

March 24, 1953

H. J. PFEIL ET AL
THREAD PROTECTOR

2,632,479

Filed March 8, 1949

2 SHEETS—SHEET 1

Fig. 1.

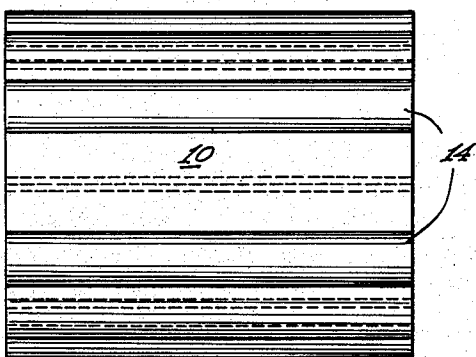


Fig. 2.

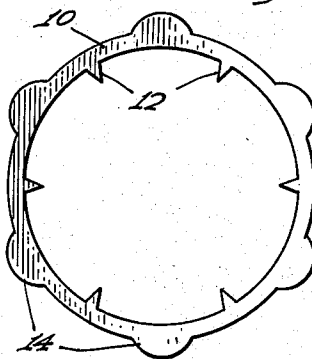


Fig. 3.

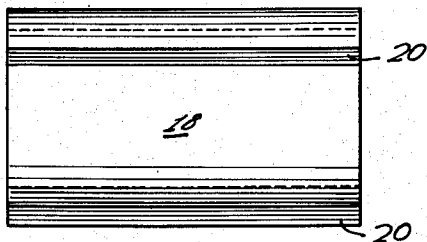


Fig. 4.

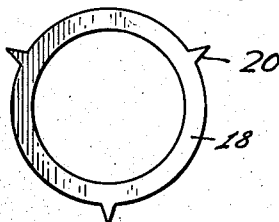


Fig. 5.

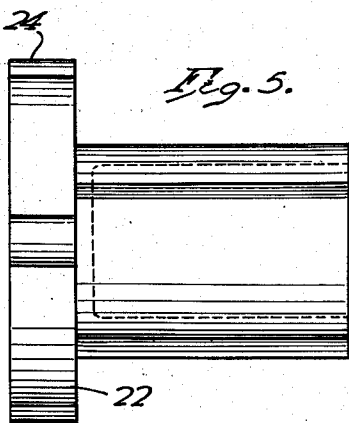
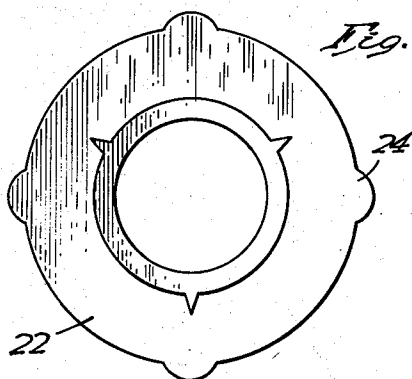


Fig. 6.



