June 12, 1934. J. L. CASSADY 1,962,804

METHOD OF MAKING GOLF CLUBS

Original Filed Oct. 3, 1930 3 Sheets-Sheet 1

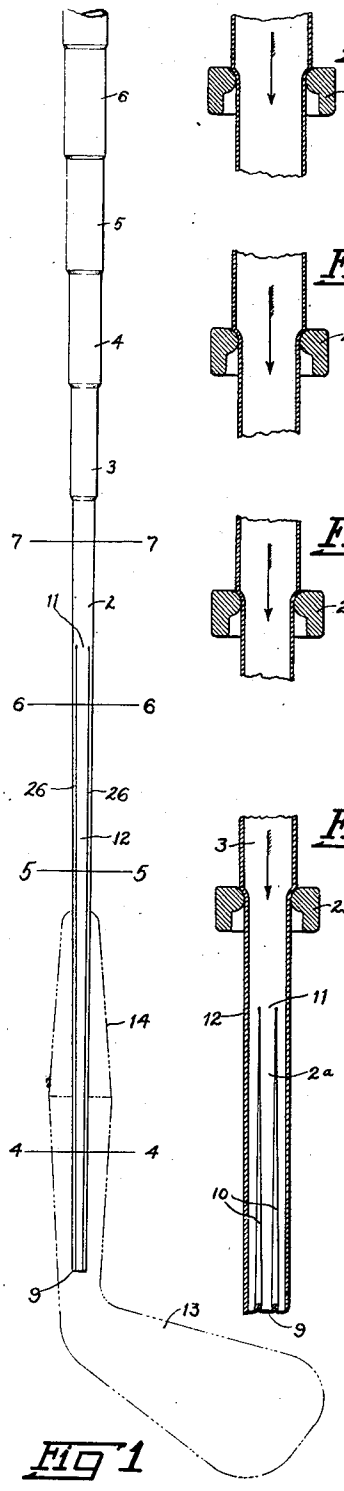


Fig 1

Fig 15

Fig 16

Fig 17

Fig 18

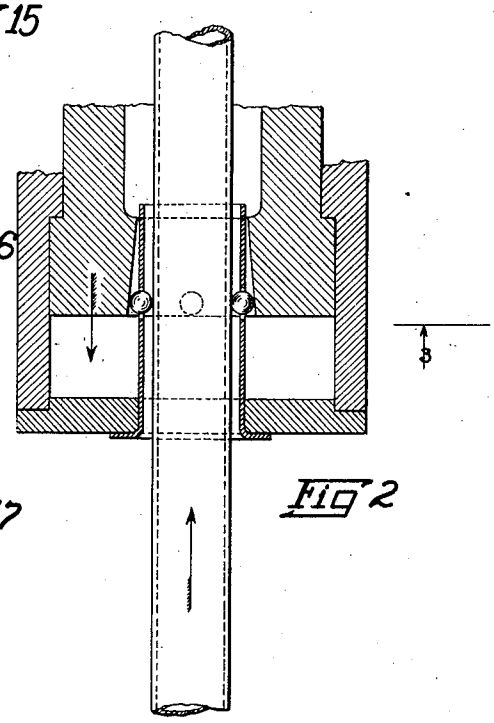


Fig 2

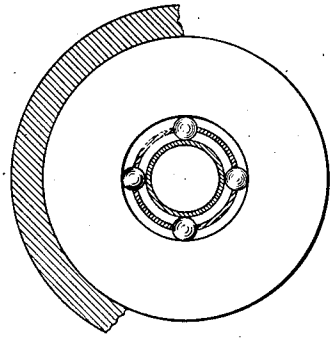


Fig 3

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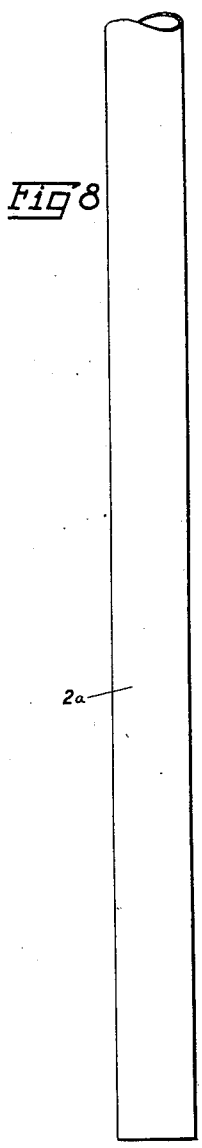


