Sept. 15, 1964 V. G. KIGHT 3,148,496

TWISTER RING

Filed Nov. 9, 1962

Fig. 1.

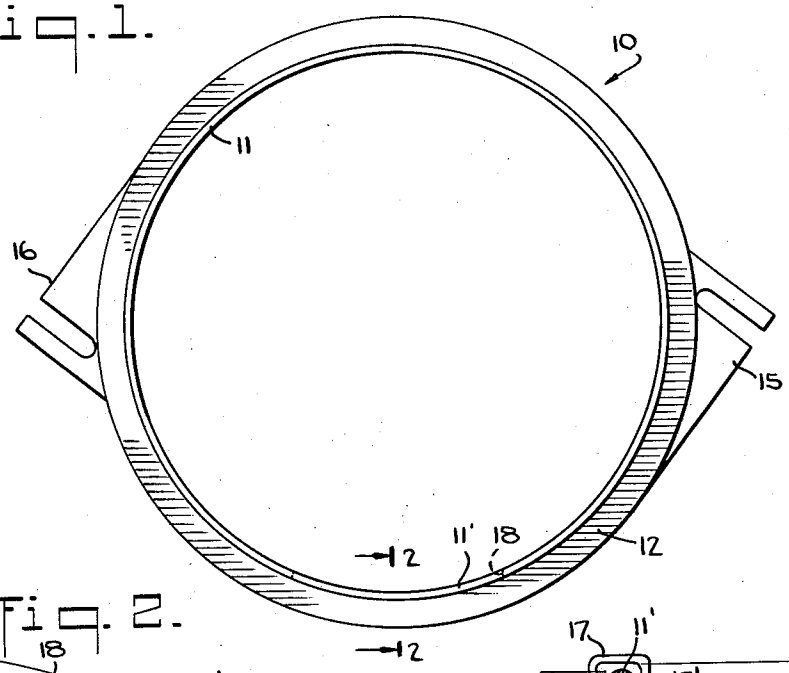


Fig. 2.

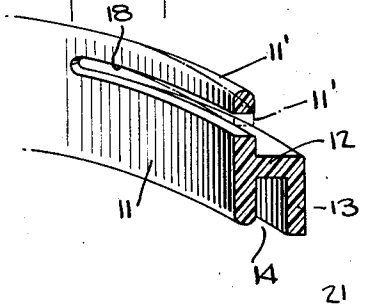


Fig. 3.

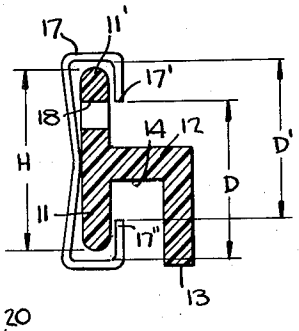


Fig. 4.

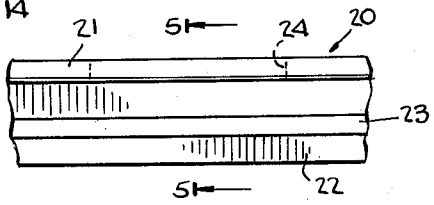


Fig. 5.

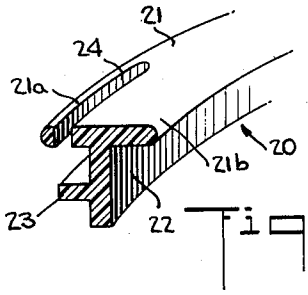
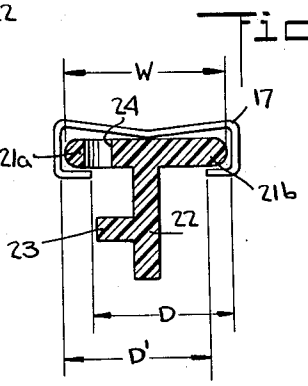


Fig. 6.



United States Patent Office 3,148,496
Patented Sept. 15, 1964

3,148,496

TWISTER RING

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Filed Nov. 9, 1962, Ser. No. 236,615
19 Claims. (Cl. 57—119)

This invention relates to twister rings as used on yarn spinning frames.

A conventional spinning frame employs a plurality of vertical spindles arranged in a row beneath a vertically reciprocating rail. Supported by the rail are a plurality of twister rings, one for each spindle, so that the rings are reciprocated by the rail lengthwise of the respective spindles. An essentially C-shaped traveler is supported by each ring so as to move circumferentially thereof, whereby the yarn ends engaged by the respective travelers are twisted about and wound onto the rotating bobbins supported on the associated spindles as the rings are moved up and down.

