

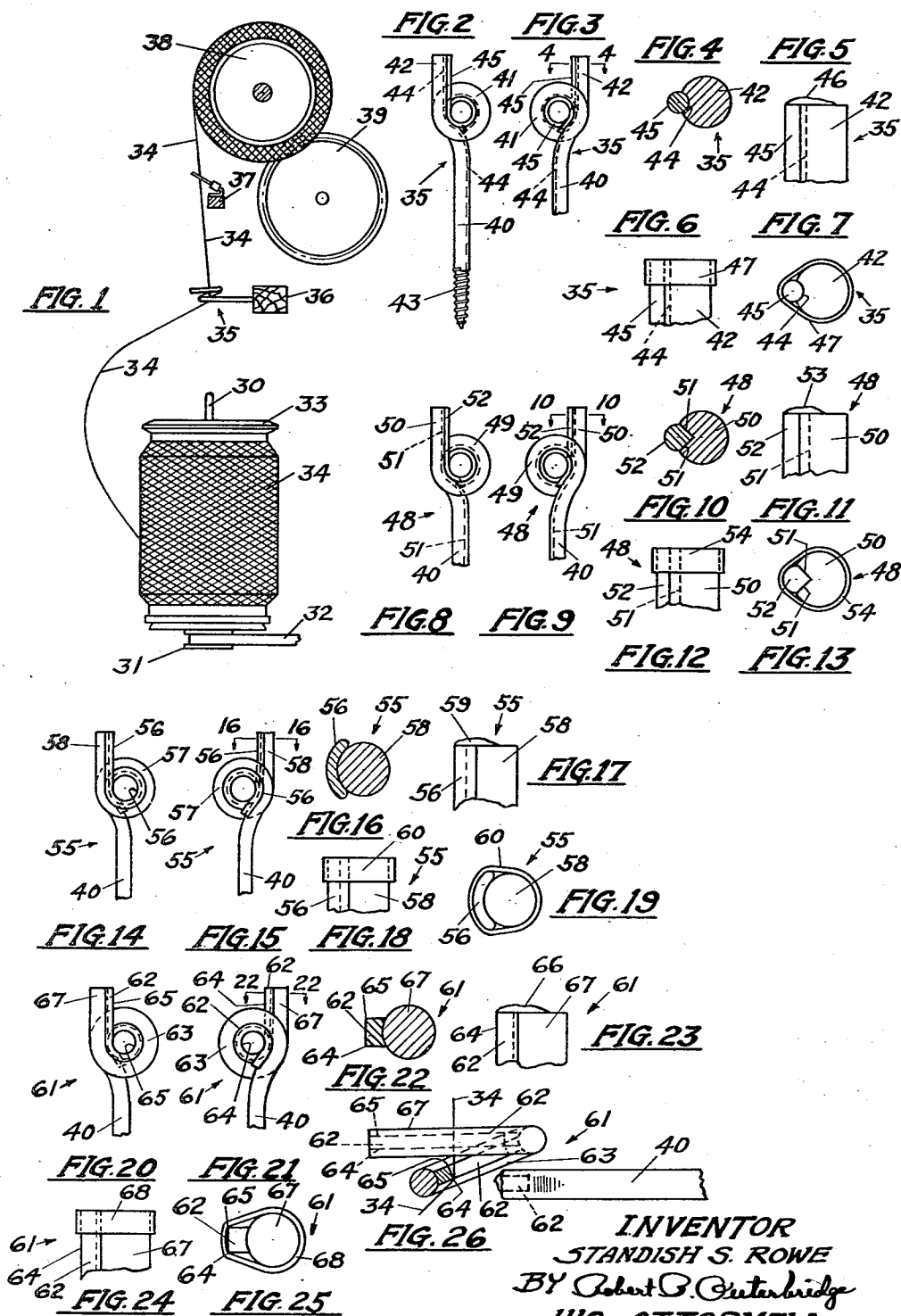
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STRAND GUIDE

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STRAND GUIDE

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The present invention relates to the production of strands of indefinite length, and more particularly to guides employed in such production. While the present invention relates to strand guides generally, an important adaptation is in the field of twisting filamentary and/or fibrous materials of various kinds into yarns, threads, other textile ends, cords, and the like.

