

Feb. 16, 1960

J. E. LEWIS

2,924,876

THREAD LUBRICANT PACKAGE AND METHOD

Filed Dec. 3, 1956

4 Sheets-Sheet 1

Fig. 1

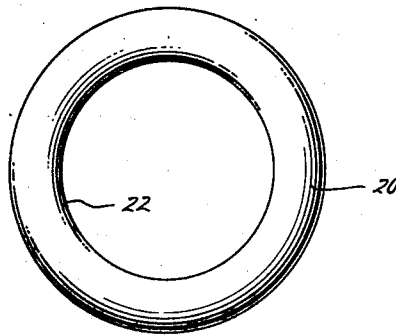


Fig. 2

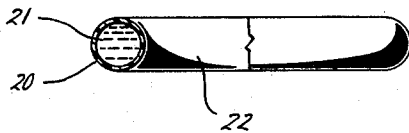


Fig. 3

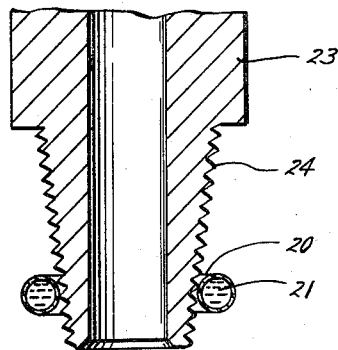
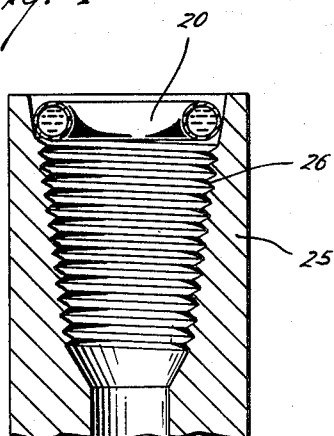


Fig. 4



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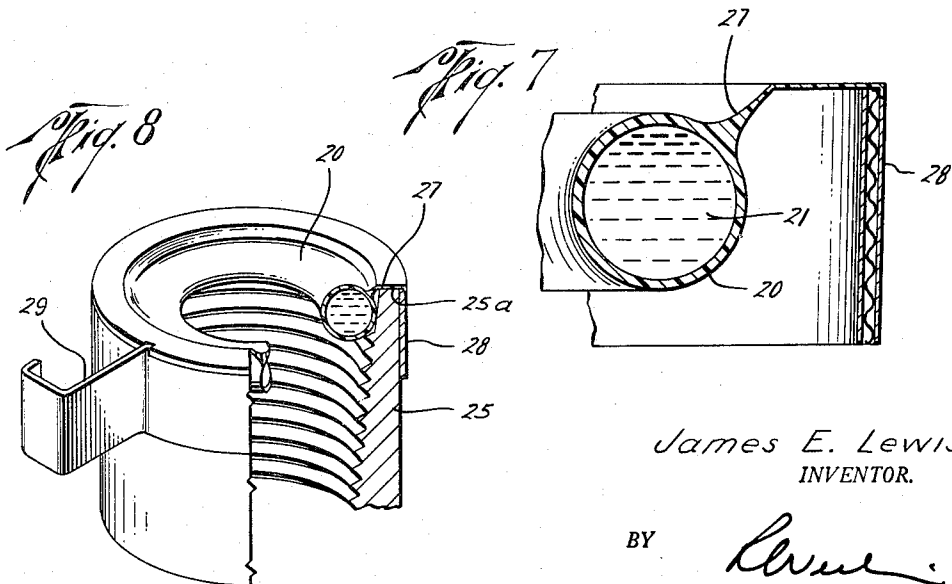
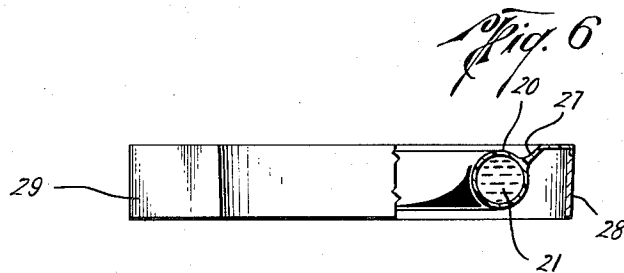
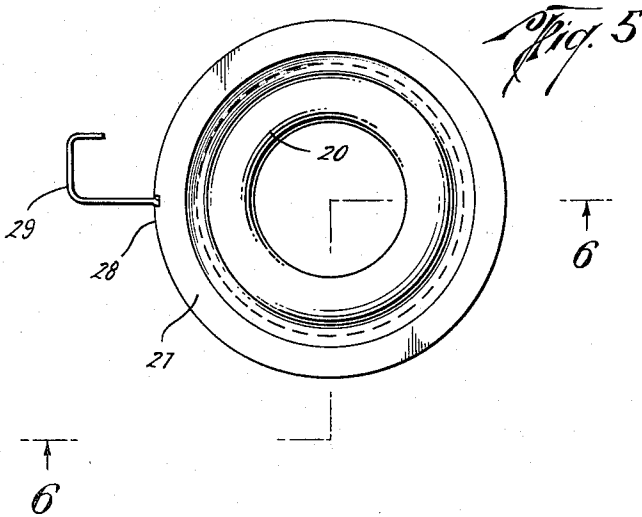
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4 Sheets-Sheet 2