Fig 8

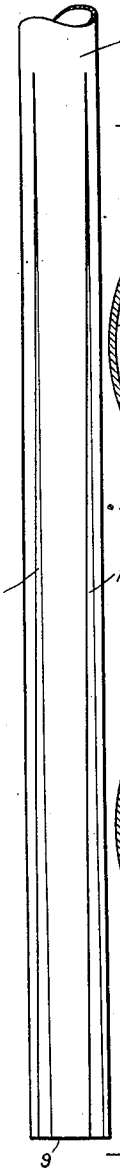


Fig 9

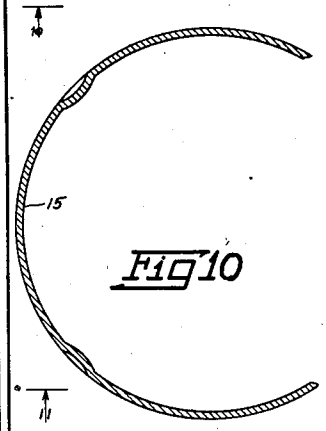


Fig 10

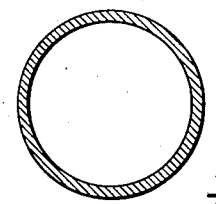


Fig 7

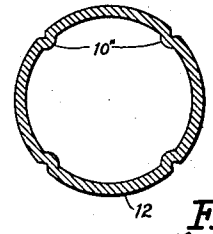


Fig 6

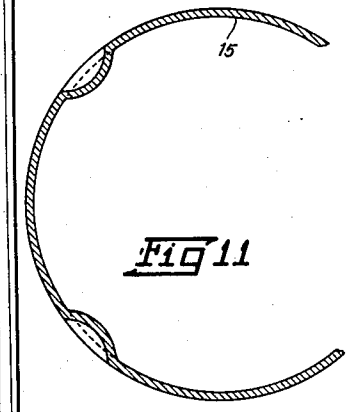


Fig 11

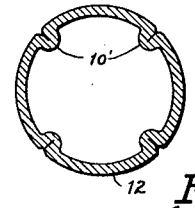


Fig 5

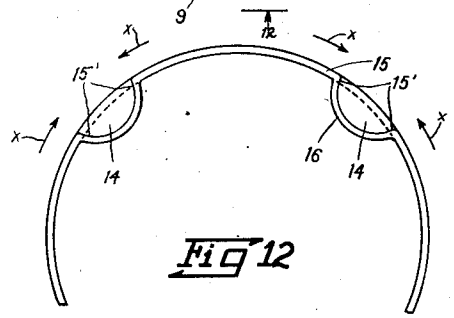


Fig 12

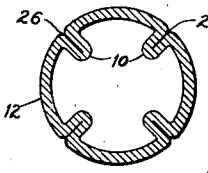


Fig 4

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Fig 14

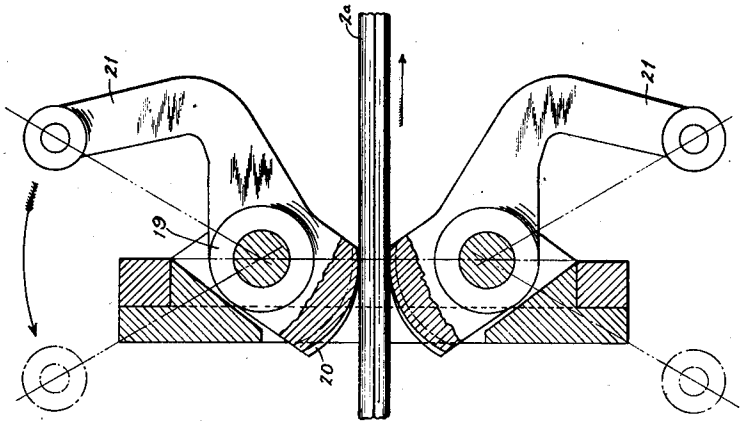
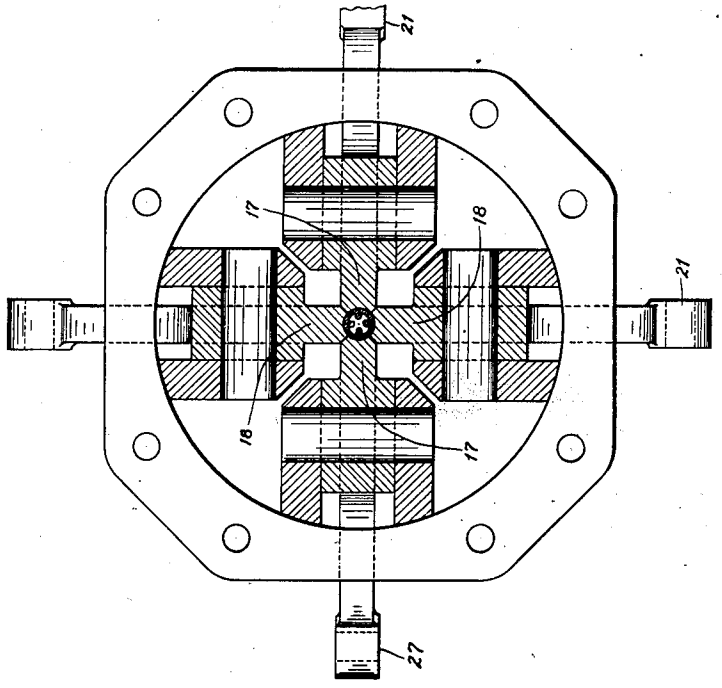


Fig 13



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UNITED STATES PATENT OFFICE

1,962,804

METHOD OF MAKING GOLF CLUBS

James Lloyd Cassady, Paris, Ontario, Canada, assignor to The American Fork & Hoe Company, Cleveland, Ohio, a corporation of Ohio

Original application October 3, 1930, Serial No. 486,200. Divided and this application January 18, 1933, Serial No. 652,256

3 Claims. (Cl. 29—156)

My invention relates to improvements in golf clubs and more particularly to improved methods of making handle shafts for golf clubs.

This application is divisional of my copending application Serial No. 486,200, filed October 3, 1930 for golf clubs.

My invention is applicable to the production of golf shafts generally of the character of those disclosed and claimed in the copending application of Hallie M. Wilcox, Serial No. 486,178, filed October 3, 1930 and having improved characteristics.

In the said application there is disclosed a shaft affixed by its smaller end to a golf club head, the shaft being of progressively reduced diameter toward the head and provided with internal ribs, integrally formed with and of the sheet metal material of the tubular walls, and which extend longitudinally of the shaft from the smaller end thereof to a point disposed substantially above the club head hosel, for reinforcing the shaft against breakage or deformation in portions adjacent the hosel.