Merely for purposes of illustration and explanation, and not by way of any limitation as to application or adaptation, the present invention is disclosed herein as incorporated in an up-stroke type twisting machine. In this type of twister a vertical driven spindle is provided on which a strand supply spool or bobbin is mounted, and the strand portion leaving this supply source passes upwardly through a guide or eye centered above the spindle to and through a reciprocating traverse mechanism for reception by a take-up spool or bobbin rotating on a horizontal axis. The strand is drawn upwardly by this take-up, and since the supply source is rotating as the strand moves upwardly, the strand balloons outwardly in a spiral path. The moving strand thus receives a definite number of turns or twists per unit distance along its length, depending upon the speed of rotation of the spindle and the rate at which the strand is withdrawn or taken up, and the balloon extends upwardly from the point where it leaves its supply source to the level of engagement of the moving strand with the guide eye.

This ballooning of the strand occurs by reason of centrifugal force, and since the guide eye is the upward terminus of the balloon in the structural set-up discussed above, it will be appreciated that the moving strand engages the guide eye throughout its inner circumference, as it were. This guide eye engagement causes frictional wear of the material of the eye opening, and while the amount of this wear depends in part upon the nature of the strand material engaging the eye, a further factor in the production of frictional wear is spindle speed, i. e., centrifugal force. If the spindle be considered as revolving very slowly, the frictional pressure of the strand material against the guide eye circumferentially of its interior by reason of ballooning centrifugal force will be very small, but since spindle speeds in practice attain thousands of R. P. M., it will be appreciated that at high spindle speeds this frictional pressure is very much greater, with consequent greater wear of the eye and resulting shortening of its useful life. It has been found that while natural fibre

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strands cause enough wear at high spindle speeds to require not infrequent guide or eye replacement, strands made of synthetic material such as rayon or nylon, for examples, produce an excessive wear at high spindle speeds, necessitating much more frequent guide or eye replacement. This replacement need slows down production and the excessive wear fosters strand breakage, which also slows down production and results in an inferior product. Nylon has been found to be a major offender in this respect, and this is an important point not only because of the tremendous demand for nylon strand material by the allied armed forces (tire cords are one example) but also because of the future demand for nylon strand products (stockings and other articles of clothing are a few examples) which was already assuming large proportions before the outbreak of current hostilities diverted nylon from civilian use.

In view of the excessive wear at high spindle speeds to which strand guides are or may be subjected, and in view of the deleterious results of such excessive wear, it is the principal object of the present invention to provide a strand guide which is highly resistant to the wear caused by the frictional contact of a moving strand with its guide.

To the accomplishment of this object and of such others as may appear hereinafter, the various features of the present invention reside in certain constructions, combinations, and arrangements of parts fully described in this specification and set forth in the appended claims which possess advantages readily apparent to those skilled in the art.

The various features of the present invention will be readily understood from reading this specification with reference to the accompanying drawing which illustrates the best physical embodiments of the invention at present known to the inventor and in which:

Fig. 1 is a somewhat diagrammatic view in side elevation showing an embodiment of the present invention in operative association with up-stroke mechanism for twisting and winding strand material;

Fig. 2 is a view in plan of a groove-type embodiment of the present invention;

Fig. 3 is a view in underside plan of the embodiment shown in Fig. 2;

Fig. 4 is an enlarged cross sectional view taken diametrically through the facing or lining of the guide, along the line 4—4 of Fig. 3;

Fig. 5 is an enlarged detail view in elevation

of the free end of the eye portion of the Figs. 2-4 embodiment, showing one manner of positively securing the facing in position;

Fig. 6 is an enlarged detail view in elevation similar to Fig. 5 but showing an alternative manner of positively securing the eye facing in position;

