May 31, 1955 F. F. HILLIX 2,709,456

THREAD PROTECTORS

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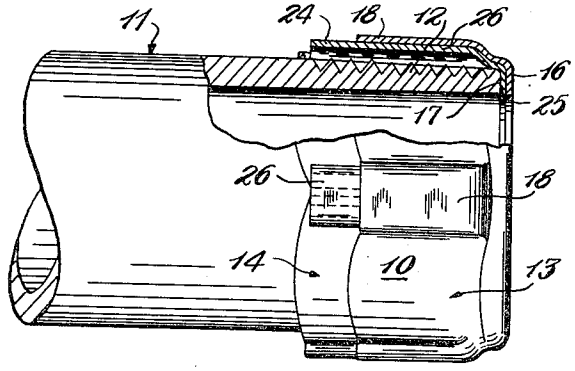


FIG. 2

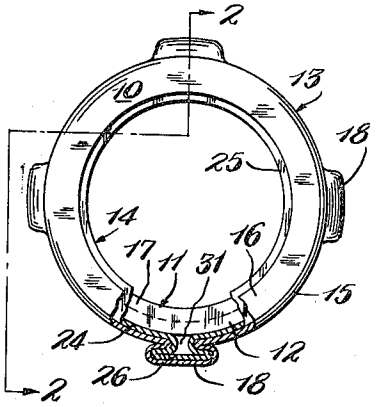


FIG. 1

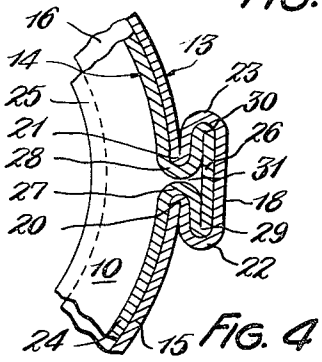


FIG. 4

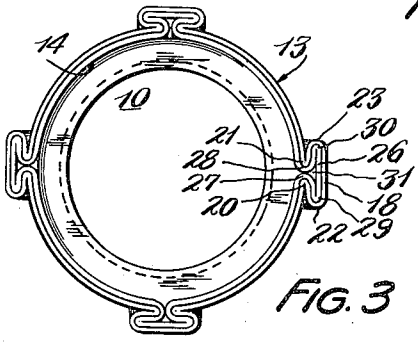


FIG. 3

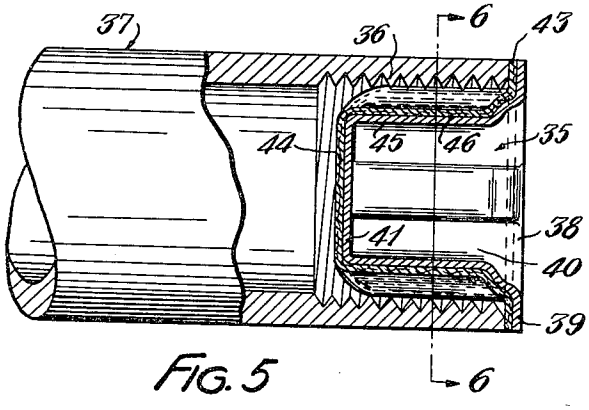


FIG. 5

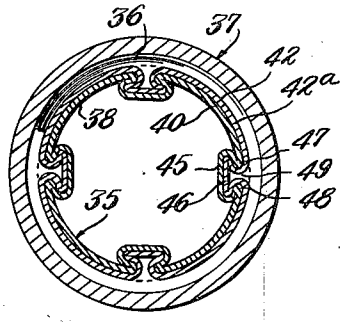


FIG. 6

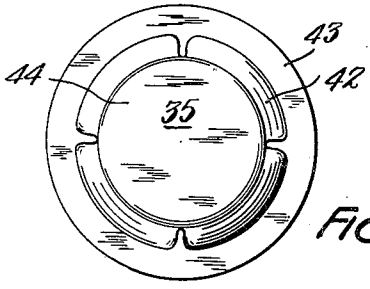


FIG. 7

INVENTOR.
FOSTER F. HILLIX
BY Hudson, Boughton, Williams, David & Hoffmann
ATTORNEYS