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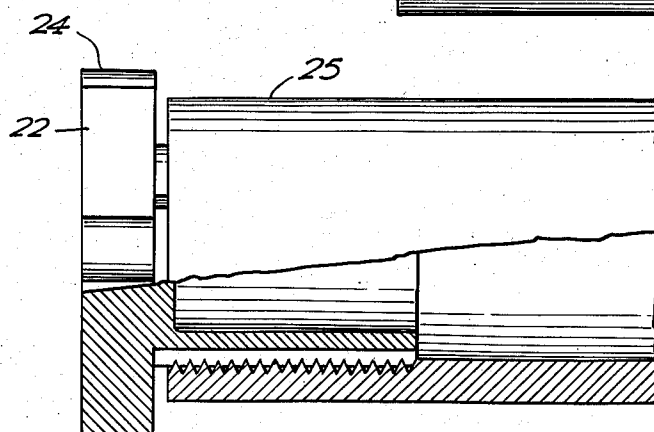
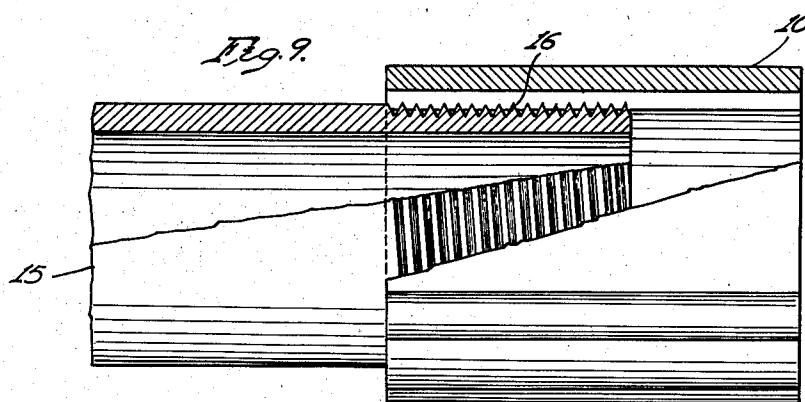
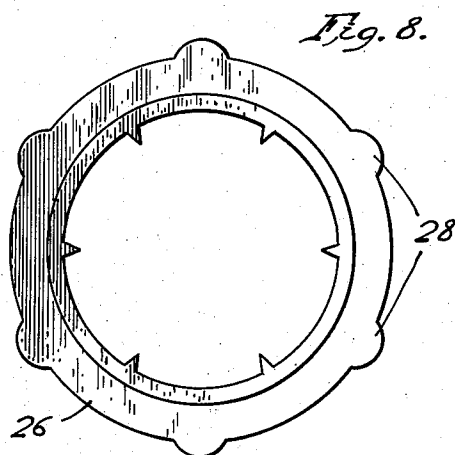
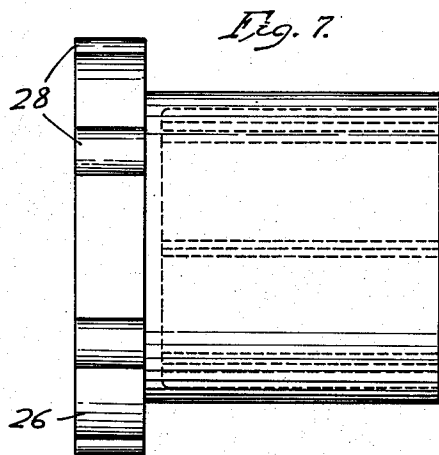
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THREAD PROTECTOR

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2 SHEETS—SHEET 2



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THREAD PROTECTOR

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7 Claims. (Cl. 138—96)

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This invention relates to devices for protecting the threads on pipes, rods, tubes, and other articles of manufacture which incorporate exposed threads that are subject to damage and mutilation in their normal manufacture, handling, storage, and shipment. The construction and manner of applying the devices, contemplated within the scope of this invention, are such that they may also serve to exclude moisture, dirt and foreign matter from entering the interior of a threaded member or members to which the devices have been applied.

Many articles of commerce, including tubing, pipe, rod, castings, and machine-produced elements are provided with threads for subsequent connection or attachment in their ultimate assembly and use. Storing, handling, and shipping of such fabricated members present the important and significant problem of providing an economical and simple means for protecting exposed threads until such time as the threaded elements are actually placed in final use.

It is, therefore, a primary object of the invention to provide a thread protecting device which is simple in form and economical in material and production costs.

It is a further object of the invention to provide a thread protector of the end protector type that is readily applied to the threads to be protected by a simple screwing or threading operation.

Another object is to provide a unitary thread protector that may be manually applied through an axial twisting operation, and which is securely held in place against being dislodged or jarred loose following its application on a threaded member.

A further object is to provide a thread protector capable of mass production by a direct or impact extrusion process, casting, or other machine tool manufacturing process, or combinations thereof.

Other objects and advantages of the invention will present themselves on consideration of the following specification when read in conjunction with the accompanying drawings, in which;

Fig. 1 represents the simplest form of thread protector of the invention, in side elevation, suitable for protecting externally threaded members;

Fig. 2 represents the protector of Fig. 1 in end elevation;

Fig. 3 represents the simplest form of thread protector of the invention, in side elevation, suitable for protecting internally threaded members;

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Fig. 4 represents the protector of Fig. 3 in end elevation;

Fig. 5 represents a modification of the internal thread protector of Figs. 3 and 4 in side elevation;

Fig. 6 represents the protector of Fig. 5 in end elevation;

Fig. 7 represents a modification of the external thread protector of Figs. 1 and 2 in side elevation;

Fig. 8 represents the protector of Fig. 7 in end elevation;

Fig. 9 represents a partial sectional view of an externally threaded member equipped with one form of thread protector of the invention; and

Fig. 10 represents a partial sectional view of an internally threaded member equipped with another form of thread protector of the invention.