Fig. 7 is an enlarged detail view in plan of the tip of the free end of the Fig. 6 structure;

Fig. 8 is a detail view in plan of an alternative groove-type embodiment of the present invention;

Fig. 9 is a detail view in underside plan of the embodiment shown in Fig. 8;

Fig. 10 is an enlarged cross sectional view taken through the center of the facing or lining, along the line 10-10 of Fig. 9;

Fig. 11 is an enlarged detail view in elevation of the free end of the eye portion of the Figs. 8-10 embodiment, showing the manner of positively securing the eye facing in position illustrated in Fig. 5;

Fig. 12 is an enlarged detail view in elevation similar to Fig. 11 but showing the alternative manner of positively securing the eye facing in position illustrated in Fig. 6;

Fig. 13 is an enlarged detail view in plan of the tip of the free end of the Fig. 12 structure;

Fig. 14 is a detail view in plan of a further embodiment of the present invention;

Fig. 15 is a detail view in underside plan of the embodiment shown in Fig. 14;

Fig. 16 is an enlarged cross sectional view taken through the center of the facing or lining, along the line 16-16 of Fig. 15;

Fig. 17 is an enlarged detail view in elevation of the free end of the eye portion of the Figs. 14-16 embodiment, showing the manner of positively securing the eye facing in position illustrated in Figs. 5 and 11;

Fig. 18 is an enlarged detail view in elevation similar to Fig. 17 but showing the alternative manner of positively securing the eye facing in position illustrated in Figs. 6 and 12;

Fig. 19 is an enlarged detail view in plan of the tip of the free end of the Fig. 18 structure;

Fig. 20 is a detail view in plan of a still further embodiment of the present invention;

Fig. 21 is a detail view in underside plan of the embodiment shown in Fig. 20;

Fig. 22 is an enlarged cross sectional view taken through the center of the facing or lining, along the line 22-22 of Fig. 21;

Fig. 23 is an enlarged detail view in elevation of the free end of the eye portion of the Figs. 20-22 embodiment, showing the manner of positively securing the eye facing in position illustrated in Figs. 5, 11, and 17;

Fig. 24 is an enlarged detail view in elevation similar to Fig. 23 but showing the alternative manner of positively securing the eye facing in position illustrated in Figs. 6, 12, and 18;

Fig. 25 is an enlarged detail view in plan of the tip of the free end of the Fig. 24 structure; and

Fig. 26 is a detail view in side elevation, partially in section, of the Figs. 20-22 embodiment.

With reference to the drawing, and in the light of the second paragraph of this specification, there are shown in Fig. 1 several elements of an up-stroke type twisting machine. Thus, a vertical spindle 30 is suitably mounted upon means (not shown) for rotation by a sheave 31 driven by a belt 32, and mounted on the spindle for rotation by it is a spool or bobbin 33 carrying a sup-

ply of untwisted strand material 34. The single strand 34 ballooning outwardly and spirally upwardly from the spool 33 passes through the eye portion of a guide which is indicated generally by the reference numeral 35 and extends from a suitable crossbar support 36, after which the strand 34 passes through an element of a reciprocating traversing mechanism indicated at 37 and is wound upon a take-up spool or bobbin 38 which is rotated by suitable means 39. Except for the guide 35, the above-referred-to elements form no part of the present invention claimed herein, and since they are well known in the art they are shown somewhat diagrammatically.