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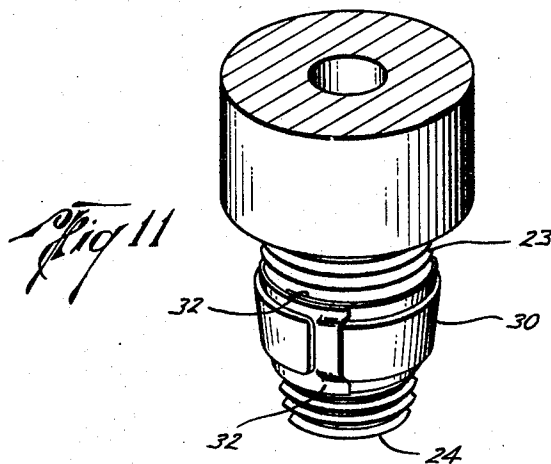
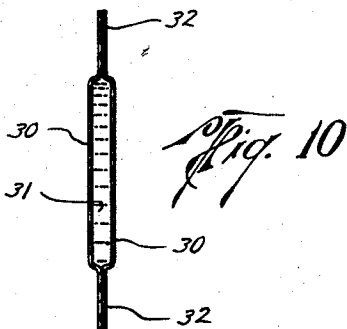
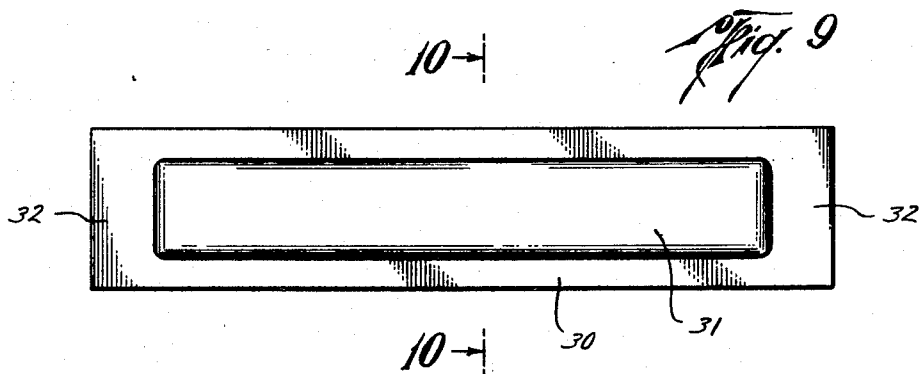
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4 Sheets-Sheet 3