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THREAD PROTECTORS

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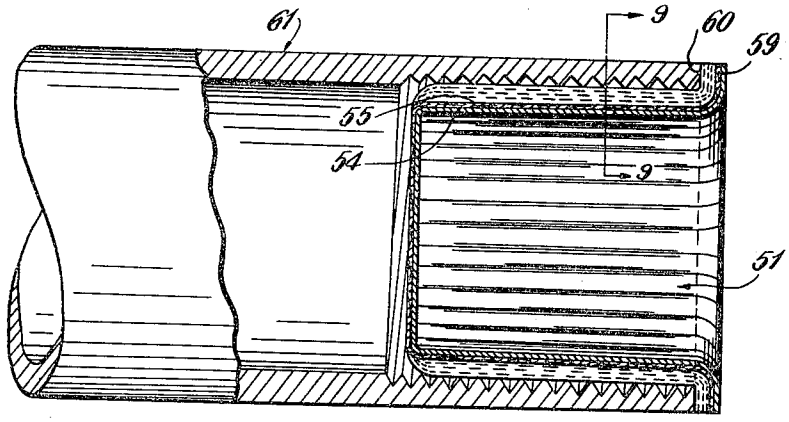


FIG. 8

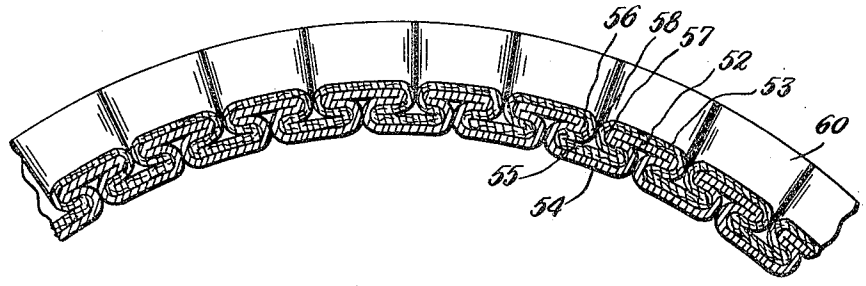


FIG. 9

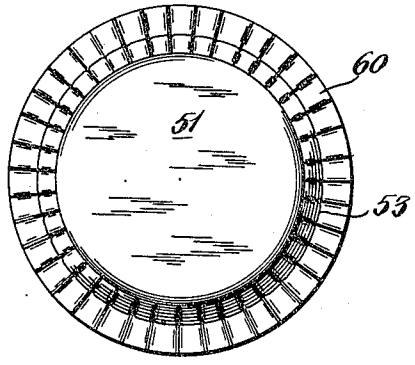


FIG. 10

INVENTOR.
FOSTER F. HILLIX
BY Hudson, Boughton, Williams, David & Hoffmann.
ATTORNEYS

United States Patent Office 2,709,456 Patented May 31, 1955

2,709,456

THREAD PROTECTORS

Foster F. Hillix, Lakewood, Ohio, assignor to Wedge Protectors, Inc., Cleveland, Ohio, a corporation of Ohio

Application March 7, 1950, Serial No. 148,070

6 Claims. (Cl. 138—96)

This invention relates to protectors of the type used on threaded articles to cover and protect the threads against damage and objectionable foreign matter during shipping and handling of the articles and, as one of its objects, provides an improved construction for a thread protector of this character. This improved thread protector can be used on a variety of threaded articles but is particularly applicable to the threaded ends of pipes, conduits and the like, and is therefore disclosed herein as being used for that purpose but without any intention of limiting the invention in this respect.

As one of its objects this invention provides an improved thread protector which can be rapidly and economically produced from sheet metal and can be quickly and easily applied to threaded pipe ends and which will be adequately capable of warding off blows and foreign matter which would otherwise damage or clog the threads.

A further object is to provide an improved thread protector of this character having an annular sleeve portion and in which the sheet metal of the sleeve portion has gathers therein at circumferentially spaced points defining axially extending ribs.

Still another object is to provide an improved thread protector having a sheet metal sleeve portion and a second sleeve or liner of non-metallic sheet material and in which such sleeve portion and second sleeve have folds or gathers forming a connecting interlock therebetween.

As a further object, this invention provides a thread protector of the kind mentioned which can be made from a relatively thin gauge sheet metal and in which folds formed in the sleeve portion at circumferentially spaced points define axially extending ribs or corrugations and also impart a desired elastic characteristic to the sleeve portion by which such sleeve portion can grippingly adapt itself to the threaded member.

