July 3, 1928. 1,676,205

C. F. MERRILL

METHOD OF CONSTRUCTING SPINNING RING TRAVELERS

Filed March 25, 1926 4 Sheets-Sheet 1

Fig. 1.

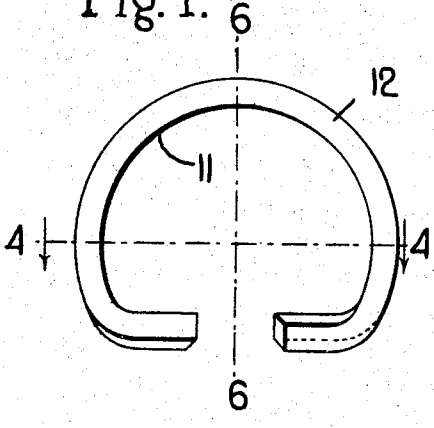


Fig. 2.

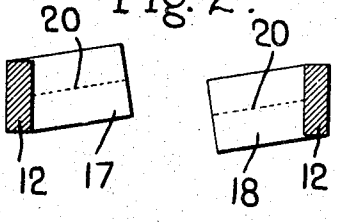


Fig. 3. Fig. 4.

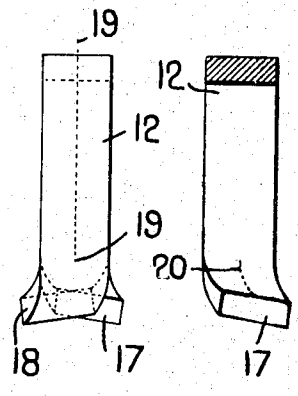


Fig. 5

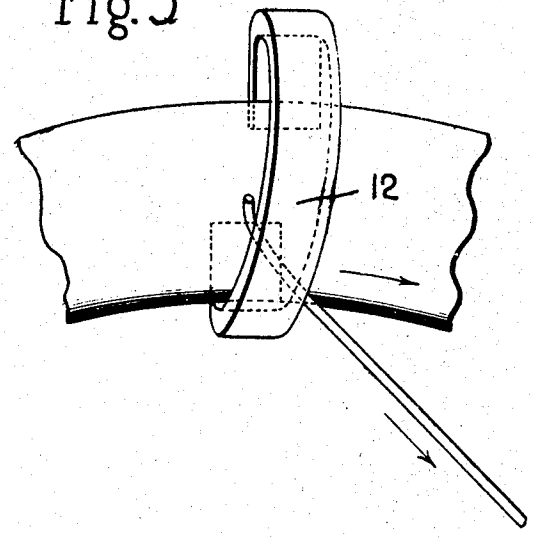
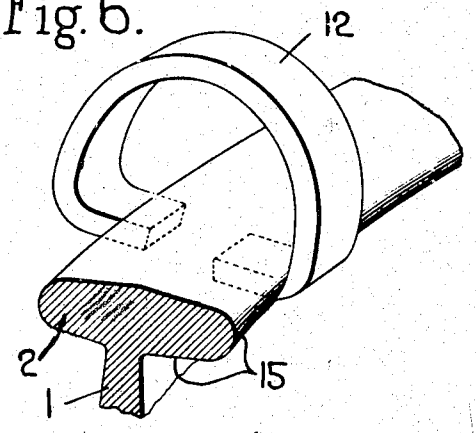


Fig. 6.



Inventor.
Charles F. Merrill
by Heard Smith & Tennant.
Attys.

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C. F. MERRILL

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Fig. 7.

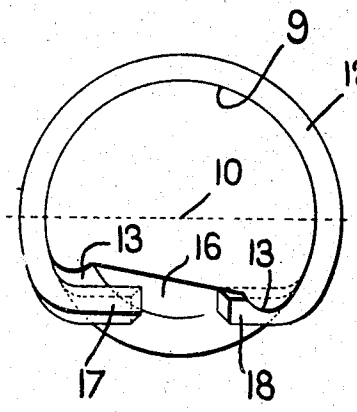


Fig. 8.