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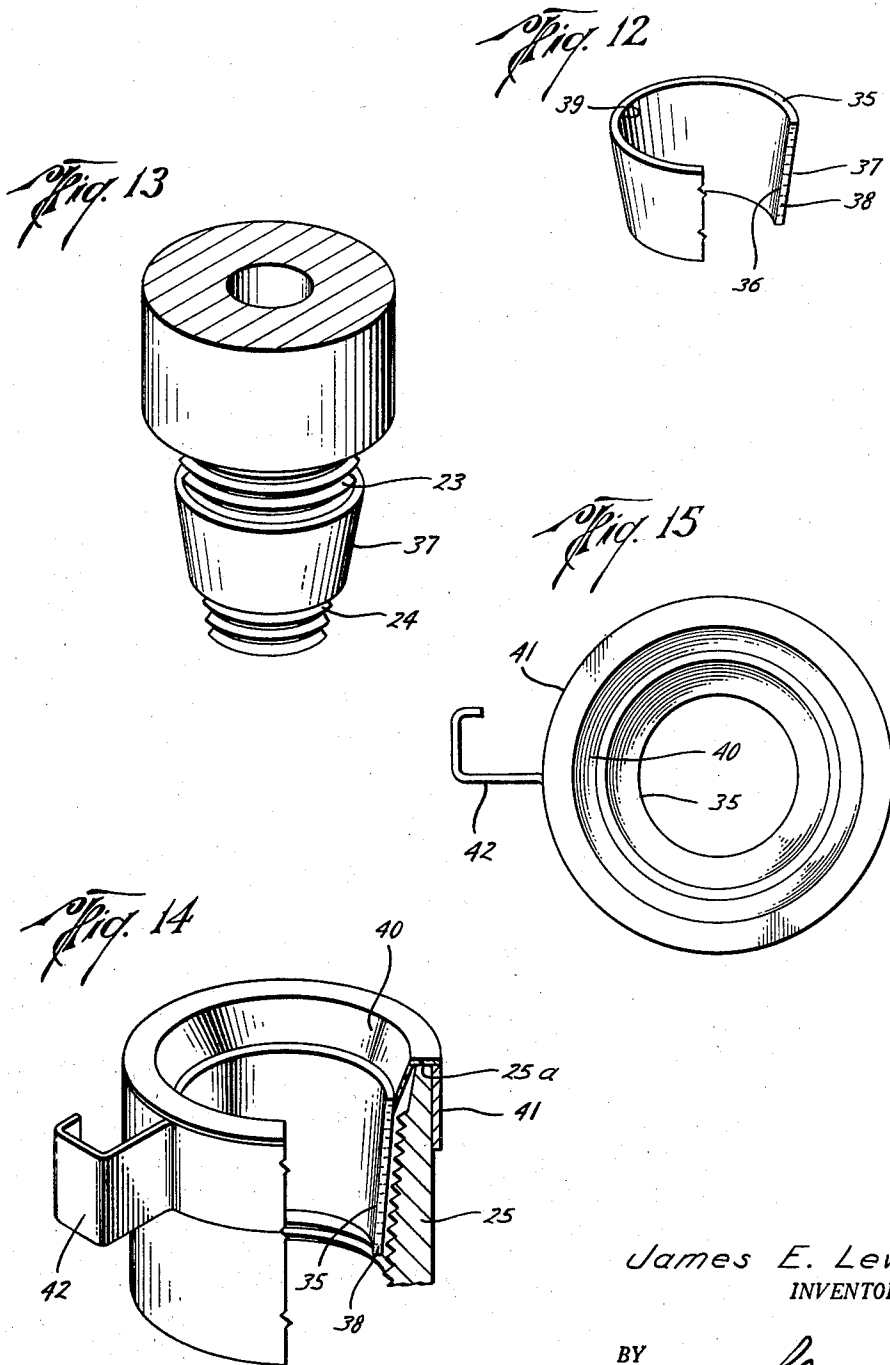
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THREAD LUBRICANT PACKAGE AND METHOD

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THREAD LUBRICANT PACKAGE AND METHOD

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15 Claims. (Cl. 29—458)

This invention relates to a method and to a package for the application of lubricant to threaded joints, particularly to the type employed in the oil industry.