Other objects and advantages of this invention will be apparent in the accompanying drawings and in the following detailed description.

In the accompanying sheets of drawings,

Fig. 1 is an end view with portions broken away showing a thread protector of the outside type embodying the present invention and applied to the externally threaded end of a pipe;

Fig. 2 is an elevation showing the same thread protector and pipe end with portions thereof in section, the view being taken substantially as indicated by section line 2—2 of Fig. 1;

Fig. 3 is an end view of the protector showing the same in detached relation and as seen from the open end thereof;

Fig. 4 is a larger scale cross-sectional detail view taken through one of the axial ribs as indicated by section line 4—4 of Fig. 2;

Fig. 5 is a longitudinal section taken through a thread protector of the inside type and showing the same applied to an internally threaded pipe end;

Fig. 6 is a transverse section taken through the inside

protector and the pipe end to which it has been applied, as indicated by section line 6—6 of Fig. 5;

Fig. 7 is an end view of the protector of Fig. 5 showing the same in detached relation and as seen from the inner or small end thereof;

Fig. 8 is a longitudinal section taken through another form of inside thread protector and showing the same applied to an internally threaded pipe end;

Fig. 9 is a detail section on a larger scale taken through the sleeve portion of the protector of Fig. 8, as indicated by section line 9—9 thereof; and

Fig. 10 is an end view showing the thread protector of Fig. 8 in detached relation and as seen from the small or inner end thereof.

In proceeding with the detailed description of this invention, reference will first be made to Figs. 1 and 2 in which the improved thread protector 10 is shown as being of the outside type and is applied to a pipe end 11 so as to extend in telescoping covering relation to the helical thread 12. The protector 10 comprises a substantially cup-shaped metal shell 13 and a non-metallic liner 14 disposed therein so as to lie between the metal shell and the thread 12.

The cup-shaped shell 13 is made from sheet metal by the use of suitable dies and appropriate forming or drawing operations and comprises an axially extending annular sleeve portion 15 and a transverse end wall 16 integrally connected with such sleeve portion. The end wall 16 is here shown as being in the form of an annular flange although it can be an imperforate wall, if desired. The sleeve portion 15 is of a suitable length to extend over all, or a substantial number of, the convolutions of the thread 12 when the protector is applied to the pipe end 11. In the applied position of the protector the transverse end wall 16 cooperates with the annular end face 17 of the pipe.

An important feature of the improved protector 10 is that the metal shell 13 has ribs 18 formed in the sleeve portion 15 and extending axially thereof at a plurality of circumferentially spaced points. In this instance the sleeve portion 15 is shown as having four such axially extending ribs 18 although a smaller or larger number can be provided, if desired. As shown in the drawings, the ribs 18 are hollow and are defined by folds or gathers formed in the sheet metal of the sleeve portion 15. As best seen in Fig. 4, the folded or gathered metal forming each of the ribs 18 comprises a pair of axially extending oppositely disposed reentrant folds 20 and 21 and a second pair of axially extending reentrant folds 22 and 23 which are located outwardly of the first pair of folds and are spaced somewhat wider apart. The rib 18 formed by these pairs of folds is a generally T-shaped rib of which the stem portion of the T extends radially of the protector and is formed by the pair of folds 20 and 21 and the top or transverse portion of the T is formed by the pair of folds 22 and 23 and the web connecting the same.

The non-metallic liner 14 is at times referred to herein as a second sleeve and is provided in the shell 13 to protect the tops of the convolutions of the thread 12 from being dulled by direct contact with the metal sleeve portion 15. This liner can be made of a fibrous sheet material, such as kraft paper, or any other sheet material suitable for this purpose. The liner 14 comprises an axially extending annular sleeve portion 24 lying against the inside of the sleeve portion 15 of the metal shell 13 and a transverse end wall 25 corresponding with the end wall 16 of the metal shell and lying against the inside thereof.

The annular sleeve portion 24 of the liner 14 can be made of the same length as the sleeve portion 15 of the metal shell or preferably, as here shown, can be made somewhat longer than the sleeve portion of the metal shell. In the improved thread protector 10 the sleeve

portion 24 of the liner 14 is of a length to cover all of the convolutions of the thread 12. This is desirable to protect the convolutions from becoming clogged or corroded and can be accomplished at much less expense than would be involved if the sleeve portion of the metal shell 13 were made long enough to extend over all of the thread convolutions.