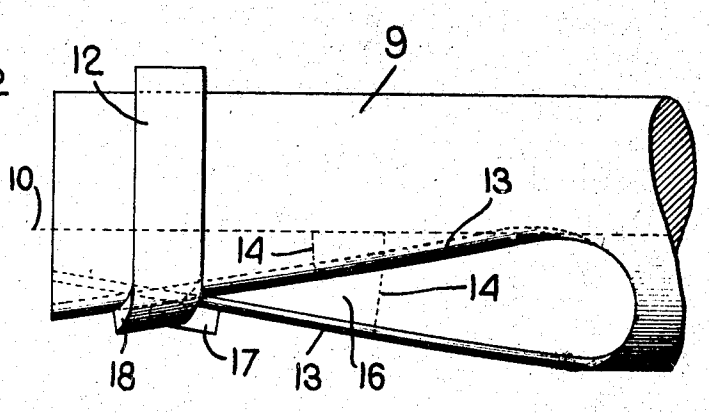


Fig. 9.

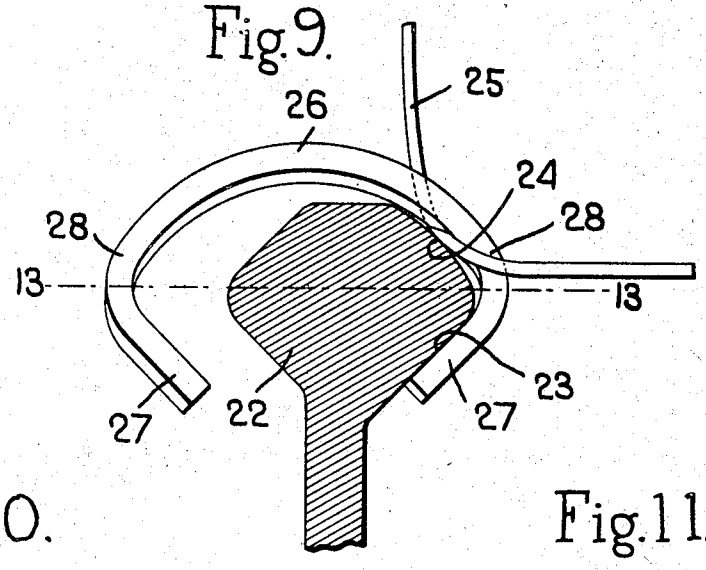


Fig. 10.

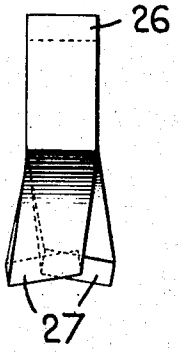
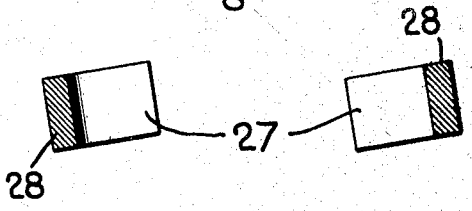


Fig. 11.



Inventor.
Charles F. Merrill
by Heard Smith & Tennant.
Attys.

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C. F. MERRILL

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Fig. 12.

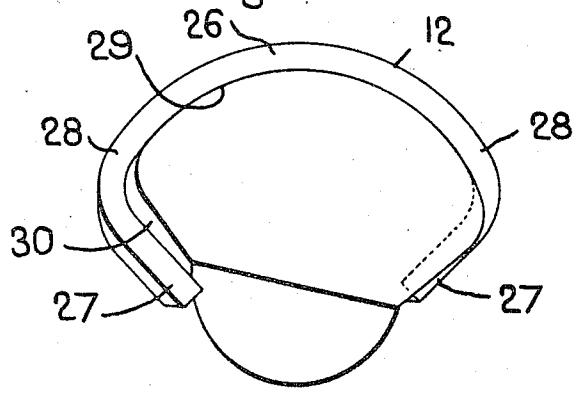


Fig. 13.