As described in that application, the so-called ribs extend for substantial distances inwardly from the inner walls of the tube shaft proper, throughout the entire lengths of the ribs and are more or less abruptly discontinued at a point in the portion of the shaft nearest the head, but substantially spaced above the hosel thereof.

It is an object of my present invention to provide a method of making golf shafts of the character described but of improved construction and less susceptible of breakage at the junction of ribbed and non-ribbed portions of the tube.

Another object of my invention is to provide a method of producing structural elements in the form of sheet metal tubes having lateral walls infolded at intervals proceeding around the tube to provide longitudinally extending ribs of improved form to reinforce a portion of the tube and without subjecting the tube to the liability of breakage in portions adjacent the rib portions.

Another object of my invention is to provide a method of producing improved handle shafts for golf clubs having superior qualities for playing purposes by reason of improved distribution of reinforcing means having certain relative properties of resistance to flexure.

Another object of my invention is to provide an improved method of manufacturing a structural element adaptable for use as a handle shaft for golf clubs and for other purposes.

Another object of my invention is to provide an improved method of providing in tubular golf shafts or the like an efficient distribution of reinforcing means.

Other objects of my invention and the invention itself will become more apparent from reference to the following description of an embodiment of my invention, wherein reference is had to the accompanying drawings illustrating the said embodiment and the process of carrying out the invention in connection with the said embodiment.

