

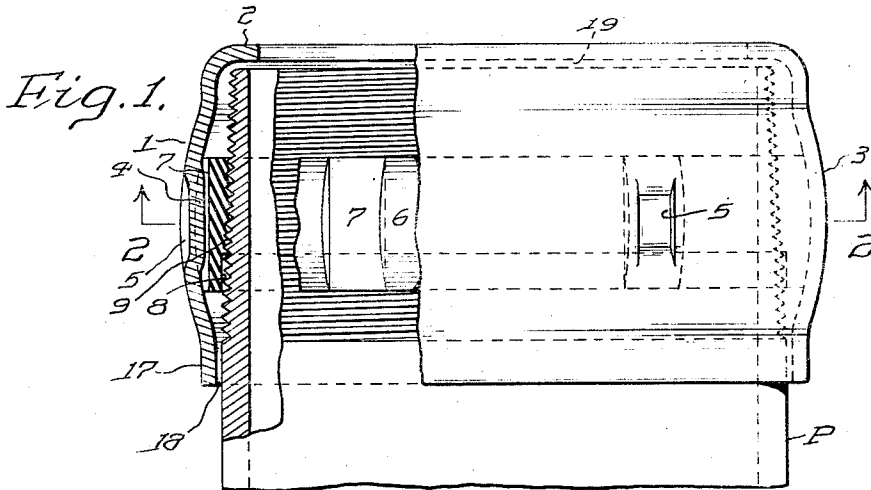
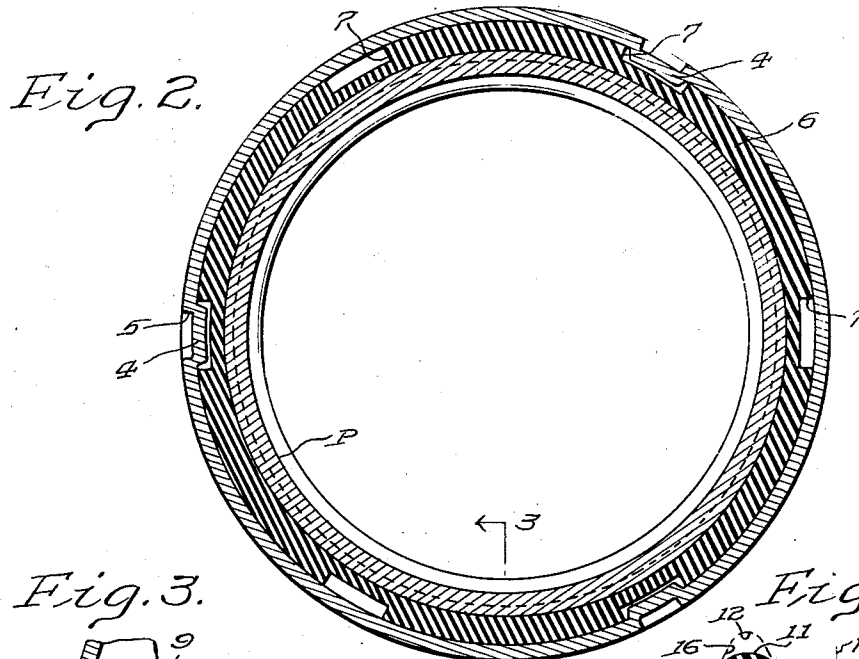
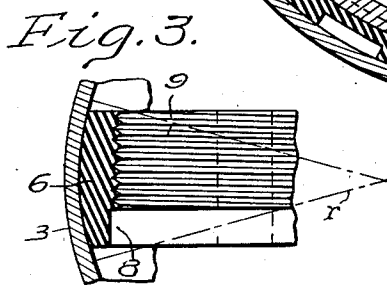
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THREAD PROTECTOR

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THREAD PROTECTOR

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3 Claims. (Cl. 138—96)

This invention relates to means for protecting, during shipment or the like, screw threads at the ends of pipes, tubes, tool joints or other externally threaded articles intended for cooperative assembly with an internally threaded element after removal of the thread protector; in the case of threaded hollow articles my thread protector in addition to affording protection to the thread and to the end of the article itself tends to prevent injury to the latter by reinforcing its wall and thereby strengthening its resistance to impact.

Thread protectors heretofore employed for similar purposes have generally been made entirely of steel, and the expense of forming the female threads therein has contributed materially to their excessive cost, while due to their non-yielding character, they have not afforded efficient protection to the threads. There have also been suggested thread protectors comprising metal shells with non-metallic inserts adapted for engagement with the threads but so far as I am aware these have not been found satisfactory enough to warrant their wide adoption in industry.

It is therefore a principal object of my invention to provide an improved thread protector of the last mentioned general class which is relatively inexpensive to produce and in which the non-metallic insert is so formed that the operation of engaging its threads with those of the threaded article is rendered very easy and risk of injury to the latter reduced, while the labor involved in applying the protector to the article is minimized.