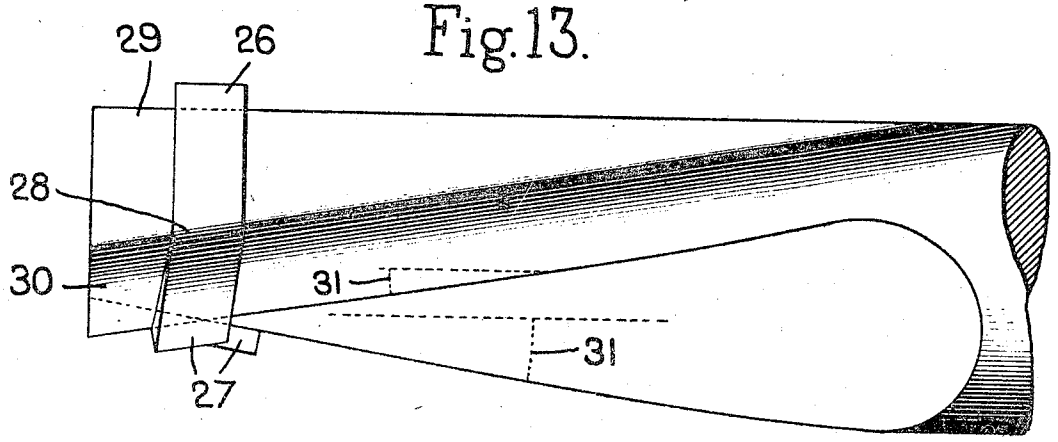
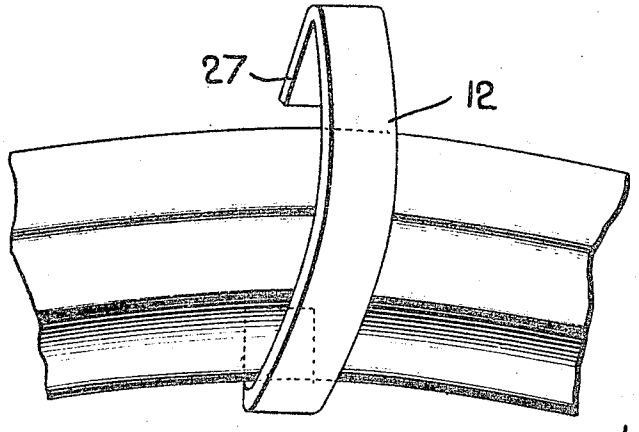


Fig. 14.



Inventor.
Charles F. Merrill
by Heard Smith & Tennant.
Attys.

July 3, 1928.

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C. F. MERRILL

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Fig. 15.

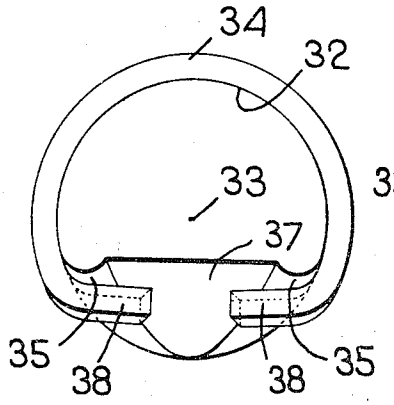


Fig. 16.

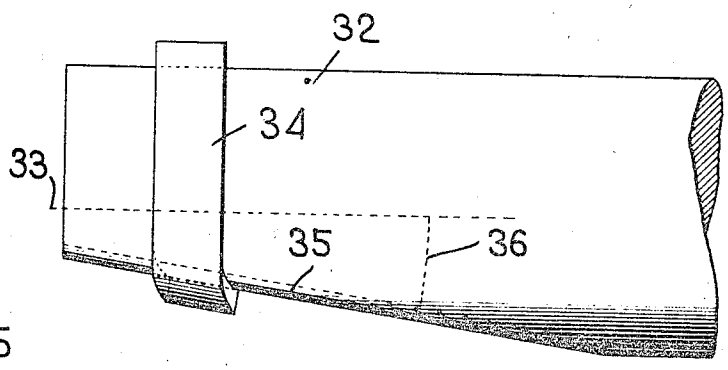


Fig. 17.