Throughout the industry, the most common type of tubular connection is the threaded joint. Applications in the plumbing trade and in the construction industry are well known, of course. Perhaps less well known are the many applications within the oil industry. There the problem of correct thread lubrication is particularly significant because gas and fluids are handled under high pressure. Any form of leakage at the coupling can be both dangerous and costly. Because the problem is so severe that type of service will be used as an example in the following discussion. Many of the problems are common to all industrial applications, and both the method and the package are suitable for general use, of course.

In the oil industry, the threaded joint is used in the coupling of casing, tubing, line pipe, drill pipe, valves, fittings, etc. It is common practice to apply lubricant or "dope" to the threaded section just before it is "made-up" or screwed together. The lubricant tends to prevent galling of the mating surfaces and to improve the sealing characteristics by facilitating complete "make-up" of the joint. In addition, it fills the voids in the threaded interval and resists corrosion and erosion of the threads that might result from fluid washing, and it facilitates later "break-out" of the thread. This is particularly significant in the production phase of the industry where repeated make and break operations are part of normal activity. Thread life under such conditions is a function of proper lubrication, of course.

Only through correct application on the threaded surface of the correct amount of uncontaminated dope can each of the advantages of using lubricant or dope be realized fully. Similarly, it is apparent that improper care of threaded joints can do nothing but decrease their effectiveness in use. Evidence of poor lubrication control are found repeatedly in the oil industry where wash-out of tool joints, tubing and casing leaks, corrosion of threads, galling and poor thread life occur with undesirable frequency.

Factors contributing to failure of threaded connections are varied, of course. As implied, however, one of the important reasons is the improper application of lubricant. Related to this, of course, is the condition of the lubricant being applied. In practice, there is a "dope bucket" on the derrick floor of every rig and on the bed of every field truck. On rigs there is constant contamination of the lubricant from drilling mud, debris, and water because the "dope bucket" remains uncovered in most instances from the time it is first opened. In the field dirt and dust and long exposure to air are the contaminants and are the reasons that viscosity characteristics change for the worse. In combination, the effect is to so limit the ability of the lubricant to do its job that even correct application is not always enough to assure good joint life.

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In each of the "dope buckets" there is the inevitable "dope stick" or brush. Often this is literally a stick with some waste or a rag wrapped around the business end. Whatever is used, however, the dope or lubricant is scooped up and wiped on the box or sometimes the pin end of the threaded connection. There can be no uniformity in the amount of lubricant deposited each time, and there is certainly no way to get uniform and effective distribution of the lubricant on the thread. In addition to the difficulties an alert, intelligent, and conscientious person would have in trying to do a good job, the problem is compounded by human error most of the time. Many times the importance of correct lubrication is not known to the roughneck or roustabout doing the job, many times he lacks one or more of the traits mentioned above, many times speed is regarded as the only goal, and many times fatigue and other human distractions contribute to improper use of material.

Accordingly, it is a principal object of the present invention to provide a method and means for the controlled application of lubricant to threaded joints of the character described above.

The present invention contemplates placing a suitable lubricant material in a substantially air-tight envelope or casing constructed of a flexible material, such as one of the many known film plastics. The casing can be made in many forms and shapes adapted to be positioned on one or the other of the members of a threaded connection and located so as to be engaged by the threads as the joint is made up, in order to rupture the casing and discharge the lubricant therefrom over the thread surfaces. The envelope or casing will be so shaped that upon rupturing the lubricant will be distributed uniformly about the inter-engaging surfaces of the joint members. The casing will be filled with the optimum amount of lubricant for the application in which it is employed. Being substantially air-tight, the envelope will protect the viscosity characteristics of the lubricant and will ensure freedom from contamination.