With specific reference to the guide structure claimed herein, there are shown in Figs. 2-7 various views of what may be called a groove-type guide 35 embodying the present invention. Merely for purposes of illustration and explanation, and not by way of any limitation as to the scope of the subject matter claimed herein, the guide 35 is shown as being of the well known "pig tail" type, for "pigtail" guides are in widespread use since their helical eye construction permits the threading of a strand through the eye portion after connection with a take-up spool, i. e., does not require the passing of a free end of a strand through the eye to thread it. The guide 35 shown variously in Figs. 2-7 has a shank portion 40, an integral eye portion 41 shown for exemplary purposes only as having the form of a single turn of a helix, and a short free end 42 which is preferably straight and extends as a continuation of the helix. In plan view (Fig. 2) and in underside plan view (Fig. 3) the interior portion of the eye 41 has a circular appearance although it is actually helical in contour, with an open free end, and such a contour is well suited for guiding coaction with a ballooned strand 34 being taken up from a supply bobbin. Where the guide 35 is to be mounted in a wooden support such as the crossbar 36 (Fig. 1), the free end portion of the shank 40 may be provided with screw threads 43, but it will be appreciated that this type of mounting is but one of many which may be employed and are in common use, so that any suitable means of mounting the guide 35 as a whole may be employed within the scope of the invention claimed herein.

In manufacture the guide 35 is made of metal preferably by any suitable wire-drawing process or operation, and preferably, although not necessarily, is circular in cross section. Merely as a matter of facility in manufacture the drawing die may be constructed to produce a groove 44 throughout the extent of the wire while it is being drawn, the wire thereafter being cut into lengths suitable for guide construction, and an end portion of each length then being twisted to produce the helical eye portion 41 and the free end 42. In performing this twisting operation care is taken to insure that the portion of the groove 44 lying along the eye 41 is located along what would be the strand-engaging surface of the eye were the groove 44 not present, i. e., were no portion of the eye material removed, and formation of the shank threads 43, where used, may be performed either before or after formation of the eye 41. The groove 44 in the Figs. 2-7 embodiment is part of a cylindrical surface, as best indicated in Fig. 4, and when not formed as a part of a wire drawing operation, may be formed after the cutting of rod-like stock lengths, i. e., stock lengths which have no groove, in which case the groove 44 need not

extend the full length of the guide 35 but may extend only from preferably the tip of the free end 42 to a point beyond the eye portion 41 in the direction of the shank 40, i. e., to some point, sufficiently beyond the eye portion 41 and in the direction of the shank 40, which is out of the path of engagement of the strand 34 with the eye portion. In Figs. 2 and 3 the eye portion 41 is shown as designed for right hand or clockwise direction twisting, but it will be appreciated that by giving the eye portion a reverse twist, i. e., by causing the free end 42 to be at the right (viewing the Fig. 2 showing which is in plan) instead of at the left, as there shown, an eye portion is provided adapted for left hand or counter-clockwise direction twisting. The guide 35 may itself have resiliency, i. e., may be made from spring wire, for example.

The above-described structure is a step-product in the formation of the Figs. 2-7 embodiment of the present invention, and completion of the guide structure 35 as a whole is effected by providing a facing or lining 45 for the interior of the eye portion 41 so that the facing presents the actual surface which the strand 34 engages until the facing is well worn away, in which event the strand 34 may also engage the material of the eye portion 41.

The facing 45 is characterized by being made of material which is harder, i. e., more resistant to strand wear, than is the material of the eye portion 41. Any material may be used suitable for the purpose, but among those favored there may be mentioned carbide material, i. e., the extremely hard products of extrusion such as tungsten carbide (popularly known as "Carboloy"), tantalum carbide, columbium carbide, and titanium carbide, and also a molded carbide product such as boron carbide (popularly known as "Norbide"). Other materials which may be used include extruded synthetic sapphire.

Pieces of any of the above-named materials are formed in a helical shape in size smaller than but complementary to the helix of the eye portion 41 and adapted to fit in the helical groove 44 in the eye portion. As best shown in Figs. 2 and 3 a facing piece 45 preferably has one free end extending beyond its helical portion in the direction of the guide shank 40, while the other free end of the facing piece 45 extends beyond its helical portion to lie along substantially the full length of the short free end 42 extending from the eye 41, this construction being preferred because it insures that the entire strand-engaging surface is made of facing material with no danger of the strand 34 catching on a facing piece end edge and also because of facility in insuring that the facing 45 is maintained in position in the eye 41 as is discussed infra.