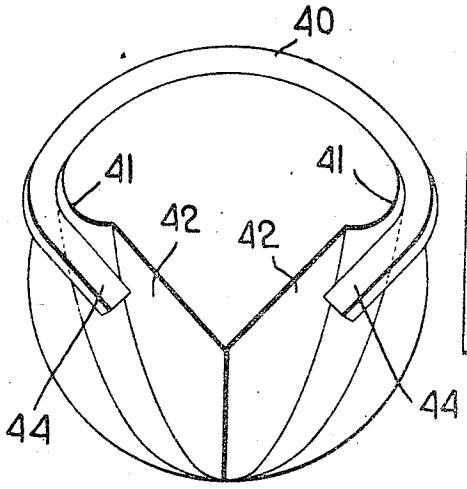


Fig. 18.

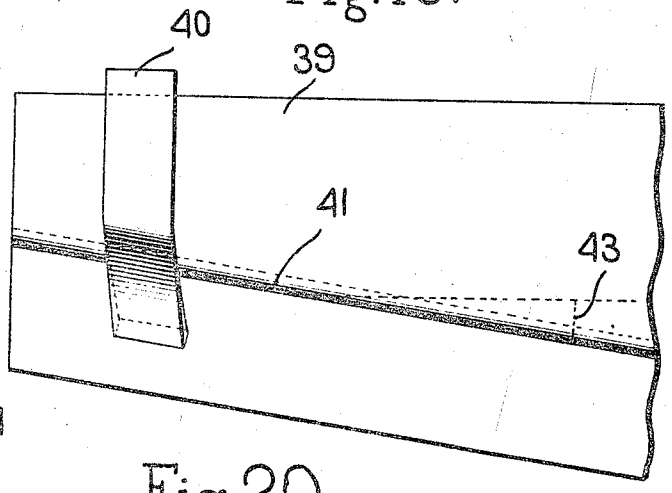


Fig. 19.

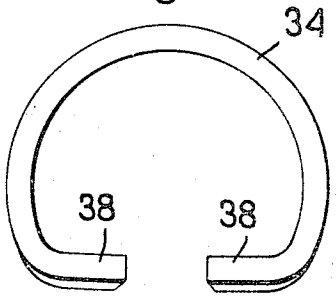
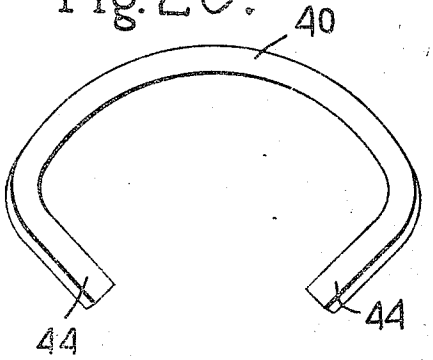


Fig. 20.



Inventor.
Charles F. Merrill
by Heard Smith & Tennant.
Attys.

Patented July 3, 1928. 1,676,205

UNITED STATES PATENT OFFICE.

CHARLES F. MERRILL, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER CORPORATION, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

METHOD OF CONSTRUCTING SPINNING-RING TRAVELERS.

Application filed March 25, 1926. Serial No. 97,242.

This invention relates to the method of constructing a traveler for a ring spinning mechanism such as disclosed in Letters Patent No. 1,666,714, granted April 17, 1928, upon an application divided out from the present application.

A great deal of engineering ability and inventive talent has been devoted to the construction of the cooperating ring and traveler in this type of ring spinning mechanism, but this mechanism is still far from perfect in operation, largely owing to uneven and often rapidly destructive wear of the contacting surfaces of the ring and traveler resulting in limitations as to uniformity, continuity and fineness of the product.

In general practice the ring of this type of spinning mechanism is flanged at its top to present a general I or T shape in radial cross section and the traveler is of general C shape, thus presenting two horns and an intermediate bow. The traveler may vary in its shape of cross section, but is usually either circular or more preferably substantially rectangular with the longer dimension presented to the ring and the present invention has to do with the latter type. The traveler is also preferably symmetrical with respect to its vertical axis so that either part of the traveler may cooperate with the ring and thus enable the operative to place the traveler, which is quite a tiny device, on the ring without having to trouble to ascertain which side of the traveler is to cooperate with the ring.