It is also an important feature of this invention that the sleeve portion 24 of the liner 14 has reentrant folds or gathers therein at circumferentially spaced points and which have an interlocked relation or crimped engagement with the ribs 18 of the metal shell for connecting the liner and shell together. As shown in the drawings, the gathers or folds formed in the sleeve portion 24 of the liner 14 provide the liner with axially extending generally T-shaped ribs 26 similar to the ribs 18 of the metal shell 13 and which are engaged in the latter in the manner of keys. The folds or gathers forming the axially extending ribs 26 of the liner also include a pair of axially extending opposed inner folds 27 and 28 and a second pair of axially extending folds 29 and 30 which are located outwardly of the folds 27 and 28 and are spaced somewhat farther apart.

Another important characteristic of the improved thread protector 10 is that the metal shell 13 is made of a relatively thin gauge sheet metal which is made possible by reason of the fact that the ribs 18 of the metal shell provide the same with a stiffening and reinforcing means. The use of a relatively thin gauge sheet metal in the thread protector 10 is a distinct advantage because it requires a smaller amount of metal and is therefore cheaper than a heavier gauge sheet metal, and also because the thin gauge sheet metal can be worked or formed more readily and with a more satisfactory life for the dies being used. Thus with the present invention, a highly satisfactory thread protector of ¾" size can be made from sheet steel stock of .020" thickness. In thread protectors for use on the larger pipe sizes the saving in metal is especially important as is indicated, by way of example, in the case of a thread protector of 2⅜" size which heretofore has been made of sheet steel of .093" thickness but with the construction of the present invention can be made of sheet steel of .032" thickness. The thin gauge sheet metal also provides the advantage that the sleeve portion 15 of the protector will have some elasticity and flexibility, enabling the same to accommodate itself to the pipe end to which it has been applied and to grippingly press the liner 14 against the tops of the thread convolutions. This flexibility of the sleeve portion 15 is also derived, in part, from the folds or gathers constituting the ribs 18 because these elements permit a limited extent of yield or expansion for the sleeve portion when the latter is applied over the threaded pipe end 11.

In connection with the folds or gathers constituting the ribs 18 of the metal shell 13, it should also be pointed out that the adjacent edges of the opposed folds 20 and 21 of the sleeve portion 15 define a radial slot 31 (see Figs. 1 and 4) therebetween and that the gathered portions of the liner 14 extend outwardly into the ribs 18 through these slots. When the thread protector 10 is applied to the pipe end 11, the above explained flexibility or elasticity provided by the thin gauge sheet metal and by the folds formed in the sleeve portion 15, permits an enlargement or expansion of the sleeve portion by a spreading or widening of the slots 31 to the condition illustrated in Fig. 1, by which the protector can be more readily moved onto the threaded pipe end.

The flexibility of the protector 10 also compensates for manufacturing irregularities or variations in size and thus permits protectors to be used successfully which might otherwise be too small or irregular for a proper fit and would therefore need to be scrapped. When the protector 10 is fully applied to the pipe end 11, the slots 31 are always present and permit the above explained

resilient characteristic of the sleeve portion 15 to continuously press the liner 14 into gripping engagement with the tops of the thread convolutions.

When the pipe lengths having the protectors 10 thereon are delivered to the point of use, the protectors can be readily knocked off or unscrewed from the threaded pipe ends. The work of removing the protectors from the threaded pipe ends is greatly facilitated by the presence of the projecting ribs 18 on the outside of the metal shell 13.

Figs. 5, 6 and 7 show another thread protector 35 embodying the present invention, but which is a thread protector of the inside type and is here shown applied to the internal thread 36 of the pipe end 37. The thread protector 35 comprises a sheet metal shell 38 having integrally connected flange and sleeve portions 39 and 40. The metal shell 38 also includes a transverse end wall 41 at the inner end of the sleeve portion 40 and which end wall can be imperforate, as here shown.

The thread protector 35 also includes a liner or second sleeve 42 of the same character and material as the liner 14 of the above described thread protector 10. The liner or cover 42 comprises an axially extending annular sleeve portion 42*a* disposed around the sleeve portion 40 of the metal shell 38 and a radial flange portion 43 at its outer end and lying against the radial flange 39 of the metal shell. The liner 42 also includes a transverse inner end wall 44 lying against the transverse end wall 41 of the metal shell 38.