The facing 45 shown in Figs. 2-7 is cylindrical in cross section since the groove 44 in which the facing fits is a portion of a cylindrical surface, but the groove 44 is preferably less than 180° of such a surface, as shown in Fig. 4, thereby insuring that more than one half the diameter of the facing 45 extends into the interior opening of the eye 41 and so provides a maximum practicable facing thickness to give greatest duration of wear. The relative cross sectional diameters of the eye portion 41 and the facing 45 which are shown in Fig. 4 are exemplary only, as it will be appreciated that with any given guide 35 the cross sectional diameter of the facing 45 (and the arc of curvature of the groove 44) may be increased or decreased within the scope of the present invention.

Mounting the facing 45 in the eye portion 41 is fundamentally a matter of threading it in, since the facing 45 and the groove 44 in the eye portion present complementary surfaces. The free end of the facing which is to lie adjacent the shank 40 in the finished guide is presented to the eye portion 41 first, and the facing is then turned with respect to the eye portion 41 and the guide free end 42 until the facing is in place, the last step in insertion being engagement of the portion of the groove in the guide free end 42 by the adjacent free end of the facing piece 45.

Inasmuch as a facing piece 45 is relatively small, it is preferred that provision be made for maintaining it in place in the eye portion 41. Where the facing is made of tungsten carbide ("Carboloy") no special securement means may be necessary for it is possible to extrude tungsten carbide into a helical shape which exhibits spring resiliency in spite of its extreme hardness, and where a resilient tungsten carbide is used for the facing 45 it may be snapped or sprung in position, spring pressure of the facing against the adjacent eye portion insuring that the facing is held in place under resilient tension. This resilient securement is indicated in Figs. 2 and 3 by the absence of special securing means. With non-resilient facings, however, such as those made of the other carbide materials mentioned above, and also with synthetic sapphire and even tungsten carbide if the resiliency of a given piece is insufficient, reliance may be placed on the resiliency of the guide 35 itself, the pressure of the eye portion 41 against the facing 45 serving this purpose.

Means may be employed, however, for positively securing the lining 45 in position. One such means is a suitable cement which may be placed all along that portion of the groove 44 which the facing 45 is to engage or placed at one or more loci therealong, the facing being thereafter mounted in position after which the cement is allowed to set. Such a cement layer may be considered as represented by the arcuate line in Fig. 4 and in Fig. 7 indicating the groove 44. Alternatively, where the facing is made of a material to which a suitable solder, such as a silver solder, for one example, will adhere, a drop 46 thereof (Fig. 5) may be placed on the tip of the guide free end portion 42 in engagement with the tip of the adjacent free end portion of the facing 45. On the other hand, a suitable solder may be placed in the groove 44 in engagement with that free end portion of the facing 45 which extends in the direction of the shank 40, or if desired the solder may be located all along the length of the facing 45 after it is in position in the groove 44, either by a dipping operation or by the use of a blow-pipe directed along the edges of the groove. A still further means of positively securing the facing 45 in place is shown in Figs. 6 and 7 in which an initially circular band 47, for example, is employed, this band being made of soft metal such as brass or copper so as to be deformable as indicated in Fig. 7 by the act of forcing the band over the tip of the guide free end 42 and the adjacent facing end, with the result that the deformed band in effect exerts a clamping action on the guide and lining ends by reason of engagement with both. If desired a deformable cap may be used instead of the band 47. In any of the above-described positive means of securement, and also in reliance upon the inherent resiliency of the guide 35 itself or of resilient tungsten carbide extruded in a helix, the danger of

any creeping of the facing with respect to the eye portion 41 is obviated.