Among the advantages to be obtained by the present invention are: (1) Assurance of the use of the correct amount of lubricant for a particular application; (2) proper placement of the lubricant on the threaded surfaces for effective distribution by the engaging threads; (3) assurance of uncontaminated lubricant by enclosure in sealed packages sized for the specific application; (4) assurance of optimum or most efficient use of the material; (5) assurance of the protection of the viscosity characteristics and lubricating properties of the lubricant from extraneous contaminants; and (6) efficient use of the lubricant by untrained or unskilled persons.

In the drawing:

Fig. 1 is a plan view illustrating a torus-shaped package;

Fig. 2 is a quarter-sectional elevational view of the embodiment illustrated in Fig. 1;

Fig. 3 is a cross-sectional view showing the package of Fig. 1 applied to the male or pin member of a threaded joint;

Fig. 4 is a view similar to Fig. 3 showing the lubricant package of Fig. 1 applied to the female or box member of the threaded joint;

Fig. 5 is a plan view of a modification of the lubricant package of Fig. 1 incorporating support elements for the package;

Fig. 6 is a partly sectional view taken along line 6—6 of Fig. 5;

Fig. 7 is an enlarged fragmentary view similar to the sectional portion of Fig. 6;

Fig. 8 is a partly sectional perspective view showing the lubricant package of Fig. 5 installed in the box mem-

ber of a threaded joint prior to insertion of the pin member;

Fig. 9 is a plan view of a so-called "sandwich" or "bandage" type package;

Fig. 10 is a cross-sectional view taken along line 10—10 of Fig. 9;

Fig. 11 is a perspective elevational view showing the bandage-type package positioned about the pin member of threaded joint;

Fig. 12 is a partly sectional perspective view of a sleeve-type lubricant package;

Fig. 13 is a perspective view showing the sleeve-type embodiment applied to the pin of the thread joint;

Fig. 14 is a partly sectional perspective view showing a modification of the sleeve-type package fitted with an applicator, shown positioned in the box member of the threaded joint; and

Fig. 15 is a plan view of the embodiment illustrated in Fig. 14.

Referring to the drawing and to Figs. 1 and 2, the embodiment shown therein is a torus-shaped envelope or casing 20 encasing a lubricant material 21 which is hermetically sealed therein in any conventional manner. The torus has an axial bore 22 therein. Casing 20 is preferably made of any one of a number of available pliable or flexible materials, such as the well known plastic film materials which are both substantially air-tight and chemically inert to the enclosed lubricant. The thickness of the envelope wall will, of course, be the minimum, consistent with that degree of strength necessary to permit handling of the package when it is shipped and when it is installed in the joint to which it is to be applied. Once installed, it will be understood that it is intended to be ruptured; hence, the wall thickness, while possessing the strength characteristics mentioned, will also be such as to rupture readily when subjected to compression or rubbing, shearing, or frictional forces developed by engagement between the threads of the pipe joint as the latter is made up. Ordinarily, the thickness of the plastic film employed to form the envelope or casing will be of the order of two mils or less.

Among the various plastic materials which are available to form the casing 20 are the following: polytetrafluoroethylene (Teflon); polyethylene terephthalate (Mylar); polyethylene; polyamide (nylon); polychlorotrifluoroethylene (Trithene); polyvinyl chloride (Velon); vinylidene chloride-vinyl chloride copolymer (Saran); polystyrene (Styroflex); nitrile rubber (Visten). Also laminates, metallized films or other combinations of film materials may be employed.

Thread lubricant 21 may be any one of the various well-known materials employed for lubricating threads, particularly in oil industry applications, and the specific composition of the thread lubricant as well as the particular type or class of plastic film employed for the casing, do not, of themselves, form a part of this invention.