During the spinning operation certain irregularities of the movement of the traveler develop due to two major causes: (1) sliding metallic contact, at high rates of speed, of the bearing surface of the traveler against the inner bearing surfaces of the ring flange, usually without perceptible lubrication, thus inducing wear and abrasion of the surfaces: (2) an unstable position assumed by the traveler, as a resultant of a number of different forces to which it is subjected in its travel, with reference to its bearing against the ring. The resultant of the several of these forces usually causes the traveler to stand oblique or inclined with respect to a radius of the ring and the path of revolution of the traveler, and also oblique or inclined with respect to the vertical plane of this radius, and also oblique or inclined with respect to the vertical axis of revolution. Furthermore, the point where the yarn passes about the traveler is usually well above the center of the contacting bearing surfaces of the traveler and ring and often above the ring itself, resulting in an unbalanced or unstable relation which tends toward uneven motion or chattering whenever there is any slight inequality in the material or surface of the portion of the ring traversed by the traveler, or whenever there are other causes tending to increase or lessen the frictional resistances to motion at different positions in the progress of the traveler around the ring. It will be understood that the traveler when running is held by centrifugal force against the inner bearing surfaces of the ring and in opposition to the pull of the yarn which runs tangentially from the bobbin in a horizontal direction through the traveler and then balloons upwardly from the traveler through the thread eye directly above the bobbin. The various forces acting on the traveler tend to give the traveler the peculiar obliquity of position referred to.

Heretofore in practice the spinning operation results in a very marked abrasion or wear of the traveler at the surfaces where the traveler contacts with the ring. This means (1) that the area of the bearing surfaces of the traveler in contact with the ring is varying from a relatively small area to a relatively large area as the wear proceeds, the traveler at the beginning of the operation perhaps contacting only along a line and finally wearing down until it contacts substantially throughout its width with the ring; (2) that the cross section of the traveler is gradually and steadily weakened, resulting in the destruction of the traveler; (3) that the weight and position of the traveler varies during the operation.

The object of the invention of the aforesaid Letters Patent is to provide a traveler and of this application to provide a method of forming such a traveler so that the bearing surfaces of the traveler will substantially conform to the opposed bearing surfaces of the ring when the traveler is running under normal conditions. Thus any wear taking place is reduced to the minimum and occurs with substantial uniformity over the entire width of the bearing surfaces of the

traveler, and consequently such wear has no material effect upon the weight or position of the traveler; the life of the traveler is materially increased; and the efficiency of the spinning operation is greatly improved.

It is a further object of the invention to enable the traveler to be constructed to meet specific conditions determined by the various factors of weight, speed, dimensions and form of ring flange, etc., so that the traveler may meet a given set of conditions and still be formed by otherwise well known and commercial processes.

It is the object of the invention after determining by suitable means the normal angle of inclination of the traveler when running under a given set of conditions so to form the traveler by commercial processes that it will assume the desired inclination with relation to the ring and at the same time have its bearing surfaces in contact with the ring bearing surfaces over the largest possible portion of their available area.

These and other objects and features of the invention will appear more fully from the accompanying description and drawings and will be particularly pointed out in the claims.

The invention is disclosed in connection with two specific forms of traveler, namely a traveler of the ordinary shape in which the bow is generally circular and the horns substantially horizontal and a traveler of a novel construction shown in my Patent No. 1,604,929, granted October 26, 1926. The invention is also disclosed in connection with both the symmetrical and the non-symmetrical types of traveler. But it is obvious that the invention is applicable to a wide variety of forms of travelers.

In the drawings:

Fig. 1 is a vertical elevation of a traveler of the common commercial type, but constructed in accordance with the principles of the present invention.

Fig. 2 is a view in horizontal cross section taken on the line 4—4 of Fig. 1.

Fig. 3 is a side elevation of the traveler shown in Fig. 1.

Fig. 4 is a view in vertical cross section taken on the line 6—6 of Fig. 1.