In Figs. 8-13 an alternative groove-type guide structure 48 is shown, this type being characterized by its eye portion 49 and the free end 50 having a groove 51 which is V-shaped in cross section (Figs. 10 and 13) and by a lining or facing 52 which is correspondingly modified in cross section to be complementary thereto. Merely for purposes of illustration and explanation and not by way of any limitation as to the scope of the subject matter claimed herein, the groove 51 is shown as having a 90° cross sectional angle, and the facing 52 is somewhat sector-shaped and preferably, although not necessarily, extends inwardly of the opening of the eye portion 49 so as to present an enlarged surface area for engagement with the strand 34 as compared with the surface area that would be presented if the facing 52 were of such size as merely to replace the material removed in forming the groove 51. In all other respects the guide structure 48 may be identical with the guide structure 35, including the manner of making the integral shank, eye portion, and free end as a step-product and the facing 52 may be made of any of the materials mentioned above, and applied to the groove in the same manner as discussed above with respect to locating the facing 45 in the groove 44. It will be appreciated that the guide structure 48 shown in Figs. 8 and 9 is illustrated only for exemplary purposes as of the right hand or clockwise direction twisting type.

Resilience, i. e., spring tension of either the guide 48 or of the facing 52 may be relied upon to hold the facing in place in the groove 51, and Figs. 8 and 9 may be considered as representing this construction, or cement may be employed on the engaging surfaces of the groove 51 and the flat sides of the facing 52. In Figs. 10 and 13 the lines indicating the groove 51 may be considered as representing cement also. Alternatively, solder of a suitable type may be employed where practicable in any of the manners discussed above, the drop of solder 53 shown in Fig. 11 being located on the tip of the free end 50 of the guide 48 and the tip of the adjacent portion of the facing 52, to give one example. It will be appreciated that a deformable band, or a cap, may also be employed as substitute securing means, as discussed above in connection with Figs. 6 and 7, such a band 54 being shown in Figs. 12-13 and functioning by reason of its deformation to clamp together the adjacent facing 52 and free end 50 portions.

Facing material may also be applied to a guide the eye and free end portions of which are not provided with a groove, and such a construction is shown variously in Figs. 14-19. The guide structure 55 in these figures is identical with the guide 35 except that it has no groove, and as a step-product may otherwise be made in the same manner as the integral shank 40, eye portion 41, and free end 42 are made. For exemplary purposes only the guide 55 is shown as of the right hand or clockwise direction twisting type. The facing 56, however, is extruded or molded in the shape of a helix having an inward convex strand-engaging surface (Fig. 16) and an outward concave surface adapted to engage the eye portion 57 and guide free end 58, and for this purpose the curvature of the concave surface of the facing 56 is preferably the same as that of the eye portion 57 and the free end 58, as indicated in Fig. 16. The facing 56 is thus arcuate in cross section,

and its opposite ends (cross sectionally speaking) are preferably curved.

The facing 56 may be made of the extrudable or moldable materials discussed above and is positioned on the eye portion 57 in a threading manner, as is also discussed above. Resilience, i. e., spring tension, of either the guide 55 or of the facing 56 may be relied upon to hold the facing in place, and Figs. 14 and 15 may be considered as representing this construction, or as means for positively securing the facing 56 to the eye portion 57 cement may be employed, this being represented in Fig. 16 by the arcuate line indicating the concave surface of the facing 56 and the portion of the surface of the eye portion 57 engaged thereby. Alternatively, a suitable solder may be employed where practicable in any of the manners discussed above, the drop of solder 59 shown in Fig. 17 being located on the tip of the free end 58 of the guide 55 and the tip of the adjacent facing portion 56, to give one example. It will also be appreciated that a deformable band, or a cap, may be employed for this same purpose, as discussed above in connection with Figs. 6-7 and 12-13, such a band 60 being shown in Figs. 18 and 19 and functioning by reason of its deformation to clamp together the adjacent facing 56 and free end 58 portions.