A general and basic feature of all forms of the thread protector of the invention is the provision of a body member provided with unitary or integral, circumferentially spaced, projecting or outstanding, initially unthreaded ribs, which project in a direction towards the threads to be protected. A further basic feature is the provision of integral ribs, which project outwardly from a surface of the body member a distance which is defined by a circle that falls within the root and crest diameters of the threads to be protected. Combined with the aforesaid features, the thread protectors of the invention incorporate a surface formation that serves as means for positively grasping and rotating the same into thread-cutting engagement between the projecting ribs and the threads to be protected, it being an essential characteristic that the material of the ribs is softer than that of the threads to be protected.

Referring now to the drawings for specific forms of thread protectors falling within the concept of the invention, Figs. 1 and 2 illustrate a simple form of protector which lends itself to production by extrusion in indeterminate lengths. The extruded lengths may thereafter be cut into short lengths in accordance with the various lengths of threads to be protected. In this particular form, the device is adapted to protect externally threaded members, and it comprises a tubular sleeve member 10 provided with interior ribs 12 and exterior ribs or protuberances 14. The interior and exterior ribs are preferably integrally formed on the sleeve 10 and the material of the unitary structure is such that the internal

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ribs 12 are characterized by being softer than the threads to be protected.

Fig. 9 illustrates the protector of Figs. 1 and 2 applied to a tubular body or pipe 15 having external threads 16 at an end thereof. It is to be observed and understood that the ribs 14 serve as a surface formation for positively grasping and axially rotating the protector 10 onto the threads 16. The internal ribs 12, on the other hand, engage the threads 16 and have a complementary thread cut into the same.

The cross sectional shape of the ribs or protuberances 12 is preferably triangular, which acts to reduce the frictional resistance to the thread-cutting operation. Also, in the external thread protector, the apices of the ribs 12 preferably contact a circle whose diameter is greater than the root diameter of the threads 16, but less than the crest diameter of these threads, and the depth or projecting height of the ribs 12 is such that a clearance is provided between the internal diameter of the sleeve 10 and the outside diameter of the externally threaded member 15. This selection of the triangular shape and dimensional characteristics of the ribs 12, coupled with the circumferential spacing of these internal ribs, avoids any unnecessary binding of the protector during its application to a threaded member (Fig. 9), the ribs 12 insuring a bottom clearance on the threads 16 and the circumferential spacing providing thread-cutting chip clearance and metal displacement clearance between adjacent ribs 12.

In the normal use of the thread protector of Figs. 1 and 2, it is selected in sufficient length to slightly overhang the end of threaded member 15, which surplus length protects the end of the threaded member against abrasion or impact that might otherwise damage or mutilate the threads. The extending end portion of the protector 10 may also be of such length that it can be spun or hammered closed, if desired, to further protect against entry of foreign material into the interior of member 15. Manual application of the thread protector is readily accomplished by grasping the external ribs 14 and threading the device onto the member to be protected, and if necessary by employing a suitable grasping tool or wrench in cooperation with the external ribs 14.

Figs. 3 and 4 illustrate the thread protector of the invention in a form suitable for application in protecting interiorly threaded members. In this form of the invention a tubular sleeve 18 is provided on its external cylindrical surface with integral or unitary ribs 20 of the same general form as the previously described ribs 12. As in case of the external thread protector, the apices of the ribs 20 of the internal thread protector preferably contact a circle whose diameter is less than the root diameter of the threads it is designed to protect, and the depth or height of the ribs is such that a definite clearance is provided between the inside diameter of the internally threaded member and the outside diameter of the cylindrical surface of the sleeve 18. The ribs 20 are also preferably triangular in cross section and this, in combination with the dimensional clearance characteristics and circumferential spacing of the ribs, insures thread-cutting chip clearance, material displacement between adjacent ribs, and facile manual introduction and thread-cutting engagement of the protector within an internally threaded member, as illustrated in Fig. 10. It will be observed that the ribs 20 serve the added function of providing a surface formation for grasping

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and axially rotating the protector into thread-cutting engagement with the internal threads to be protected. The thread protector of Figs. 3 and 4 may, if desired, be a solid bar or plug provided with integral ribs on its exposed cylindrical surface instead of the illustrated tubular sleeve.