Fig. 5 is a top plan view of a portion of a ring with the traveler constructed as in Figs. 1 to 4 in running position on the ring.

Fig. 6 is a view in perspective of the construction shown in Fig. 5.

Fig. 7 is an end view in front elevation of a mandrel for forming the traveler illustrated in Figs. 1 to 6 with the traveler shown thereon.

Fig. 8 is a side elevation of the construction shown in Fig. 7.

Fig. 9 is a view in radial cross section of a portion of a ring with a traveler of the type shown in my aforesaid Letters Patent No. 1,604,929, but embodying the present invention in running position on the ring.

Fig. 10 is a side elevation of the traveler shown in Fig. 9.

Fig. 11 is a view in horizontal cross section on the traveler taken on the line 13—13 of Fig. 9.

Fig. 12 is an end view in front elevation of a mandrel for forming the traveler illustrated in Figs. 9 to 11 with the traveler shown thereon.

Fig. 13 is a side elevation of the construction shown in Fig. 12.

Fig. 14 is a top plan view of a portion of a ring with the traveler constructed as in Figs. 9 to 13 in running position on the ring.

Fig. 15 is an end view in front elevation of a mandrel for forming a non-symmetrical traveler of the type shown in Figs. 1 to 6 with the traveler shown thereon.

Fig. 16 is a side elevation of the construction shown in Fig. 15.

Fig. 17 is an end view in front elevation of a mandrel for forming a non-symmetrical traveler of the type shown in Figs. 9 to 14 with the traveler shown thereon.

Fig. 18 is a side elevation of the construction shown in Fig. 17.

Fig. 19 is a vertical elevation of the traveler shown in Figs. 15 and 16.

Fig. 20 is a vertical elevation of the traveler shown in Figs. 17 and 18.

With the ordinary commercial type of traveler and ring where the ring is of generally T-shape and where the traveler is of generally C-shape, as already explained, it is found in practice that the horn and adjacent portion of the bow of the traveler which bear against the inner peripheral bearing surfaces of the ring flange gradually wear away. If the traveler is reversed, similar wear takes place at the opposite side. It will be seen, therefore, that the wear of the traveler begins at one edge of its inner periphery and gradually extends across the inner face or bearing surface, thus gradually increasing the area of contact between the traveler and ring and consequently changing the running conditions and also cutting through the cross section of the traveler and weakening the traveler until, as not infrequently happens, the horn breaks off and the traveler is rendered useless.

As already pointed out, in the present invention the traveler is constructed in the first instance so that under normal conditions or under a prescribed set of conditions, the inner bearing surface of the traveler will contact substantially throughout its entire surface with the opposed bearing surface of the ring and in a general way it may be said that the traveler with which this invention

is concerned is constructed so that its bearing surfaces assume at the outset the general character occasioned as the result of wear with the ordinary traveler, while maintaining uniform the cross section of, and the width of bearing surface of, the traveler.

In commercial practice, travelers of the type with which this invention is concerned are usually formed by taking a strip of metal of the proper cross section and bending the strip around a transverse zone of a mandrel having a cross section corresponding to the cross section of the space bounded by the inner surface of the desired traveler, with the traveler, and consequently its medial line and its edges, extending around the mandrel in planes normal to the longitudinal axis of the mandrel.

In constructing a traveler embodying the present invention of the form shown in Figs. 1 to 8, a mandrel is provided of the shape shown in Figs. 7 and 8. This mandrel has the central segment 9 of its surface cylindrical with the elements of the surface extending parallel to the axis 10 of the mandrel. This segment is usually and preferably circular arcuate and has a radius of curvature corresponding to that of the central bow section 11 of the desired traveler 12, the central bow section being that portion of the traveler, the inner surface of which does not contact with the ring under normal running conditions. When as is usual and desirable, the traveler is symmetrical with respect to its vertical axis, the side segments 13 of the mandrel surface are similar and complementary and each of these surfaces is of the helicoidal type with the helical angles 14 corresponding to the normal angle of inclination of the traveler when running under the prescribed conditions. These helicoidal surfaces may be considered as generated by a line such as 15, see Fig. 6, which bounds the radial cross section of that portion of the ring upon which the inner surface of the traveler is to bear when this line in forming the helicoidal surface is maintained at an angle to the helicoidal axis corresponding to the normal angle, as 14, of inclination of the traveler when running. The surface of the mandrel is cut back at 16 between these side segmental surfaces to enable the traveler horns to be bent surely and positively into close contact with the side segmental surfaces.