The sleeve portion 40 of the metal shell 38 has gathers or folds therein at circumferentially spaced points defining longitudinally extending ribs 45 which are similar to the ribs 18 of the above described thread protector 10 except that the ribs 45 are located on the inside of the metal shell 38. The sleeve portion 42*a* of the liner 42 also has folds or gathers therein at circumferentially spaced points defining axially extending ribs 46 which engage in interlocked relation with the ribs 45. In connection with the folds or gathers constituting the ribs 45, it should be pointed out that these folds include a pair of opposed axially extending folds 47 and 48 whose adjacent edges are spaced apart by an intervening radial slot 49. The folds or gathers of the line 42 which define the ribs 46 extend into the ribs 45 through these radial slots 49, as shown in Fig. 6.

The sheet metal shell 38 of the thread protector 35 is also made of a relatively thin gauge sheet metal and by reason of the use of such thin gauge sheet metal and the provision of the radial slots 49 and the folds or gathers defining the ribs 45, the metal shell will have a desired flexibility and elasticity which will enable it to accommodate itself readily to the internal thread to which it is applied. Thus, when the thread protector 35 is inserted into the internally threaded pipe end 37, this flexibility will permit a contraction of the sleeve portion 40, if necessary, and the tendency of this sleeve portion to expand as the result of such contraction will cause the sleeve portion 42*a* of the liner to be firmly pressed against the tops of the convolutions of the thread 36.

Figs. 8, 9 and 10 show another form of thread protector 51 which is similar to the thread protectors 10 and 35 above described, but in which the folds or gathers of the sheet metal shell 52 and the non-metallic or fibrous liner 53 are provided in large number and are disposed in a closely spaced recurring relation. The construction here shown is especially suitable for thread protectors to be used in or on the threaded ends of pipes of a relatively large diameter. With the construction here shown a large size thread protector can be made from thin gauge sheet metal at a considerable saving in the cost of the metal stock and such thread protector will still be adequately strong to protect the threads against blows and shocks. Moreover, the folds or gathers formed in the sheet metal shell 52 and the liner 53 provide an interlock there-

between which is substantially continuous around the full circumference of the protector and will result in the liner being permanently connected with the metal shell.

As shown in Fig. 9, the folds or gathers formed in the metal shell **52** form axially extending ribs **54** on the inside thereof and the folds or gathers formed in the liner **53** form axially extending ribs **55** thereon which engage in the ribs **54** of the sheet metal shell. The wall portions forming the sheet metal rib **54** include a pair of opposed folds **56** and **57** having an intervening radial slot **58** therebetween and the folds or gathers defining the ribs **55** of the liner include portions extending through the slot **58** into the rib **54**.

The thread protector **51** is provided at the outer end thereof with an annular radial flange **59** which engages the annular end face **60** of the pipe end **61**. As shown in the drawings, the ribs **54** and **55** of the sheet metal shell **52** and the non-metallic liner **53** extend in continuous relation along the sleeve portion of the protector and are carried radially outwardly into the annular flange **59**. This results in the liner being securely connected to the sheet metal shell around the full peripheral edge of the flange **59**, as well as around the full circumference of the sleeve portion of the protector.

All of the thread protectors herein disclosed have been illustrated and described as comprising a sheet metal shell and a second sleeve of a non-metallic or fibrous sheet material and, although the use of the non-metallic sleeve member is highly desirable in these devices, it should be understood, however, that the non-metallic sleeve member can be omitted, if desired, and the protectors can still be successfully used for the purpose intended. It will also be understood that the non-metallic sleeve, when used, can be located either on the inside or the outside of the metal shell and that the non-metallic sleeve can be conveniently termed a liner, as referred to herein.

From the accompanying drawings and the foregoing description it will now be understood that this invention provides an improved construction for thread protectors by which devices of this kind can be economically produced and will possess the important advantages already explained herein.

Although the improved thread protector construction provided by this invention has been illustrated and described herein to a somewhat detailed extent it should be understood that the invention is not to be regarded as being limited correspondingly in scope but includes all changes and modifications coming within the terms of the claims hereof.