Referring to the drawings:—

Fig. 1 is a side elevational view of a golf club head with an end portion of an improved steel tubular shaft, embodying the principles of my invention, secured thereto;

Figs. 2 and 3 are respectively medial longitudinal and transverse sectional views of a ball die mechanism which may be employed for accomplishing a preliminary grooving operation upon a tube section, preliminarily to reform the tube to form the golf club handle shaft of Fig. 1;

Figs. 4, 5, 6 and 7 are transverse sectional views taken respectively on the lines 4—4, 5—5, 6—6, and 7—7 of Fig. 1;

Fig. 8 is an elevational view of a portion of a cylindrical tube adapted for the purpose of reformation to the form of tube illustrated in the foregoing figures, whereby it is adapted for use as the golf club handle shaft thereof;

Fig. 9 is an elevational view of the tube of Fig. 8 after being subjected to a special grooving operation near an end portion thereof;

Fig. 10 is a transverse sectional view taken on the line 10—10 of Fig. 9;

Fig. 11 is a transverse sectional view taken on the line 11 of Fig. 9;

Fig. 12 is an enlarged end view taken on the line 12—12 of Fig. 9;

Figs. 13 and 14 are respectively a transverse sectional view and a longitudinal sectional view of an adjustable die element adapted for the purpose of reducing to a tapered form a tube drawn therethrough of initially cylindrical or other form and adapted for the purpose of applying graduated compressive stress upon the grooved tube portion of Fig. 9, to progressively reduce such grooved portion of the tube to the form shown in Figs. 1 and 4 to 7, inclusive.

Figs. 15 to 18 inclusive illustrate a preferred method of accomplishing a tube reduction operation in the forming of the golf club handle shaft of Fig. 1.

Although my invention is not limited thereto, the method disclosed herein involves the making of a handle shaft for golf clubs of the general type disclosed and claimed in United States Letters Patent No. 1,670,530, dated May 22nd, 1928, for Golf shafts, to Robert H. Cowdery, wherein a handle shaft for golf clubs of stepped tubular form is disclosed comprising a plurality of relatively longitudinally disposed tubular integral sections, of progressively decreased diameter proceeding from the hand grip end of the shaft toward the club head supporting end of the shaft.

The present invention is directed more par-

ticularly to the provision of a method for producing an improved end section for a handle shaft of the above general character and reference will therefore be had to the said Cowdery patent for a more complete description of the progressively stepped tube structure employed in the shaft of the foregoing figures of drawings, and such description will be therefore omitted in the present application.

In the aforementioned copending application of Wilcox, the tubular section of handle shaft which is of least diameter, and which is secured by its end within the hosel recess of a golf club head, is described as being preferably of generally cylindrical form, and provided with infolded portions of its outer wall, projecting within the bore at the said smaller end of the tube in such a manner as to constitute reinforcing ribs, there being a plurality of such infolded internal ribs which extend from the small end of the shaft upwardly to a substantial distance above the upper end of the hosel, these being preferably equally spaced around the tubular shaft end and the wall portions forming each fold being pressed so closely together substantally to the entire depth of the folds, so as to obliterate any tendency toward the provision of exteriorly disposed grooves.

The exterior surface of the tube, therefore, remains substantially cylindrical in form and the tube is not unduly yieldable to rotational stresses as would be the case were the folds constituting such ribs left unclosed.

In the present application, in the handle shafts made according to my improved method, the greater portion of the length of the handle shaft is substantially of the construction disclosed in the said Cowdery patent, and as illustrated particularly in Fig. 1 comprises a plurality of integrally formed substantially cylindrical tubular sections extending longitudinally of the tube from the section of least diameter, 2, through intermediate sections of progressively increased diameter such as the sections 3, 4, 5 and 6 of progressively increased diameters, until the larger end of the shaft is reached, whereat the shaft is preferably suitably covered with a wrapping of leather or other hand grip covering material according to the ordinary practice. Preferably a large number of the stepped sections, such as 3 to 6 inclusive are provided; preferably there will be about 17 sections, although the number may be varied.

The tubular section 2 in the present application is preferably made of greater length than the adjacent sections of progressively larger diameters, and is also provided with an external tapered surface, being of gradually decreased diameter proceeding from its junction with the tube section 3 to the end 9. The tapered tubular section 2 is also preferably provided with internal ribs 10, preferably four in number, although the number may be varied, which essentially comprise infolded portions of the lateral walls of the tube, each extending for a preferably like distance from the small end of the tube longitudinally toward its larger end, to such a point as is indicated on the drawings, as for instance at 11.

