interiorly-supported packages and with machines of other types.

Of course, the improvements specifically shown and described, by which the above results are obtained, can be changed and modified in various ways without departing from the scope of the invention herein disclosed and hereinafter claimed.

We claim:

1. In combination, in a braiding machine and the like, an annular support for high-speed rotation about a vertical axis, a plurality of horizontal package-carrier frames supported on, and about, the outer perimeter, of the support slidably embracing the same for high-speed rotation oppositely thereto and providing inner spindle bearings adjacent thereto, substantially radial side arms extending from said frames, and spindle bearings radially outward from said perimeter between the substantially radial side arms of said frames, said side arms having yarn-guide portions, one of which is of depending arc-shape having an eyelet thereover, the radially outer spindle bearings comprising socket members having exterior screw threads in, and outwardly-extending open-end flanges against the radially-inner sides of the frame portions between said radial side arms, spring-biased latch dogs carried by the radially-inner ends of the frames over the inner spindle bearings, and spindle structures removably positioned in the frames, each comprising a rod-like inner spindle having an outer ball end for position in one of said sockets, a cylindrical bearing for the cooperating inner bearing, and a plurality of bearings intermediate said spindle end bearings, and a tubular spindle element journaled on said intermediate bearings about said rod in longitudinally locked relation thereon and carrying an outer-end package-backing disc.

2. In a braiding machine, a drum, an annular guide track at the outer side thereof, a yarn carrier at the outer side of the drum rotatable around said track, a U-shaped frame having the ends of

its arms at its open end rigidly secured to the carrier adjacent to the drum and projecting outwardly from the drum, and a package-carrying spindle having its axis horizontal, substantially radial, and parallel to each of the frame arms, one end of the spindle being supported by the closed end of the U-shaped frame, the other end of the spindle being supported by the carrier.

3. In a braiding machine, a revolving drum, an annular guide track at the outer side thereof, a yarn carrier at the outer side of the drum rotatable around said track, a U-shaped frame having the ends of its arms at its open end rigidly secured to the carrier adjacent to the drum and projecting outwardly from the drum, and a package-carrying spindle having its axis horizontal, substantially radial, and parallel to each of the frame arms, one end of the spindle being supported by the closed end of the U-shaped frame, the other end of the spindle being supported by the carrier, one of the legs of the U-shaped frame being shorter than the other.

4. In a braiding machine, a main carrier support, a guide track at the outer side thereof, a braid strand carrier at the outer side of the drum, a U-shaped frame having the ends of its arms at its open end rigidly secured to the carrier adjacent to the drum and projecting outwardly from the drum and a package-carrying spindle, one end of the spindle being supported by the closed end of the U-shaped frame, the axis of said spindle being positioned approximately radially about the braiding center.

5. In a braiding machine, a main carrier support, a guide track at the outer side thereof, a braid strand carrier movable on said track, a U-shaped frame having the ends of its arms at its open end rigidly secured to the carrier adjacent to the drum and projecting outwardly from the drum, and a package-carrying spindle, one end of the spindle being supported by the closed end of the U-shaped frame, the axis of said spindle being positioned approximately radially about the braiding center, the arms of the frame serving as yarn guides.

6. In combination, in a braiding machine, an annular support, a plurality of package-carrier frames supported on, and about, the outer perimeter, of the support providing inner spindle bearings adjacent thereto, side arms extending from said frames, and spindle bearings outwardly from said perimeter between said side arms, the arms having yarn guide portions, one of which is of depending arc shape having an eyelet thereover, the outer spindle bearings comprising socket members between said arms, latch means carried by the inner ends of the frames adjacent to the spindle bearings, and spindle structures removably positioned in the frames, each comprising a rod-like inner spindle having an outer end for position in one of said sockets, a bearing for the cooperating inner bearing, and a plurality of bearings intermediate the spindle end bearings, and a tubular spindle element journaled on said intermediate bearings about said rod and carrying an outer end package-backing element.

7. In combination, in a braiding machine, an annular support, a plurality of package-carrier frames supported on the outer perimeter of the support providing inner spindle bearings adjacent thereto, arms extending from said frames, and outer spindle bearings between said arms, the arms having yarn guide portions, one of which is of depending arc shape having another of said guide portions thereover, spindle latch

means carried by the inner ends of the frames, and spindle structures movably positioned in the frames, each comprising a rod-like inner spindle, and a tubular element journaled on the rod thereabout.

8. In combination, in a braiding machine, a support rotatably mounted about a vertical axis, a plurality of package-carrier frames radially outwardly of the support and including inner ends movably mounted thereon about said axis having base portions providing radially-inner spindle bearings, arms projecting substantially radially outwardly from the base portions and spindle bearings outwardly from the base portions between the arms, the arms having yarn-guide portions, one of which on one of the arms of each frame is of depending arc shape and another of which on said one arm of each frame has an eyelet over the arc, spindle latch means on the frames, and spindles movably positioned in the frames.

9. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, the inside bearing means including a plurality of upright roller-bearing elements arranged in an annular series about said axis carried by the rotor for anti-friction rolling action thereon of the carrier means about said axis and to assume radial thrust of the carrier means.

10. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, said structures of U-shape each carrying a substantially horizontal yarn-package spindle extending substantially radially of the rotor axis outside the cup, and means for supporting the outer-end of the spindle extending from the corresponding structure of U-shape outside the package position on the spindle to the outer end of the spindle.

11. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, the inside bearing means including a plurality of upright roller-bearing elements arranged in an annular series about said axis carried by the rotor for anti-friction rolling action thereon of

the carrier means about said axis and to assume radial thrust of the carrier means, said structures of U-shape each carrying a substantially horizontal yarn-package spindle extending substantially radially of the rotor axis outside the cup, and means for supporting the outer end of the spindle extending from the corresponding structure of U-shape outside the package position on the spindle to the outer end of the spindle.

12. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, said structures of U-shape each carrying a substantially horizontal yarn-package spindle extending substantially radially of the rotor axis outside the cup, and means for supporting the outer end of the spindle including a pair of arms extending from the corresponding structure of U-shape outside the package position on the spindle to an element connecting the outer ends of the arms and cooperating with the outer end of the spindle.

13. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, said structures of U-shape each carrying a substantially horizontal yarn-package spindle extending substantially radially of the rotor axis outside the cup, means for supporting the outer end of the spindle including a pair of arms extending from the corresponding structure of U-shape outside the package position on the spindle to an element connecting the outer ends of the arms and cooperating with the outer end of the spindle, and means on the arms for guiding yarn from the package about the package and the arms to a braiding point on said axis.

14. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, said structures of U-shape each carrying a substantially horizontal yarn-package spindle extending substantially radially of the rotor axis outside the cup, and means for permanently pivotally connecting the outer end of the spindle to the structure of U-shape about a horizontal axis including means extending from the correspond-

ing structure of U-shape outside the package position on the spindle to the outer end of the spindle.

15. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, said structures of U-shape each carrying a substantially horizontal yarn-package spindle extending substantially radially of the rotor axis outside the cup, and means for removably mounting the spindle on the structure of U-shape and supporting the outer end of the spindle thereby including means extending from the corresponding structure of U-shape outside the package position on the spindle to the outer end of the spindle.

16. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, said structure of U-shape each carrying a substantially horizontal yarn-package spindle extending substantially radially of the rotor axis outside the cup, means for pivotally movably mounting the outer end of the spindle on the structure of U-shape including means extending from the corresponding structure of U-shape outside the package position on the spindle to the outer end of the spindle, and means on the structure of U-shape for releasably latching the inner end of the spindle.

17. In a braiding machine, an upright substantially cup-like rotor having a vertical axis of rotation and including yarn-carrier bearing means about the inside and outside of the upright side, adjacent to the upper open end, of the cup, and oppositely-rotatable yarn-carrier means including a plurality of structures of inverted substantially U-shape each having its free ends extending downwardly from its closed end at opposite sides of the open upper end rim of the cup carrying journal means for cooperation with said inside and outside bearing means, respectively, said

structures of U-shape each including means for pivotally mounting one end of a yarn-package spindle, a seat for laterally receiving the other end of the spindle, and a latch element movably mounted on the structure of U-shape for holding the spindle laterally against, and releasing it to have opposite movement about its pivot laterally away from said seat.

18. In a yarn-working machine, a yarn carrier comprising a yarn-package support, a yarn-package spindle, and means for bodily-separably mounting the spindle on the support and locking the spindle adjacent to each end against lateral movement relative to the support, including an element on the yarn-package support having an apertured portion for receiving one end of the spindle both to prevent movement of the spindle laterally to its axis in the aperture of said portion when the spindle is held at its other end against like movement and to provide for movement of the spindle angularly to its normal operative position when the spindle is released at its other end, the spindle including a ball-like element on said one end having a diameter providing it with close lateral fit in the aperture of said portion and a constricted neck adjacent to the ball-like end providing for said angular movement of the spindle relative to the support prior to withdrawal of said ball end from the aperture and bodily withdrawal of the spindle from the support, and latching means on the support for releasably holding the other end of the spindle.

19. In a yarn-working machine, a yarn carrier comprising a yarn-package support, a yarn-package spindle, and means for bodily-separably mounting the spindle on the support and locking the spindle adjacent to each end against lateral movement relative to the support, including a cup-like element on the yarn-package support, for receiving one end of the spindle and operating as an end-thrust bearing for the spindle at the bottom of the cup, the cup-like element also operating both to prevent movement of the spindle laterally to its length in the cup when the spindle is held at its other end against like movement and to provide for movement of the spindle angularly to its normal operative position when the spindle is released at its other end, the spindle including a ball-like element on said one end having a diameter providing it with close lateral fit in the cup and a constricted neck adjacent to the ball-like end and to the mouth of the cup providing for said angular movement of the spindle relative to the support prior to withdrawal of said ball end from the cup, and latching means on the support for releasably holding the other end of the spindle.

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