The strip of traveler metal of uniform cross section throughout and presenting a flat inner surface due to its preferably rectangular cross section, is then bent about the mandrel into conformity with the mandrel surface, as shown in Figs. 7 and 8. The central bow section of the traveler which engages the central segment 9 of the mandrel consequently lies at right angles or normal to the mandrel axis 10 and assumes a cylindrical shape. The horns 17 and 18 and the bow sections adjacent the horns lie against the side segmental surfaces of the mandrel and are bent into conformity therewith and consequently diverging away from the central plane of the traveler in opposite directions and also away from the central vertical axis 10 of the traveler in opposite directions, as illustrated, and consequently into conformity with the bearing surfaces of the ring against which these portions of the traveler bear when the traveler is running under normal conditions at a normal angle of inclination to the ring. The traveler when thus formed is readily removed from the mandrel by rotating it with respect to the mandrel when it comes off in much the same manner as a nut comes off from a bolt.

A traveler thus formed has a uniform cross section throughout its length, has flat inner bearing surfaces, has the medial line 19—19, see Fig. 3, of the central section of the bow lying in a plane, has the bearing surface of each horn and the adjacent bow section conforming substantially to the inner peripheral bearing surfaces of the ring against which the traveler bears when the traveler is running at a normal angle of inclination to the ring and has the medial lines 20 of these bearing surfaces of the horns and adjacent bow sections presenting the same angle to the plane of the central bow section as the angle 14 or the normal angle of inclination of the traveler to the ring.

Thus a traveler thus formed, when running under normal conditions at a normal angle of inclination to the ring has its horn and adjacent bow section fitting snugly against the bearing surfaces of the ring flange with the full width of the bearing surfaces of the traveler in engagement with those of the ring, subject only to the very slight curvature of the ring because of its circular form, a feature which is immediately taken care of by a very slight amount of wear. The traveler is shown in its normal position running on the ring in Figs. 5 and 6.

Figs. 9 to 14, inclusive, of the drawing illustrate a traveler of the form made the subject of the Letters Patent No. 1,604.929 above referred to and the application of the invention to this form of traveler will be apparent.

In this construction the web 21 of the ring has a flange 22 of a somewhat square shape with the inner peripheral bearing surfaces of the flange converging and preferably at substantially equal angles to the horizontal. The lower bearing surface 23 is preferably frusto-conical and the upper bearing surface 24 convex. The yarn 25 acts as a slight separating medium between

the upper bearing surface 24 and the opposed section of the traveler.

The traveler comprises the central bow section 26, preferably of circular arcuate shape, the horns 27 and the bow sections 28 adjacent the horns which are preferably a prolongation of the curve of the central bow section. The horns and these adjacent bow sections present the inner bearing surfaces which engage or come opposite the bearing surfaces 23 and 24 of the ring.

The mandrel shown in Figs. 12 and 13 is formed on the principles already described, the only substantial difference being in the proportions into which the surface of the mandrel is divided between the central segmental cylindrical surface 29 and the side helicoidal segmental surfaces 30. The helicoidal angle 31, as before, corresponds to the normal angle of inclination of the traveler when running. When, therefore, the strip of traveler metal is bent into engagement with the mandrel, as shown in Figs. 12 and 13, the central bow section 12 assumes a cylindrical shape and extends normal and at right angles to the axis of the mandrel, while the bow sections 28 and the horns 27 engaging the helicoidal surfaces of the mandrel assume the required positions so that their inner surfaces conform to the inner bearing surfaces of the ring against or opposite which they travel when the traveler is running at a normal angle of inclination, or an angle corresponding to the angle 31, with respect to the ring. The completed traveler of this form is shown in position on the ring in Fig. 14.