In one type of ring, generally termed "vertical," the traveler is mounted on a substantially right cylindrical portion of the ring with the open side of the traveler facing outwardly of the ring. The latter further comprises at least a horizontally extending outer flange designed for strengthening or reinforcing the ring, and in certain cases also an additional skirt-like annular flange extending downwardly from the outer periphery of the reinforcing flange. In another type of ring, generally termed "horizontal," the traveler is mounted on an annular cross web-like portion of the ring with the open side of the traveler facing downwardly of the ring. Here the ring is usually provided with a downwardly extending substantially cylindrical reinforcing flange which may itself be provided with an annular reinforcing rib projecting radially from the flange. The terms "vertical" and "horizontal" are thus seen to refer to the orientation of the traveler and its riding member, i.e. the mouth of the C is vertical when the traveler embraces a vertical right cylinder, and horizontal when the traveler embraces a horizontal annular web. To permit the use of either of these structures, the traveler, which is usually made of metal, e.g. steel, brass or the like but may be made of suitable plastics, must be bent out of shape so as to widen the mouth of the C and permit the free ends thereof to pass the opposite edges of the cylindrical or web-like ring portion the edge to edge dimension of which is generally greater than the gap between the free ends of the C-shaped traveler. In addition, special tools are required for installation of heavy travelers.

Due to the fact that such rings are usually maintained in continuous use, a number of problems has been encountered. The high rate of speed at which the traveler normally moves over the ring is such as to result in considerable wear which requires periodic replacement of either the ring or the traveler or both, since periodic movement of the traveler over uneven portions of the ring would have an injurious effect either on the yarn being wound or on the quality of the winding. Although it has usually been the custom to provide means for lubricating the ring so as to facilitate the smooth passage of the traveler thereover, it has been proposed to avoid the need for external lubrication by forming the ring, through molding techniques, of a synthetic plastic material having a solid lubricant incorporated therein and having a low dynamic coefficient of friction with respect to the traveler to be used thereon.

Merely by way of example, as disclosed in a copending U.S. patent application of Wade Truesdale, Ser. No. 48,642, filed August 10, 1960, the plastic material from which the ring is molded may be nylon, e.g. nylon 6/6,

nylon 6/10 or nylon 6, polyacetal resins such as oxymethylene homopolymers and/or copolymers as described in U.S. Patent No. 3,027,352, and the like. The preferred material, nylon, even in the absence of additives, has a dynamic coefficient of friction with respect to steel of about 0.20 or less, is abrasion-resistant and has a stiffness in excess of about 300,000 p.s.i., for example, about 400,000 p.s.i. as set forth in ASTMD-747-50. The proportion of solid lubricant desirably ranges from about 0.25 to 5% of the total weight and preferably up to about 2.5%. Representative solid lubricants which have been employed include molybdenum disulfide and graphite, of which molybdenum disulfide is the preferred material. As further disclosed in the aforesaid copending application, the solid lubricant can be combined with the plastic material by dispersion in a melt of the plastic, by superficial fritting or sintering of plastic particles to secure the solid lubricant thereto so as to prevent settling, and like procedures. The entire mass is then molded, as by extrusion, casting or the like, into the final predetermined configuration.

Although the just described manner of constructing th ring has effectively overcome the problems of wear and lubrication, the problem of fitting the traveler onto the body of the ring still exists. Thus, to mount the traveler on the ring, the traveler must still be opened as hereinbefore set forth. While the necessary traveler deformation is relatively easily effected in the case of a light traveler, a heavy traveler poses a considerable difficulty since it cannot be bent open unless extremely high forces are employed, requiring a special tool. It has accordingly been proposed heretofore to provide a cut-out or recess in the ring structure which will enable the traveler to be slipped onto the ring without being bent open. Irrespective of which of these expedients is employed, however, the danger still exists that the sharp ends of the C defining the mouth or opening of the traveler may come into contact with some part of the ring structure along which the traveler rides, with the result that such part would be nicked or scratched. The presence of such a recess and/or nicks or scratches tends, of course, to interfere with the smooth movement of the traveler in the same manner as a worn out spot resulting from normal wear and tear.

It is therefore, an object of the present invention to provide a twister ring construction which is adapted to have the traveler mounted thereon easily and rapidly and without any possibility of nicking or scratching of the ring surfaces.

Another object of the present invention is to provide such a ring construction which enables the traveler to be mounted thereon without any deformaion of the traveler during the mounting operation.