The protector illustrated in Figs. 5 and 6 differs from that shown in Figs. 3 and 4 only in that it is provided with a cap or end closure member 22 having integral external ribs 24. The device of this embodiment of the invention is illustrated in its application to an internally threaded pipe or member 25 in Fig. 10, in which case the closed end 22, which is preferably formed integrally with the protector, as by impact extrusion, casting or forging, prevents entry of foreign material into the threaded member 25.

An external thread protector is illustrated in Figs. 7 and 8 which incorporates a closed end or cap 26 provided with external surface formations or ribs 28 for axially rotating the protector onto threads to be protected. The device is otherwise similar to the protector illustrated in Figs. 1 and 2, and lends itself to economical construction and production by impact extrusion, casting or forging processes.

The initially unthreaded, thread-engaging ribs in the various illustrations of the invention have been disclosed as being parallel to the axis of the tubular body portion of the thread protectors. These ribs may, if desired, be spirally disposed or inclined to the axis of the protector. Axially parallel thread-engaging ribs, however, do permit ease and economy in manufacturing the devices since direct or impact extrusion may be employed to better advantage. The same remarks hold true for the tool-engaging ribs. Casting and forging practices may also be employed in the production of the thread protectors of the invention in which cases more latitude may be taken in the disposition and direction of the thread-engaging and tool-engaging ribs. For example, the ribs may, if desired, be interrupted in their length to provide localized rib projections instead of continuous length ribs.

The thread protectors of the invention may also be fabricated from sheet or plate stock that is provided with suitable ribs or protuberances in its course of manufacture. Sheet stock having the proper rib projections may be formed into cylindrical tubes to serve as thread protectors, and the otherwise open ends of the same may be capped, as by welding a sheet of material on at least one end thereof, to prevent entry of foreign material or dirt into the interior of a thread protected aperture.

The exact number of thread-engaging and tool-engaging ribs or protuberances is immaterial. However, in the case of the thread-engaging ribs, it is preferred to provide at least three ribs as an aid to centralizing and axially advancing the protector into engagement with the threads.

Various materials may be employed in the fabrication of the thread protectors of the invention. In the case of relatively hard threads, such as represented by the ferrous metals and their alloys, thread protectors selected from the relatively softer non-ferrous metals, such as copper, magnesium, aluminum, and their alloys have performed satisfactorily, since these softer metals and their alloys react favorably to a thread-cutting operation in contact with the harder ferrous threads. The thread protectors may also be fabricated from plastic materials, such as the phen-

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olic resins, urea derivatives, and the like, with equally good results on both ferrous and non-ferrous threads. The essential characteristic lies in the selection of a material for the thread protector that provides a relatively softer thread-engaging rib or protuberance than the hardness exhibited by the threads to be protected, which insures a positive thread-cutting operation between the threads and the protector, as distinguished from mere elastic conforming with, or resilient displacement of, the material of the protector by the threads to be protected. Relative hardness is the significant factor in selecting the proper thread protector for a given thread, and a commercial application of the invention has been employed wherein thread protectors extruded from an aluminum alloy having the nominal composition by weight, 1.2 per cent magnesium and the balance commercially pure aluminum have been employed to protect heat treated and threaded aluminum alloy tubing having the nominal composition by weight, 0.25 per cent copper, 0.6 per cent silicon, 1.0 per cent magnesium, 0.25 per cent chromium, balance commercially pure aluminum.

Thread protectors fabricated in accordance with the above instructions and description have met with commercial success and acceptance, and serve equally well with straight and tapered threads.

What is claimed is:

1. A one-piece thread protector comprising a cylindrical member provided with unitary circumferentially spaced unthreaded rib formations outstanding from a surface thereof towards threads to be protected, said rib formations being relatively small in cross section in respect to their circumferential spacing and outstanding therefrom a distance greater than a circle formed by joining the crest diameters and less than a circle formed by joining the root diameters of the threads to be protected, a surface formation incorporated in said cylindrical member providing means for positively grasping and rotating the same, and said cylindrical member being selected from a material of less hardness than the threads to be protected into which rib formations a thread is cut when the thread protector is axially aligned and rotated to advance the same along the threads to be protected.