The travelers, the construction of which has thus far been illustrated and described, are of the preferred symmetrical form, but the invention in its broader aspects is applicable to the construction of travelers of the non-symmetrical form. In a traveler of such form, of course, care must be taken to place the traveler correctly in position on the ring.

In Figs. 15, 16 and 19 the traveler is, except for the non-symmetrical feature, of the type first described. In this case the mandrel has the same central segment 32 of its surface cylindrical and with the elements of this surface extending parallel to its axis 33. The radius of curvature of this surface corresponds to that of the central bow section 34 of the traveler. The side segments 35 of the mandrel surface are similar and each extends obliquely at an angle 36 corresponding to the normal angle of inclination of the traveler when running under the prescribed conditions. These surfaces, as heretofore, may be considered as generated by a line which bounds the radial cross section of that portion of the ring upon which the inner surface of the traveler is to bear, when this line in forming the surface is moved longitudinally of the axis along a line extending at an angle to the axis corresponding to the angle 36. The surface of the mandrel is cut back at 37 between the side segmental surfaces to enable the traveler horns 38 to be bent surely and positively into close contact with the side segmental surfaces. It will be seen that in this construction the plane of the cut-back portion 37 and the plane into which the bearing surfaces of the horns are bent extends obliquely to the axis of the mandrel at an angle corresponding to the angle 36. The mandrel also gradually increases in cross sectional area from its outer end and consequently the traveler must be bent about the mandrel at a predetermined section so as to be of the correct size.

The traveler in this form will be as shown in Fig. 19 and when properly placed upon the ring will run in precisely the same manner and in the same position as the traveler already described.

In the construction shown in Figs. 17, 18 and 20, the traveler is of the non-symmetrical type and otherwise of the type shown in Figs. 7–14. The construction of the mandrel will be readily understood. The central segmental cylindrical surface 39 corresponds to the central bow section 40 of the traveler and the side segmental sections 41 of the mandrel with the cut-back portions 42 are generated by lines corresponding to a line bounding the radial cross section of that portion of the ring upon which the inner surface of the traveler bears when moved at an angle 43 corresponding to the normal angle of inclination of the traveler. In this case, of course, the planes of the cut-back portions 42 and the planes into which the inner bearing surfaces of the horns 44 of the traveler are bent converge as illustrated. In this case too the cross sectional area of the mandrel varies and the traveler must be placed at a predetermined position on the mandrel when it is formed. The completed traveler is shown in Fig. 20.

It will thus be seen that in all the cases illustrated the broad principle of construction is the same and by reason thereof the traveler, when in normal running position on the ring, will have that portion of its inner surface opposite the ring in bearing engagement with the ring throughout its entire width thus insuring a minimum of wear and a perfection of bearing cooperation between the ring and traveler not hitherto attainable.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. The method of constructing a spinning ring traveler which consists in forming a mandrel having a central segment of its surface with its elements parallel to the axis

and in right cross section corresponding to the shape of the central bow section of the traveler and having similar complementary side segments of its surface helicoidal and each generated by a line bounding a radial cross section of the ring upon which the traveler bears when this line is maintained at an angle to the helicoidal axis corresponding to the normal angle of inclination of the traveler when running, and in then bending a strip of traveler metal of uniform cross section having a flat inner bearing surface into conformity with the mandrel surface with that portion engaging the central segment of the mandrel surface lying at right angles to the mandrel axis.

2. The method of constructing a spinning ring traveler which consists in forming a mandrel having a central segment of its surface with its elements parallel to the axis and in right cross section corresponding to the shape of the central bow section of the traveler and having similar complementary side segments of its surface each generated by a line bounding the radial cross section of the ring upon which the traveler bears when this line is moved along a line extending at an angle to the mandrel axis corresponding to the normal angle of inclination of the traveler when running, and in then bending a strip of traveler metal of uniform cross section having a flat inner bearing surface into conformity with the mandrel surface with that portion engaging the central segment of the mandrel surface lying at right angles to the mandrel axis.

In testimony whereof, I have signed my name to this specification.

CHARLES F. MERRILL.