A further object is to provide in a thread protector of this type a non-metallic insert threaded in such way as to cooperate in a novel manner with the threaded article to retain the protector in position thereon whereby the likelihood of its becoming accidentally loosened or detached from vibration or other causes during shipment over long distances is materially lessened.

Another object is to provide a thread protector in which a metal shell of novel form is combined with a non-metallic insert and these parts so constructed that their assembly in the manufacture of the completed protectors is facilitated without impairment of the effectiveness of the finished protector in the performance of its intended function.

A still further object is the provision of a thread protector of the character aforesaid in which the shell and insert are adapted for relative universal or ball-and-socket movement in

any plane of their common axis but are restrained against relative rotative and/or longitudinal movement whereby the degree of protection afforded to the threaded pipe or tube end is materially enhanced and the risk of injury thereto resulting from impact, especially "off-center" impact, upon the thread protector shell is minimized.

Other objects, purposes and advantages of the invention will hereinafter more fully appear or will be understood from the following description of the preferred embodiment thereof illustrated in the accompanying drawing in which

Fig. 1 is a side elevation partly in section of the thread protector applied to the threaded end of a pipe;

Fig. 2 is a section on the line 2—2 in Fig. 1;

Fig. 3 is a fragmentary detail in vertical section on the line 3—3 in Fig. 2 and

Fig. 4 is a greatly enlarged diagrammatic detail of the thread preferably employed in the insert.

In the several figures like characters are used to designate the same parts.

More particularly the thread protector comprises a generally annular metal shell 1 having at one end an intumed flange or lip 2 normal to its axis and intermediate its ends a symmetrical outwardly bulging zone 3 the inner surface of which conforms substantially to the surface of a sphere of radius r (Fig. 3) whose center lies on the axis of the shell. A plurality of lugs 4 are formed in this zone, preferably by indenting the metal of the shell from the outside, which operation thus produces corresponding depressions or recesses 5 in the external surface of the shell whereby with the aid of a suitably formed wrench the protector may be applied to or removed from a threaded pipe P or any similarly threaded article. The shell may be formed in any convenient way, the operations incident thereto being no part of the invention. The inwardly projecting lugs 4, preferably three in number, and the adjacent curved zone 3 are engaged by the non-metallic insert 6 which may desirably be molded from a yieldable plastic material such as hard rubber or a suitable synthetic plastic. This insert is generally annular in form and its outer peripheral surface is of substantially the same parti-spherical contour as the interior of the zone 3 in the shell, but with preferably six equidistantly spaced peripheral grooves 7 extending parallel to its axis and each subtending approximately the same circumferential distance as the lugs 4 so that the latter can be fitted snugly therein. Only alternate grooves 7 receive lugs

4 when the protector is assembled, for the six adjacent grooves are spaced approximately 60° apart circumferentially of the insert and the three lugs 4 in the shell are spaced 120° apart, this arrangement allowing the insert to be assembled in the shell with but a minimum of relative rotation to align one set of three grooves 7 with lugs 4, it being immaterial which set of grooves is employed for this purpose; after assembly those disposed between the lug-receiving grooves are of little importance.

In that end of the inner surface of the insert which is adjacent the open, i. e., non-flanged, end of the shell, a chamfer 8 is preferably formed, the inner diameter of which slightly exceeds the maximum diameter of the pipe thread, and an internal thread 9, desirably of the special form hereafter more fully described, extends from the inner end of chamfer 8 to the opposite end of the insert. This thread 9, shown in detail in Fig. 4, is adapted for cooperation with a standard tapered V-thread on the pipe P or other article to which the protector is to be applied and its side faces or flanks 10 are thus disposed at an angle of 30° to a plane *p* normal to its axis; its crest 11 is rounded off appreciably within the limits of groove 12 formed by the root of the standard thread, and at the root of the insert thread the thread groove 14 extends farther from its axis than the crest 15 of a standard thread and thus remains out of engagement with the latter when the threads are in cooperative relation. Consequently the flanks 10 of the insert thread engage the side faces or flanks 16 of the pipe thread, and the threads do not engage each other at all at either crest or root. The chance of damage to the crest of the pipe thread is therefore avoided while threading the insert onto the end of the article to be protected and its removal therefrom are facilitated by these clearances and the absence of binding engagement of the crest and root of the insert thread at the root and crest respectively of the pipe thread.

This special thread form on the insert furthermore simplifies the problem of manufacturing the inserts inasmuch as it eliminates the necessity for an excessively high degree of intricate precision machining in the formation of the molds in which the inserts are made and facilitates removal of the latter from the molds after having been formed therein.