In the shaft made according to my improved method, the internal ribs 10 extend inwardly from the lateral, otherwise cylindrical walls 12 of the tube toward the axis thereof to progressively increased distance from such axis proceeding from the end 9 of the tube section 2 where the ribs 10 extend inwardly toward the axis of the tube substantially more than is the case at the line of section 5—5. The inwardly extending ribs 10'', Fig. 6, extending inwardly but a very short distance, and at the point indicated at 11 the ribs 10'' are merged with the non-ribbed portion of the tube, the annular form of which is indicated for the line of section 7—7. The lines of section above indicated are shown in the drawings in connection with Fig. 1.

As described, therefore, the handle shaft section 2, which is of smallest diameter and of tapered form is reinforced internally by a plurality of like, preferably equally spaced internal ribs of duo-fold construction, the ribs being of progressively increased size proceeding from a point such as the point 11 on the shaft section toward the end 9 of the shaft, which as shown in Fig. 1 is ultimately disposed at the bottom of the hosel recess of the club head 13, the shaft section 2 extending from the mouth of said recess, and being preferably reinforced by a wood adapter, surrounding the end of the shaft section 2, and having a portion projected in the hosel recess around such shaft end, and a portion projecting outwardly from the recess, and surrounding the tube section 2 adjacent the hosel end, and which is engaged within a thin-walled tapered metallic sleeve 14, substantially as described in the said copending application of Wilcox, the adapter construction being not specifically illustrated herein, reference being had to the aforesaid application of Wilcox for a more complete description thereof.

In order to form the tapered tube section 2 having integral infolded longitudinally extending rib elements 10 of graduated size indicated by the figures 4 to 6 inclusive, the apparatus of Figs. 13 and 14 is preferably employed.

In forming the tubular golf shaft of Figs. 1 to 7 inclusive, the end of a cylindrical tube, shown at 2*a* in Fig. 8, is first operated upon by the apparatus of Figs. 2 and 3 to provide longitudinally extending grooves 14 extending from the end 9 of the tube to the point 11 thereon, the grooves 14 proceeding from the point 9 toward the point 11 being of progressively decreased depth and width, as illustrated by the end view, Fig. 12 taken of the tube end 9 and the views of Figs. 11 and 10 taken respectively on the lines of section 11—11 and 10—10 of Fig. 9, wherein the grooves 14 are shown as being of progressively decreased depth proceeding inwardly from the generally annular portions 15 of the tube.

The grooving of the tube 2*a* as described is preferably effected by the apparatus of Figs. 2 and 3, and the tube section 2 is then in accordance with the method described in the said Cowdery patent progressively reduced by successively projecting it through annular reducing dies, such as those shown at 22, 23, 24, and 25 in Figs. 15, 16, 17 and 18, respectively, until it becomes of reduced diameter, though of still generally cylindrical form, except for the now nearly closed grooves previously provided as opened grooves 14 on its exterior surface.

The closure of the grooves 14 is accomplished by the compressive reduction in diameter of the tube, because of the fact that the arcuate portions 15 intermediate the grooves tend to maintain their length and to increase their arcuity, and therefore the adjacent ends 15' of two adjacent arcuate sections of the reduced tube proceeding towards each other in the direction of the arrows *x*—*x*, Fig. 12, at the same time, results in a projection of the inwardly deflected

portion 16 forming the bottom wall of such grooves, and which was initially bodily deflected inwardly from between the wall portions 15 toward the axis of the tube.

Therefore, the compressional reduction of the diameter of the tube section 2*a*, having the grooves 14 provided therein, by preliminarily inwardly deflecting lateral wall portions 16 of the tube walls, effects a progressively achieved narrowing and deepening of the grooves 14 until the grooves become of maximum depth and of minimum width until ultimately the grooves are closed entirely by the lateral sides thereof approaching to substantial contact.

Of course the grooved portions nearer the end 9 of the tube will achieve a greatest depth, because of their greater initial depth and width, with the result that at the end of the shaft the tube will be formed transversely substantially as shown in Fig. 4, and at different points in the length of the tube section 2*a* proceeding toward the point 11, the tube will take the approximate cross-sectional forms indicated successively in Figs. 5 and 6, with the result that internal longitudinally extending ribs 10, Fig. 18, are formed.