The various guide structures discussed above are all characterized by the fact that their facings 45, 52, and 56, as the case may be, present strand-engaging surfaces which are curved transversely, as it were, and do not present strand-engaging edges. In considering the present invention in a different light, however, attention is called to the type of strand guide disclosed in U. S. Letters Patent No. 2,189,257, granted to Alfred E. Sunderland on February 6, 1940, for "Device for use in twisting threads." Sunderland was concerned with the problem of correcting the situation in which the centrifugal force generated by the high spindle speed causes displacement and entanglement of strand fibres or filament ends in the ballooned strand portion so that their parallel relationship is disturbed and there result the undesirable formations in the strand commonly known as loops and corkscrews. Sunderland's approach to this problem was to form a strand guide of thin flat material and then twist it to form a helical eye portion characterized by having "a sharp, lower thread contacting edge." But efficacious as Sunderland's approach may be considered to be to the problem of eliminating loops and corkscrews, his construction has the disadvantage that as soon as appreciable wear of the thread contacting edge occurs that edge is no longer an edge but a surface which becomes increasingly wider as wear increases, so that the effect of the edge on the strand is necessarily lost.

The Sunderland principle may be employed in practicing the present invention with resulting prolongation of edge life, and such an embodiment is variously illustrated in Figs. 20-26. The guide 61 may be identical with the guide 55, i. e., may be made in the same manner as discussed above for making the step-product comprising the integral shank 40, eye portion 41, and free end 42 without the formation of any groove, and may be made with either a right hand or a left hand helix, but the helical facing 62, instead of being concavo-convex as best shown in Fig. 16, is concavo-flat, as best shown in Fig. 22. Stating this differently, the facing 62 has an outward concave surface as has the lining 56 in Fig. 16, but from this surface the facing 62 extends inwardly

of the eye portion 63 in substantially parallel top and bottom surfaces (cross sectionally speaking) and the inner surface of the facing 62 joins them at substantially 90° (Fig. 22) so as to form a relatively sharp lower edge 64 and the like upper edge 65. This latter edge has no function in the operation of the Figs. 20-26 embodiment, but provision for it is preferably made in the extruding die, for example, since a double edge construction provides that whether the facing be formed upon extrusion into a left hand helix or a right hand one, in either case there is a strand-engaging edge. The lower edge 64, however, does engage the strand 34 in the twisting and drawing thereof, as indicated in Fig. 26, and by reason of such engagement functions as does the relatively sharp edge in the above Sunderland patent.

The facing 62 may be made of the extrudable or moldable materials discussed above and is positioned in the eye portion 63 in a threading manner, as is also discussed above. Resilience, i. e., spring tension of either the guide 61 or of the facing 62, may be relied upon to hold the facing in place, and Figs. 20 and 21 may be considered as showing this. Means for positively securing the facing to the eye portion may be employed, however, such as cement, in which case the arcuate line in Fig. 22 representing the concave surface of the facing 62 and the portion of the surface of the eye portion 63 engaged thereby may be considered as representing a layer of cement. Suitable solder may be employed as an alternative positive securing means in any of the manners discussed above, the drop of solder 66 shown in Fig. 23 being located on the tip of the guide free end 67 and the tip of the adjacent facing portion 62, to give one example. A deformable band, or a cap, may also be employed for this purpose, after the manners discussed above, such a band 68 being shown in Figs. 24 and 25 and functioning by reason of its deformation to clamp together the adjacent facing 62 and free end 67 portions.

It is contemplated, in making embodiments of the present invention shown in Figs. 2-19, and the like, that after the facing material is in place it be given a polish, since a polished strand-engaging surface minimizes friction with the strand 34. Any suitable means may be employed in polishing, but one satisfactory manner of achieving this end is to employ a conical-ended tool which is dipped in oil, for example, so as to be able to carry diamond dust, the tool being inserted first into one side of the faced eye opening and rotated in engagement with the facing and then inserted into the other side of the eye opening and rotated in like manner.