In the manufacture of my thread protector I preferably initially form the skirt 17 of the outer shell 1 on substantially the same diameter as the greatest diameter of the curved zone 3 and then, after the insert has been fitted into this zone, constrict the skirt 17 of the shell so as to cause the zone 3 to substantially conform to and rather loosely grip the insert; beyond the latter the skirt is then further constricted to an inner diameter a little greater than the outer diameter of the pipe P which the protector is designed to receive so as to leave only a small clearance 18 between the inner surface of the skirt and the outer surface of the pipe after the protector is in position thereon.

When the protector is applied to a pipe P or the like as in Fig. 1, it is first slipped over the pipe end until the latter enters the chamfer 8 which properly centers it with relation to the thread in the insert so that protector can be then screwed onto the pipe without danger of cross-threading until preferably but a short space 19 is left between its end and the inner face of the flange 2. The operation of applying the pro-

jector to the pipe end is therefore an extremely simple one, and the recesses 5 in the outer surface of the shell enable a power wrench or other suitable tool to readily grip the protector to turn it without defacing its surface, deforming it or damaging the pipe, the engagement of lugs 4 on the shell in grooves 7 of the insert insuring unitary rotation of the insert and shell.

The yielding character of the insert and frictional engagement of its thread with the pipe thread insure the firm retention of the protector on the pipe even when the latter is shipped for long distances during which it may be subjected to more or less constant vibration of a character to cause loosening of thread protectors having metal-to-metal engagement with the pipe.

Moreover, due to the spacing of the flange 2 from the extremity of the pipe the latter is protected from injury even under relatively severe endwise blows, the force of such blows being received by the outer shell and transmitted to the pipe partly through the yielding insert which, since its thread is not in contact with the crest of the pipe thread, prevents transfer of any material portion of the force of the blow to the said crest but transmits it instead through the thicker, and therefore stronger, part of the pipe thread without damage to the latter; the rest of the force of an endwise blow or impact, when "off-center," that is, when not uniformly distributed circumferentially of the protector, is either dissipated in causing the shell to pivot relatively to the insert about the center of the spherical zone 3 with a substantially ball-and-socket movement, or else reacts against the pipe body after the limit of such movement has been reached and the flange 2 and skirt 17 have therefore been brought into engagement respectively with the end of the pipe and with its outside wall back of its threaded area. Thus none of the force of the blow can react through metal-to-metal contact with any part of the thread and the possibility of injury to the latter from such a blow is substantially negated.

Should the thread of the insert, due to inaccuracies in manufacture or other reasons, be loose enough on the pipe thread to allow the protector to be screwed onto the pipe until the flange 2 engages the pipe end, it is desirable that it be set up tightly enough to wedge the insert between the shell and the pipe toward the skirt 17, whereby subsequent accidental loosening of the protector from the pipe is prevented.

It will of course be apparent the insert is preferably made of yielding material of such character that if the protector should for any reason come loose so as to enable its threads to jar against the pipe thread or even cross the latter, no damage or deformation of the pipe thread will ensue.

The rigid construction of the outer shell of the protector, reenforced as it is by the bulging spherical zone 3 and by the flange 2, is such that it affords materially greater resistance to radial compression or deformation than the generally substantially cylindrical thread protectors heretofore utilized, giving, in addition to the protection heretofore explained, maximum protection against deformation of the pipe itself by radial crushing forces or the like.

While I have herein described one embodiment of the invention with considerable particularity it will be understood I do not desire or intend to limit or confine myself specifically thereto as changes and modifications therein will occur to

those skilled in the art and may be made without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim
5 and desire to protect by Letters Patent of the United States:

1. A thread protector comprising an annular metal shell having between its ends a circumferential outwardly bulged spherical zone with its
10 center lying on the axis of the shell, a ring-like relatively yieldable internally pre-threaded element seated in said zone, said shell being relatively movable with respect to the element about
15 said center, and means for restraining the element and shell from relative rotation about said axis.

2. A thread protector comprising an annular metal shell having an inturned flange at one of its ends and outwardly bulged intermediate
20 said end and its opposite end to form a parti-spherical surface on its interior, an annular in-

ternally threaded insert of molded yieldable material seated in the shell proximate and substantially conforming to said surface and universally movable with respect thereto, and mutually co-
operative means on the insert and the shell for
5 holding these parts in non-rotatable relation.

3. A thread protector comprising an annular metal shell having an inturned flange at one of its ends and an outwardly bulged zone intermediate said end and its opposite end having
10 an inner parti-spherical surface, an annular internally threaded insert of molded yieldable material seated in the shell in said bulged zone, said shell embodying circumferentially spaced
15 inwardly directed lugs in said bulged zone and said insert slots receiving these lugs to retain the shell and insert in non-rotatable relation, the non-flanged end of the shell being of at least as great internal diameter as the root of the insert thread.
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