The foregoing and other objects, characteristics and advantages of the present invention will be more fully understood from the following detailed description thereof when read in conjunction with the accompanying drawing, in which:

FIG. 1 is a top plan view of a vertical twister ring constructed in accordance with the present invention;

FIG. 2 is a fragmentary sectional view, in perspective, taken along the line 2—2 in FIG. 1;

FIG. 3 is a sectional view of the ring of FIGS. 1 and 2 and shows a traveler mounted thereon to illustrate the normal dimensional relationships between the ring and traveler;

FIG. 4 is a fragmentary side elevational view of a horizontal twister ring constructed in accordance with the present invention;

FIG. 5 is a fragmentary sectional view, in perspective, taken along the line 5—5 in FIG. 4; and

FIG. 6 is a sectional view of the ring of FIGS. 4 and

5 with a traveler mounted thereon to illustrate the normal dimensional relationships between this ring and the traveler.

Referring now more particularly to FIGS. 1 to 3, it will be seen that the twister ring **10** according to one aspect of the present invention comprises an inner web-like portion **11** having the shape of a right cylinder of substantially uniform, thin wall thickness which minimizes uneven heat distribution and retention, whether this heat arises during production or during subsequent use of the ring. Warping due to excessive heating is thus effectively prevented. Extending outwardly from and entirely about the outer periphery of the central ring portion **11** is a radial strengthening or reinforcing flange **12**. From the outermost periphery of the reinforcing flange **12** depends an annular skirt-like flange **13** the generatrix of which is substantially parallel to the axis. Thus, there is defined between the flange **13** and the lower half of the inner ring portion **11** an annular recess **14**. If desired, the ring may be provided with a pair of opposed, slotted securing fingers **15** and **16** which extend outwardly, at diametrically opposed locations, from the outer periphery of the flange **13**. These fingers may, of course, be omitted if other means to secure the ring to the rail (not shown) are employed.

Conventionally, the traveler **17** adapted to be used with the twister ring **10** has a generally C-shaped configuration as shown in FIG. 3. The distances D and D′ between the respective free ends **17′** and **17″** of the C and the inner surfaces of the opposed hooks of the traveler are smaller than the height H of the ring portion **11**, so as to ensure that the traveler cannot become separated from the ring during use. It is this dimensional relationship which has heretofore generally required the traveler to be deformed and opened to permit the free ends **17′** and **17″** to be passed over the opposite edges of the ring portion **11**.

This disadvantage is overcome by the present invention through the provision of an elongated slot **18** in the upper half of the ring portion **11**. The slot is preferably formed by cutting the necessary material out of the said ring portion after the ring **10** has been finished, but it will be understood that the slot may be formed as an integral part of the molding or casting operation. The dimensions of the slot are such that the bridge **11′** which overlies the slot is relatively thin and, consequently, sufficiently flexible to permit it to be bent down toward the bottom of the slot, as indicated in broken lines in FIG. 2.

Thus it will be seen that the provision of the slot **18** extending circumferentially along the central ring portion **11** renders the latter in the region of the slot axially resiliently compressible to facilitate the mounting of the traveler **17** on the ring. The construction of the ring **10** is such that the traveler-mounting operation can be quickly and easily carried out simply by applying finger pressure to the slotted portion of the ring with one hand, then fitting the upper hook of the traveler over the top edge of the cylindrical ring portion **11** until the inner surface of the upper hook of the traveler rests on the bridge **11′**, and then rocking the traveler to bring the lower end **17″** thereof past the lower edge of the cylindrical portion **11** and into the region of the annular slot or cavity **14**. This is rendered possible by so dimensioning the slot that upon deflection of the bridge **11′** the height of the ring at that point is slightly less than the distance D′. As soon as the lower hook end of the traveler has passed the lower edge of the portion **11**, the bridge **11′** is released and returns to its normal position, again establishing the original relationship so that the height H of the ring portion **11** exceeds the distances D and D′. As a consequence, neither of the traveler ends **17′** and **17″** is ever permitted to come into contact with the upper and lower edges of the central cylindrical ring portion **11** or with any part of the ring surface, so that no nicking and scratching of the latter at any point can ever occur.