The type of strand guide selected herein for purposes of illustration and explanation is shown as of the "pig tail" type only because such a type of guide is in widespread use. It will be appreciated, however, that since the principal object of the present invention is to provide a guide which is highly resistant to wear by a strand, the broad features of the present invention may be employed, for twisting operations, in strand guides other than the "pig tail" type, and also may be employed in guides of various types not concerned with twisting at all. It is not necessary that the shank, eye portion, and free end be of integral construction, and the affixation of a lining or facing in a guide structure which is grooved, or which has no groove for receiving the facing, either by reliance upon spring tension or by positive securing means as discussed above, is not con-

finied to guides having a helical eye contour, but may be employed in guide structures having other contours, and there may be used as facing material other substances than those specifically named above, all within the scope of the present invention. To this end the various features of the present invention are set forth in their true scope in the following claims which intentionally use generic terms and expressions that are inclusive in meaning of various modifications and adaptations in addition to the specific structures shown in the accompanying drawing or described above.

What is claimed as new is:

1. A strand guide having a helical eye portion the strand-engaging part only of which consists of a separate piece of material more resistant to strand wear than is the material of the remainder of the eye portion.
2. A strand guide having a shank and an integral helical eye portion, the strand-engaging part only of the eye portion consisting of a separate piece of material more resistant to strand wear than is the material of the remainder of the eye portion.
3. A strand guide having a helical eye portion the strand-engaging part of which consists of a facing of carbide material separate from the remainder of the eye portion but mounted thereon.
4. A strand guide having a helical eye portion the strand-engaging part of which has a facing of synthetic sapphire separate from the remainder of the eye portion but mounted thereon.
5. A strand guide having a helical eye portion the strand-engaging part of which consists of a separate piece of facing material more resistant to strand wear than is the material of the remainder of the eye portion, said facing material being mounted on the eye portion under spring tension.
6. A strand guide having a helical eye portion the strand-engaging part of which consists of a facing comprising a separate piece of carbide material mounted on the eye portion under spring tension.
7. A strand guide having a helical eye portion provided with a groove extending along at least that part of the eye portion which would be in frictional engagement with a strand passing through the eye portion were the groove not present, and a facing of material more resistant to strand wear than is the material of the eye portion mounted in the groove to present an engagement surface for the strand.
8. A strand guide having a helical eye portion provided with a groove extending along at least that part of the eye portion which would be in frictional engagement with a strand passing through the eye portion were the groove not present, and a facing of carbide material mounted in the groove to present an engagement surface for the strand.
9. A strand guide having an eye portion provided with a groove extending along at least that part of the eye portion which would be in frictional engagement with a strand passing through the eye portion were the groove not present, and a facing of material more resistant to strand wear than is the material of the eye portion, said facing being mounted in the groove under spring tension to present an engagement surface for the strand.
10. A strand guide having an eye portion provided with a groove extending along at least that part of the eye portion which would be in frictional engagement with a strand passing through

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the eye portion were the groove not present, and a facing of carbide material mounted in the groove under spring tension to present an engagement surface for the strand.

11. A strand guide having a helical eye portion the strand-engaging part of which is faced with a separate piece of material more resistant to strand wear than is the material of the remainder of the eye portion, and means for positively maintaining the facing material in position with respect to the eye portion.

12. A strand guide provided with an eye portion comprising rod-like stock having the shape of a helix, the strand-engaging part only of said eye portion being provided with a facing which consists of a separate piece of material more resistant to strand wear than is the remainder of the eye portion.

13. A strand guide provided with an eye portion comprising rod-like stock having the shape of a helix, the strand-engaging part only of said eye portion being provided with a facing which consists of a separate piece of carbide material.

14. A strand guide having a helical eye portion the strand-engaging part of which has a facing of material separate from and more resistant to strand wear than is the remainder of the eye portion, said facing being provided with a

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relatively sharp lower edge adapted to engage a strand when the guide is in use.

15. A strand guide having a helical eye portion the strand-engaging part of which is provided with a facing of carbide material separate from the remainder of the eye portion but mounted thereon, said material being provided with a relatively sharp lower edge adapted to engage a strand when the guide is in use.

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