2. A one-piece thread protector comprising a body member provided with at least three unitary circumferentially spaced unthreaded rib formations outstanding from a surface thereof towards threads to be protected, said rib formations being of triangular cross section, relatively small in cross section in respect to their circumferential spacing and outstanding therefrom a distance greater than a circle formed by joining the crest diameters and less than a circle formed by joining the root diameters of the threads to be protected, the base of each triangular rib formation making contact with a circle providing clearance between the body member and thread to be protected, a surface formation incorporated in said body member providing means for positively grasping and rotating the thread protector, and said thread protector being selected from a material of less hardness than the threads to be protected into which rib formations a thread is cut when the thread protector is axially aligned and rotated to advance the same along the threads to be protected.

3. A one-piece thread protector comprising a sleeve member provided with unitary circumfer-

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entially spaced unthreaded ribs outstanding from a surface of the sleeve member towards threads to be protected, said ribs being triangular in cross section, relatively small in cross section in respect to their circumferential spacing and outstanding therefrom a distance greater than a circle formed by joining the crest diameters and less than a circle formed by joining the root diameters of the threads to be protected, a surface formation on said sleeve providing means for positively grasping and rotating the same, and said unitary sleeve and ribs being selected from a material of less hardness than the threads to be protected into which ribs a thread is cut when the thread protector is axially aligned and rotated to advance the same along the threads to be protected.

4. A one-piece thread protector comprising a sleeve member provided with at least three unitary circumferentially spaced unthreaded rib formations outstanding from a surface of the sleeve member towards threads to be protected, said rib formations being triangular in cross section, relatively small in cross section in respect to their circumferential spacing and outstanding therefrom a distance greater than a circle formed by joining the crest diameters and less than a circle formed by joining the root diameters of the threads to be protected, a surface formation on said sleeve providing means for positively grasping and rotating the same, and said unitary sleeve and rib formations being selected from a material of less hardness than the threads to be protected into which rib formations a thread is cut when the thread protector is axially aligned and rotated to advance the same along the threads to be protected.

5. A one-piece extruded thread protector comprising a body member of generally cylindrical form provided with at least three unitary circumferentially spaced unthreaded rib formations of relatively small cross section in respect to their circumferential spacing, said rib formations outstanding from a cylindrical surface thereof in a direction in axial alignment with threads to be protected, said rib formations being of generally triangular cross section with their apices furthest removed from the cylindrical surface of the body member and outstanding therefrom a distance greater than a circle formed by joining the crest diameters and less than a circle formed by joining the root diameters of the threads to be protected, the base of each triangular rib formation making contact with a circle providing clearance relationship between the cylindrical surface of the body member and thread to be protected, and said thread protector being selected from a material of less hardness than the threads to be protected into which rib formations a thread is cut when the thread protector is axially aligned and rotated to advance the same along the threads to be protected.

6. A one-piece sheet metal thread protector comprising a generally cylindrical body member provided with at least three unitary circumferentially spaced unthreaded rib formations of relatively small cross section in respect to their circumferential spacing, said rib formations outstanding from a cylindrical surface of the protector in a direction in axial alignment with threads to be protected, said rib formations having a cross sectional width substantially less than their circumferential spacing and outstanding from cylindrical supporting surface a distance greater than a circle formed by joining the crest diameters and less than a circle formed by join-

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ing the root diameters of the threads to be protected, the cylindrical supporting surface of the rib formations making contact with a circle providing clearance relationship between said cylindrical supporting surface and the thread to be protected, and said sheet metal of the thread protector being selected in hardness less than that of the threads to be protected into the rib formations of which a thread is cut when the thread protector is axially aligned and rotated to advance the same along the threads to be protected.

7. A one-piece thread protector comprising an impact extruded cylindrical body member having a closed end integrally formed thereon and extending outwardly beyond the exterior cylindrical surface of the body member, at least three integral, circumferentially spaced, unthreaded rib formations of relatively small cross section in respect to their circumferential spacing outstanding from a cylindrical surface of the body member a distance greater than a circle formed by joining the crest diameters and less than a circle formed by joining the root diameters of the threads to be protected, the cylindrical surface of the body member supporting the integral rib formations making contact with a circle providing clearance relationship between said cylindrical

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supporting surface and the thread to be protected, said rib formations having a cross sectional width substantially less than the circumferential spacing between said rib formations, integral protuberances on the outwardly extending closed end of the thread protector for positively grasping and rotating the same, and said thread protector being selected from a material of less hardness than the threads to be protected into which rib formations a thread is cut when the thread protector is axially aligned and rotated to advance the same along the threads to be protected.

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