The applicability of the principles of the present invention to a horizontal twister ring is illustrated in FIGS. 4 to 6. The ring **20**, there shown only schematically but formed by the same techniques and from the same materials as the vertical ring **10**, comprises an annular thin, plane web-like member **21** from the lower surface of which depends an integral reinforcing flange **22** provided with a radial reinforcing rib **23**. The ring web **21** adjacent one side thereof is provided with an elongated circumferentially extending slot **24** defined between a reduced-thickness portion **21*a*** and the remainder **21*b*** of the web. In a ring of this type, the dimensions D and D′ of the traveler **17** are slightly smaller than the width W of the ring web **21**. The mounting of the traveler again involves only the application of finger pressure to the slotted section of the web to compress the ring radially, by engendering a corresponding deflection of the portion **21*a*** radially inwardly of the ring, until the ring width in the region of the slot is less than the dimensions D and D′ of the traveler. Here too no bending of the traveler is required, and no nicking or scratching of any part of the ring surface can occur.

The exact dimensions of the slot will depend upon the height and thickness of the ring and the degree to which it must be compressed to allow the traveler to be hooked thereover without nicking. In one example using an oxymethylene copolymer molded ring having an internal diameter of 4 29/32 inches, with a ring portion **11** having a height of 7/16 inch and a thickness of 3/32 inch, a slot 1½ inches long and 1/16 inch high and located 1/8 inch from the top of the ring was found to permit manual compression of the ring by the full height of the slot, viz. 1/16 inch.

By way of résumé, therefore, it is apparent that the objectives of the present invention are achieved by rendering a limited region of the traveler-supporting portion of a twister ring effectively resiliently compressible in a direction which is both substantially transverse to the path of movement of the traveler or the longitudinal dimension of the slot and substantially parallel to the imaginary line connecting the free ends (**17′** and **17″**) of the hooks of the traveler.

It is to be understood that the foregoing detailed description is given merely by way of illustration, and that many variations may be made in my invention without departing from the spirit thereof.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. A twister ring of a synthetic plastic material comprising a web-like annular portion adapted to support a generally C-shaped traveler, said portion being provided intermediate its peripheral edges with an elongated slot extending circumferentially along said portion and rendering the latter in the region of said slot manually resiliently compressible in a direction which is substantially transverse to the longitudinal dimension of said slot and which is substantially parallel to the imaginary line connecting the free ends of the hooks of the traveler, thereby to facilitate mounting of the traveler on the ring.

2. A twister ring according to claim 1, said portion having the shape of a plane annulus, with said slot being located so as to render said portion radially compressible.

3. A twister ring according to claim 1, said portion having the shape of a right cylinder, with said slot being located so as to render said portion axially compressible.

4. A twister ring according to claim 3, further comprising an annular substantially radial reinforcing flange extending outwardly of the ring medially of said right cylindrical portion, said slot in said portion being located between the plane of one of said peripheral edges thereof and the plane of said reinforcing flange.

5. A twister ring molded of a composition comprising a thermoplastic material selected from the group consisting of nylon and polyacetals and about 0.25 to 5% by weight of a solid lubricant selected from the group consisting of molybdenum disulfide and graphite, said ring comprising an annular web-like portion adapted to sup-

port a generally C-shaped traveler and arranged to be mounted with its axis vertical, said portion being provided intermediate its peripheral edges with an elongated slot extending circumferentially along said portion and rendering the latter in the region of said slot resiliently compressible in a direction which is substantially transverse to the longitudinal dimension of said slot and which is substantially parallel to the imaginary line connecting the free ends of the hooks of the traveler, thereby to facilitate mounting of the traveler on the ring.

6. A twister ring according to claim 5, said portion having the shape of a plane annulus, with said slot being located so as to render said portion radially compressible.

7. A twister ring according to claim 5, said portion having the shape of a right cylinder, with said slot being located so as to render said portion axially compressible.

8. A twister ring according to claim 7, further comprising an annular substantially radial reinforcing flange extending outwardly of the ring medially of said right cylindrical portion, said slot in said portion being located between the plane of one of said peripheral edges thereof and the plane of said reinforcing flange.

9. A twister ring according to claim 8, further comprising a cylindrical skirt-like flange extending from the outermost periphery of said reinforcing flange past the other peripheral edge plane of said right cylindrical portion and surrounding the unslotted section of the latter to define thereabout an annular channel for receiving the lower hook end of the traveler.

10. A twister ring assembly for use in combination with the ring rail of a spinning frame to support a traveler, comprising a central ring portion in the shape of a thin-walled right circular cylinder having a vertical axis, a reinforcing annular flange extending outwardly from said central ring portion over the entire circumference thereof, and a skirt-like annular flange extending downwardly from said reinforcing flange to a plane below the bottom end plane of said central ring portion, said central ring portion being provided in the section thereof between the plane of one of its peripheral edges and the plane of said reinforcing flange with an elongated slot extending circumferentially for a predetermined distance along said central ring portion and rendering the latter axially resiliently compressible in the region of said slot to facilitate the mounting of a traveler thereon.