The dimensions of the torus-shaped package will be dependent upon the size of the joint member to which it is to be applied and, as illustrated in Figs. 3 and 4, may be applied either to the male or pin member 23 of the joint by slipping the package over the pin threads 24, or it may be inserted in the upper end of a box member 25 of the joint, as illustrated particularly in Fig. 4, the box member having the internal threads 26.

Where the lubricant package is placed over the pin, as shown in Fig. 3, the latter may then be inserted into the box member of the joint and as the threads engage, the lubricant package will be compressed and otherwise mechanically engaged between the joint members so as to be ruptured by such engagement and discharge the lubricant over the engaging thread surfaces. As the joint is made up, the lubricant will, of course, be extruded by the engaging threads and will flow about the

thread surfaces throughout the length of the thread section which is engaged.

By this method of application, it will be seen that uncontaminated lubricant will be applied to the threads. Moreover, since the quantity of lubricant enclosed in the casing will have been pre-determined to provide the optimum amount of lubrication for the joint threads, wastage of lubricant will be avoided and uniform distribution of the lubricant will be accomplished.

Similarly, in the embodiment illustrated in Fig. 4 the lubricant package will be installed in the upper end of the female or box member of the joint and when the pin member is inserted in the conventional manner, the package will be ruptured and the lubricant caused to flow downwardly over the surfaces of the box threads 26, with the same advantageous results noted previously in connection with the application to the pin member of Fig. 3. It will be understood that once a lubricant package has been put in place about a joint member it may be ruptured in any suitable manner to allow the lubricant to spill over the thread section and be subsequently spread by engagement of the joint members.

Figs. 5 to 8 illustrate a modification of the torus-shaped package in which supporting elements are incorporated or connected to the package in such a way as to assist in initially positioning the package in the box member of the joint, so as to maintain it in proper position for reception of the pin member. In this embodiment, the torus-shaped package 20 is connected by means of an annular web or membrane 27 which extends radially from the outer periphery of the casing and circumferentially thereof, the membrane being constructed of the same or similar film plastic material as casing 20. The outer periphery of the membrane is secured to a ring 28 which may be of any readily removable construction, and may be constructed of cardboard or other material which functions as a support frame adapted to embrace the upper end of the box member 25, so that the membrane 27 overlies the upper end 25a of the box member and thereby supports casing 20 concentrically within the upper end of the interior of the box member. A radially projecting hook or handle 29 is secured to the exterior of ring 28. This embodiment is employed in the following manner: Casing 20, with its enclosed lubricant, is inserted into the upper end of the box member 25 and, as noted, is supported from the upper end 25a of the box member by the membrane 27 and the support ring 28. The pin member of the joint is then inserted into the box member and in such insertion casing 20 will be ruptured, as previously described, and the lubricant discharged between the threads of the joint members as they are made up. As the joint members are fully made up, the membrane 27, which is of very thin material, will be ruptured either by engagement of the joint members or as ring 28 is pulled off of the box member by means of handle 29.

This embodiment will be useful in many instances because the unsupported torus-shaped package will frequently be flabby and so flexible in general character that it may be difficult to position properly within the box member. Hence, membrane 27, ring 28, and handle 29 provide means for supporting the package in its initial position preparatory to engagement by the other member of the joint.

Figs. 9, 10 and 11 illustrate still another embodiment which may be termed a "sandwich" or "wrap-around" package. In this embodiment, the package has an elongate substantially flat form constructed from a pair of sheets of plastic film 30—30 disposed face-to-face and which are adhesively or otherwise sealed about their periphery. The unsealed central portions define between them a casing 31 of thin cross-section which contains the requisite quantity of thread lubricant. The end portions of this package form the tabs 32—32 which may be coated with adhesive or may be of self-adhering plastic,

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such as Saran, so that the package may be wrapped around the pin member, as illustrated particularly in Fig. 11, the end tabs being caused to overlap and to adhere to one another to hold the package in place on the threads 23 of the pin member 24. It will be evident that when the pin member, carrying the wrap-around package installed thereon, is inserted in the box member of the joint, the package will be effectively ruptured, releasing the lubricant which will then be discharged over the threads by the thread engagement and the extrusive forces of the engagement. When the wrap-around package is installed, as shown in Fig. 11, it becomes a sleeve-type package which may be readily shaped and dimensioned to effectively spread lubricant over the joint threads.