Having thus described my invention, I claim:

1. A thread protector comprising, a substantially cup-shaped hollow body of relatively light gauge sheet metal and having an axially extending annular sleeve portion adapted to be inserted into an internal thread to be protected, the sheet metal of said sleeve portion having groups of reentrant folds formed therein at circumferentially spaced points and each such group of folds including a pair of opposed folds having their adjacent edges spaced apart, said folds being disposed so that each group of folds defines an axially extending generally T-shaped rib lying on the inside of said sleeve portion and forming an axial stiffening means thereon, said folds and the spaces between said adjacent edges imparting to said sleeve portion an elastic characteristic circumferentially thereof which permits contraction of said sleeve portion when being inserted into said internal thread.

2. A thread protector comprising, a sheet metal shell having an annular sleeve adapted to be moved into covering relation to a thread to be protected, the sheet metal of said sleeve having reentrant gathers therein at circumferentially spaced points defining axially extending generally T-shaped ribs on said sleeve, and a substantially annularly continuous second sleeve of non-metallic

sheet material disposed so as to lie between the first mentioned sleeve and said thread and having reentrant gathers therein forming generally T-shaped keys which engage in and are interlocked with the ribs of said first mentioned sleeve.

3. A thread protector comprising, a substantially cup-shaped sheet metal body having an annular sleeve portion adapted to be moved into covering relation to a thread to be protected, and a second sleeve of fibrous sheet material substantially coextensive with said sleeve portion both axially and circumferentially so as to lie between the latter and said thread, said sleeve portion of the metal body having reentrant folds therein at circumferentially spaced points and extending axially along said sleeve portion, said sleeve portion also having substantially radially offset portions forming connecting portions extending circumferentially between and connecting pairs of said folds such that said connecting portions and the pairs of folds connected thereby define substantially flat-topped axially extending reinforcing ribs of a substantial width circumferentially of said sleeve portion, said second sleeve also having reentrant axially extending folds therein at circumferentially spaced points and substantially radially offset connecting portions connecting pairs of the last mentioned folds, the connecting portions of said second sleeve and the pairs of reentrant folds connected thereby defining substantially flat-topped axially extending key elements of a substantial width circumferentially of said second sleeve and located on the latter such that said key elements engage in said ribs for connecting said second sleeve with said metal body.

4. A thread protector comprising, a substantially cup-shaped hollow sheet metal body having an axially extending annular sleeve portion adapted to be telescopingly applied in covering relation to a thread to be protected, the sheet metal of said sleeve portion having groups of folds formed therein at circumferentially spaced points and each such group of folds including a pair of opposed fold edges and a substantially radial slot between said opposed fold edges, said folds being disposed so that each group of folds defines an axially extending generally T-shaped rib lying on the side of said sleeve portion remote from said thread, and a substantially annularly continuous second sleeve of fibrous sheet material forming a liner extending coaxially with said sleeve portion so as to lie between the latter and said thread, said second sleeve also having folds therein defining generally T-shaped axial keys which extend into said ribs through said slots and are interlocked in said ribs for retaining the liner in connected relation with said cup-shaped body, the folds and slots of said sleeve portion imparting thereto an elastic characteristic circumferentially thereof which permits flexing of said sleeve portion while being telescopingly applied to said thread.

5. A thread protector as defined in claim 2 in which the sleeve portion of said metal shell and said second sleeve have annularly coextensive substantially radial flanges on one end thereof and in which the interlocked ribs and keys defined by the reentrant gathers of said sleeve portion and said second sleeve extend into said radial flanges.

6. A thread protector for application to an externally threaded member and consisting of a one-piece substantially cup-shaped hollow body of relatively light gauge sheet metal and having an axially extending annular sleeve portion adapted to be applied over the external thread of said member, the sheet metal of said sleeve portion having groups of reentrant folds formed therein at circumferentially spaced points and each such group of folds including a pair of opposed folds having their adjacent edges spaced apart, said folds being disposed so that each group of folds defines an axially extending generally T-shaped rib lying on the outside of said sleeve portion and forming an axial stiffening means thereon, said folds and the space between said adjacent edges

imparting to said sleeve portion an elastic characteristic circumferentially thereof which permits expansion of said sleeve portion when applied over said external thread, said sleeve portion having at one end thereof an inwardly extending integral portion defining a substantially radial annular flange adapted for abutting engagement with the end of said threaded member.

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