11. A twister ring assembly according to claim 10, said slot being located between the top end edge plane of said central ring portion and the plane of said reinforcing flange.

12. A twister ring assembly of a synthetic plastic material for use in combination with the ring rail of a spinning frame to support a traveler, comprising a traveler-supporting ring portion in the shape of a substantially plane annular web having a vertical axis, and a reinforcing annular flange extending downwardly from said ring portion intermediate the peripheral edges of the latter, said ring portion being provided in the section thereof between one of its peripheral edges and the location of said reinforcing flange with an elongated slot extending circumferentially along part of said ring portion and rendering the latter radially resiliently compressible in the region of said slot to facilitate the mounting of a traveler thereon.

13. A twister ring assembly according to claim 12, said slot being located between the outer peripheral edge plane of said ring portion and said reinforcing flange.

14. A twister ring comprising a web-like annular portion adapted to support a generally C-shaped traveler, said portion being provided intermediate its peripheral edges with an elongated slot extending through said portion substantially radially and circumferentially along said portion and rendering the latter in the region of said slot manually resiliently compressible in a direction which is substantially transverse to the longitudinal dimension of said slot and which is substantially parallel to the imaginary line connecting the free ends of the hooks of the traveler, thereby to facilitate mounting of the traveler on the ring.

15. A twister ring assembly for use in combination with the ring rail of a spinning frame to support a traveler, comprising a traveler-supporting ring portion in the shape of a substantially plane annular web having a vertical axis, and a reinforcing annular flange extending downwardly from said ring portion intermediate the peripheral edges of the latter, said ring portion being provided in the section thereof between one of its peripheral edges and the location of said reinforcing flange with an elongated slot extending circumferentially for a predetermined distance along said ring portion and through said ring portion substantially perpendicular to the plane of said ring portion and rendering said ring portion manually radially resiliently compressible in the region of said slot to facilitate the mounting of a traveler thereon.

16. A twister ring comprising a web-like annular portion adapted to support a generally C-shaped traveler, said portion being provided intermediate its peripheral edges with an elongated slot extending along part of the circumference of said portion and rendering the latter in the region of said slot resiliently compressible in a direction which is substantially transverse to the longitudinal dimension of said slot and which is substantially parallel to the imaginary line connecting the free ends of the hooks of the traveler, thereby to facilitate mounting of the traveler on the ring.

17. A twister ring comprising a solid web-like annular portion adapted to support a generally C-shaped traveler, said portion being provided intermediate its peripheral edges with an elongated slot extending circumferentially along said portion and rendering the latter in the region of said slot resiliently compressible in a direction which is substantially transverse to the longitudinal dimension of said slot and which is substantially parallel to the imaginary line connecting the free ends of the hooks of the traveler, thereby to facilitate mounting of the traveler on the ring.

18. A twister ring assembly for use in combination with the ring rail of a spinning frame to support a traveler, comprising a traveler-supporting ring portion in the shape of a solid substantially plane annular web having a vertical axis and a reinforcing annular flange extending downwardly from said ring portion intermediate the peripheral edges of the latter, said ring portion being provided in the section thereof between one of its peripheral edges and the location of said reinforcing flange with an elongated slot extending circumferentially along part of said ring portion and rendering the latter radially resiliently compressible in the region of said slot to facilitate the mounting of a traveler thereon.

19. A twister ring comprising a web-like annular portion having the shape of a right cylinder adapted to support a generally C-shaped traveler, said portion being provided intermediate its peripheral edges with an elongated slot extending circumferentially along said portion and rendering the latter in the region of said slot resiliently compressible in a direction which is substantially transverse to the longitudinal dimension of said slot and which is axial, thereby to facilitate mounting of the traveler on the ring, an annular substantially radial reinforcing flange extending outwardly of the ring medially of said right cylindrical portion, said slot in said annular portion being located between the plane of one of said peripheral edges thereof and the plane of said reinforcing flange, and further comprising a cylindrical skirt-like flange extending from the outermost periphery of said reinforcing flange past the other peripheral edge plane of said right cylindrical annular portion and surrounding the end slot section of the latter to define thereabout an annular channel for receiving the lower hook end of the traveler.

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