The tube so formed could be put into use as a fold club shaft, but I prefer to still further reduce the section 2 of the shaft, to a progressively increased degree proceeding towards the end 9 thereof, and this may be satisfactorily accomplished by employing the apparatus of Figs. 13 and 14, which apparatus is illustrated more specifically and completely in the copending application of Batcheller, Serial No. 268,130, filed April 7, 1928, to which reference may be had for a more complete description of the contracting reducing die mechanism adaptable for use in the forming of tapered tubes or rods.

In a manner which will be well understood by reference to the said Batcheller application, the formed end section 2 of the tube is placed between the reducing jaws, which are arranged in oppositely disposed pairs 17—17 and 18—18, each of said jaws being journalled for rotation on a journal pin 19, individual thereto and provided with longitudinally extending grooved eccentric die faces 20, like portions of which, of the different dies being adapted to be adjustably disposed for compressive engagement of the tube section 2*a*, according to the rotational position of the die elements 17—17 and 18—18, as determined by the lever arms 21, one of which is provided for each die element, all lever arms being moved in unison at a given rate, while the tube 2*a* is drawn through the die aperture defined by the contiguous faces 20, the rate of movement of the lever arms 21 being commensurable to the rate of longitudinal movement of the tube 2*a* through the die aperture, whereby, the die element faces will increasingly compress the tube 2*a* proceeding from the point 11 thereon towards its end 9.

The result is that the substantially cylindrical tube provided with internal ribs, as before described, is progressively reformed to a tapered shape, as illustrated in Fig. 1, the exterior diameter of which is progressively reduced proceeding toward the end 9 of the shaft section 2 of the finished tube, as indicated, also in Figs. 4, 5, 6 and 7, indicating the end portion of the tube and three spaced sections successively disposed nearer the larger handle end of the tube section 2.

The compressive reduction operation accomplished with the apparatus of Figs. 13 and 14 upon the tube section 2*a* to reform it to the tapered form of tube section 2 tends to increase the degree of closure of the previously formed grooves 14 to such a degree that complete closure of the seams 26 which is scarcely visible at the exterior surface of the tube 2, is efficiently effected.

Having thus described my invention in a given embodiment, I am aware that numerous and extensive departures may be made from the embodiment of my invention illustrated, but without departing from the spirit of my invention.

I claim:—

1. The method of making a tubular shaft for golf clubs or the like from a tube which includes forming in the walls of the tube a plurality of circumferentially spaced outwardly flaring recesses beginning at one end of the tube and continuing toward the other end over a portion thereof and being of progressively less and less depth in the tube walls, then operating upon the tube to progressively taper it from one end toward the recessed end and to close up the recesses by bringing their confronting opposite faces into mutual contact and thereby forming internally of the tube a corresponding plurality of circumferentially spaced longitudinally extending ribs of less and less inward radial extent progressively thereover from the said recessed end of the tube.

2. The method of making a tubular shaft for golf clubs or the like from a tube which includes forming in the walls of the tube a plurality of circumferentially spaced outwardly flaring recesses beginning at one end of the tube and continuing toward the other end over a portion thereof and being of progressively less and less depth in the tube walls, then operating upon the tube to progressively generally taper it from one end toward the recessed end and to close up the recesses by bringing their confronting opposite faces into mutual contact and thereby forming internally of the tube a corresponding plurality of circumferentially spaced longitudinally extendings ribs of less and less inward radial extent progressively thereover from the said recessed end of the tube, the tapering of the tube being effected by successively drawing the tube through a series of successively smaller die passes to form a longitudinal series of successively smaller generally cylindrical stepped sections.

3. The method of making a tubular shaft for golf clubs or the like from a tube which includes forming in the walls of the tube a plurality of circumferentially spaced outwardly flaring recesses beginning at one end of the tube and continuing toward the other end over a portion thereof and being of progressively less and less depth in the tube walls, then operating upon the tube to progressively generally taper it from one end toward the recessed end and to close up the recesses by bringing their confronting opposite faces into mutual contact and thereby forming internally of the tube a corresponding plurality of circumferentially spaced longitudinally extending ribs of less and less inward radial extent progressively thereover from the said recessed end of the tube, the tapering of the tube being effected by successively drawing the tube through a series of successively smaller die passes to form a longitudinal series of successively smaller generally cylindrical stepped sections, and finally taper drawing the section of smallest diameter toward the small end of the shaft.

JAMES LLOYD CASSADY.