Figs. 12 and 13 illustrate still another modification in which the lubricant package comprises a sleeve-shaped package 35 constructed of film plastic of the kind described, and having spaced-apart inner and outer walls 36 and 37 forming an enclosure for the thread lubricant 38. The sleeve-shaped package has a bore 39 which is adapted to receive the threaded section 23 of the pin member 24, as shown particularly in Fig. 13. The sleeve-shaped package is preferably tapered to complement the taper of the pin threads, so that it may be pushed up over the pin threads until it is frictionally supported thereon. With the sleeve-shaped package thus installed on the pin member, the latter may be inserted in the box member of the joint and the engagement between the joint members will, as in the previously described embodiments, rupture the package and effect the desired distribution of lubricant over the threads.

Figs. 14 and 15 illustrate the sleeve-shaped embodiment of Figs. 12 and 13, equipped with support elements such as those employed in connection with the embodiment illustrated in Figs. 5 to 8, namely, a membrane 40 constructed of thin plastic film secured to the upper end of the sleeve-shaped package 35 and shaped to extend over the upper end 25a of box member 25 and secured to a support ring 41, similar in form and construction to support ring 28, and provided also with a handle 42 like handle 29. This latter embodiment is installed in the box member, as shown in Fig. 14, and the pin member is then inserted, the latter will, upon engagement with package 35, rupture the same and cause release and distribution of the lubricant as the joint is made up. Membrane 40 will be ruptured and ring 36 removed from the joint, as previously described.

From the foregoing, it will be seen that this invention provides a useful method and means for effectively lubricating the threads of threaded pipe joints in a manner which provides several advantages and fulfills the several objects previously enumerated.

It will be understood that numerous modifications and variations may be made in the details of construction and form of the lubricant packages within the scope of the appended claims but without departing from the spirit of this invention.

What I claim and desire to secure by Letters Patent is:

1. As an article of manufacture, a lubricant package, comprising, a closed easily-rupturable flexible casing shaped for placement about one of the members of a threaded pipe joint, said casing being constructed of a thin plastic film material, and a body of a pipe thread lubricant enclosed within the casing.

2. As an article of manufacture, a lubricant package, comprising, a closed easily-rupturable flexible casing of hollow toroidal shape, said casing being constructed of a thin plastic film material, and a body of a pipe thread lubricant enclosed within the casing.

3. As an article of manufacture, a lubricant package, comprising, a closed easily-rupturable flexible casing of sleeve-like shape having a hollow wall defining an annular chamber, said casing being constructed of a thin plas-

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tic film material, and a body of a pipe thread lubricant enclosed within said chamber.

4. As an article of manufacture, a lubricant package for lubricating threaded pipe joints, comprising, a closed readily-rupturable flexible hollow casing shaped for placement between the members of a threaded pipe joint, said casing being constructed of thin plastic film material which is readily rupturable by engagement between the joint members during their make-up, and a pre-determined quantity of a suitable thread lubricant enclosed within said casing.

5. As an article of manufacture, a lubricant package for lubricating threaded pipe joints, comprising, a closed readily-rupturable flexible hollow casing adapted for placement between the threaded members of a threaded pipe joint, said casing being constructed of a thin plastic film material which is readily rupturable by engagement between the joint members during their make-up, a pre-determined quantity of a suitable thread lubricant enclosed within the casing, and means connected to the casing for initially supporting the casing in operative position about a joint member.

6. As an article of manufacture, a lubricant package for lubricating threaded pipe joints, comprising, a closed readily-rupturable flexible hollow casing of toroidal shape adapted for placement between the members of a threaded pipe joint, said casing being constructed of a thin plastic film material which is readily rupturable by engagement between the joint members during their make-up, and a pre-determined quantity of a suitable thread lubricant enclosed within said casing.

7. As an article of manufacture, a lubricant package for lubricating threaded pipe joints, comprising, a closed readily-rupturable flexible hollow casing of toroidal shape adapted for placement in the box member of a threaded pipe joint, said casing being constructed of a thin plastic film material which is readily rupturable by engagement between the joint members during their make-up, a pre-determined quantity of a suitable thread lubricant enclosed within said casing, and removable means connected to said casing for supporting the casing in initial operative position in said box member.

8. As an article of manufacture, a lubricant package for lubricating threaded pipe joints, comprising, a sleeve-shaped readily-rupturable flexible casing adapted for placement between the thread sections of the members of a threaded pipe joint, the inner and outer walls of said casing defining between them a closed annular chamber of narrow cross-section, said casing being constructed of a thin plastic film material which is readily rupturable by engagement between the joint members during their make-up, and a pre-determined quantity of a suitable thread lubricant enclosed within said chamber.

9. As an article of manufacture, a lubricant package for lubricating threaded pipe joints, comprising, a sleeve-shaped readily-rupturable flexible casing adapted for placement between the thread sections of the members of a threaded pipe joint, the inner and outer walls of said casing defining between them a closed annular chamber of narrow cross-section, said casing being constructed of a thin plastic film material which is readily rupturable by engagement between the joint members during their make-up, said casing having initially a flat elongate shape which is formable into said sleeve-shape by wrapping it about the male member of said joint, and a pre-determined quantity of a suitable thread lubricant enclosed within said chamber.

10. A method of lubricating the threads of a threaded pipe joint, comprising, encasing a quantity of a thread lubricant sufficient to lubricate said threads in a thin rupturable pliable casing shaped for placement between the threaded portions of the members to be joined, positioning the casing on one member of the joint to effect said placement, and engaging the casing by the other joint member as the joint is made-up whereby to rupture

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the casing and discharge the lubricant over the engaging thread surfaces.

11. A method of lubricating the threads of a threaded pipe joint, comprising, encasing a quantity of a thread lubricant sufficient to lubricate said threads in a pliable casing constructed of a thin, rupturable plastic film material and shaped for placement between the threaded sections of the members to be joined, positioning the casing in the box member of said joint substantially concentric with the thread section thereof, and inserting the pin member of the joint into the box member to engage and rupture said casing as the joint is made up whereby to discharge the lubricant over the engaging thread surfaces.

12. A method of lubricating the threads of a threaded pipe joint, comprising, encasing a quantity of a thread lubricant sufficient to lubricate said threads in a pliable casing constructed of a thin, rupturable plastic film material and shaped for placement between the threaded portions of the members to be joined, positioning the casing concentrically about the pin member of the joint to effect said placement, and inserting the latter with the casing into the box member of the joint to engage the casing between the joint members as the joint is made up to engage and rupture the casing and discharge the lubricant over the engaging thread surfaces.

13. As an article of manufacture, a lubricant package, comprising, a closed easily rupturable flexible casing shaped for placement about one of the members of a

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threaded pipe joint, said casing being constructed of a thin easily-rupturable material, and a body of a pipe thread lubricant enclosed within the casing.

14. As an article of manufacture, a lubricant package, comprising, a closed easily rupturable flexible casing shaped for placement about one of the members of a threaded joint, said casing being constructed of a thin easily rupturable material, and a body of a thread lubricant enclosed within the casing.

15. A method of lubricating the threads of a threaded joint, comprising, encasing a quantity of a thread lubricant in a sealed casing constructed of thin, easily-rupturable material shaped for placement between the threaded portions of the members to be joined, disposing the casing in thread-lubricating position on one of the members of a threaded joint to effect said placement, and engaging the casing by the other member of the joint as the joint is made up whereby to rupture the casing and discharge said lubricant on to the thread surfaces of said joint.

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