Feb. 27, 1951 C. H. ENGH 2,543,100

SCREW AND NUT MECHANISM

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Fig. 1

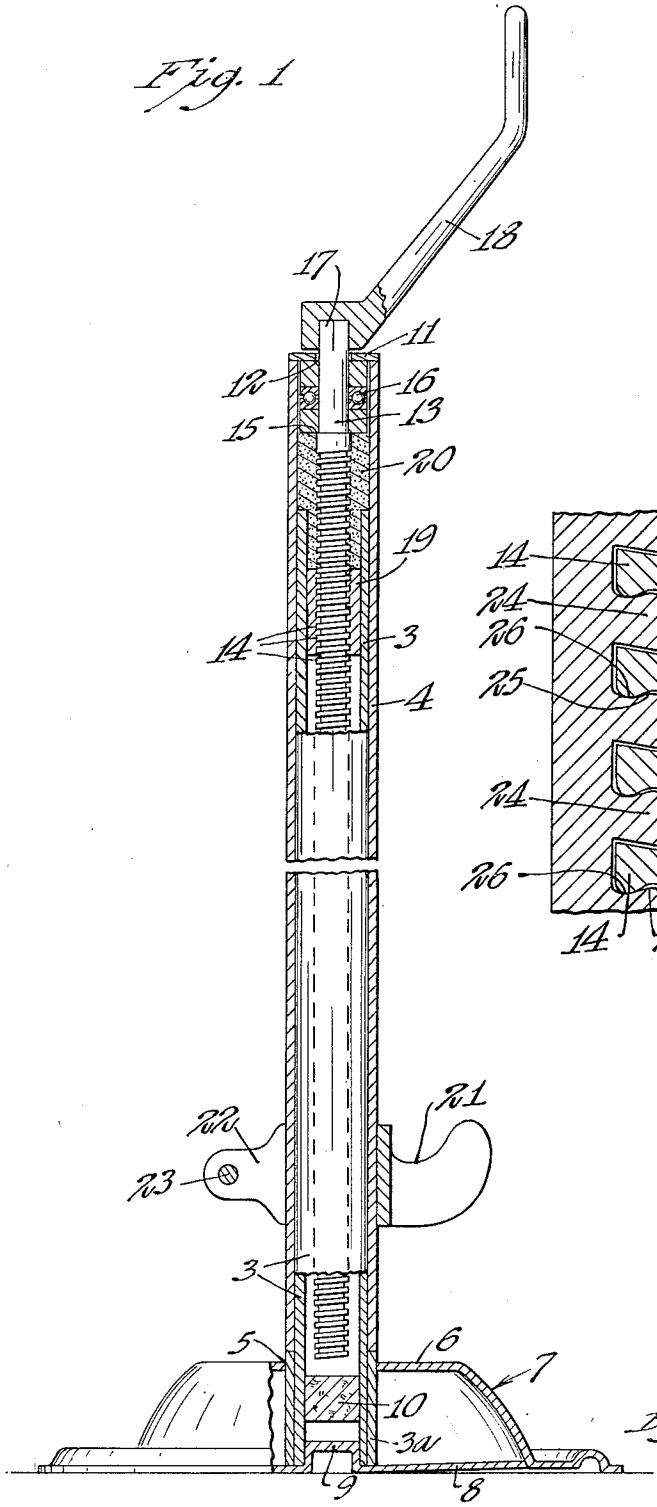
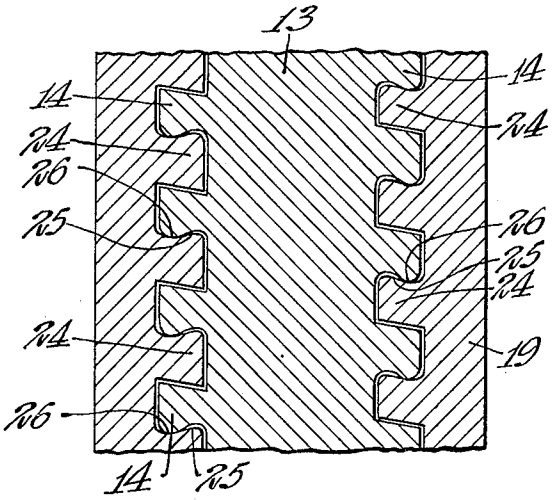


Fig. 2



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SCREW AND NUT MECHANISM

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4 Claims. (Cl. 74—459)

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This invention relates to lifting jacks such as are frequently used for raising motor vehicles or portions thereof.

It is a general object of the invention to provide a lifting jack which is vertically extensible and operated by screw threaded members wherein proper lubrication of the threads is provided for and wherein the threads themselves are so formed that they will to a great extent, cut down the amount of frictional drag imposed on the threads when the device is lifting a relatively heavy weight.

The above and other objects and advantages of the invention will more fully appear from the following description made in connection with the accompanying drawing wherein like reference characters refer to the same parts throughout the views, and, in which:

Figure 1 is a view partially in side elevation and partially in vertical section, of a form of the invention; and

Figure 2 is an enlarged fragmentary vertical sectional view through the screw thread unit.

The device shown in the drawing includes a post unit comprising an inner tubular member 3 and a telescoping outer tubular member 4. The inner member 3 is removably received in an opening 5 in the upper portion 6 of a post 7. The post 7 is provided with a bottom plate 8 having an upwardly struck boss 9 over which the tubular member 3 is removably received. A plug 10 is fitted into the lower end of the inner section 3 above a point to which the boss 9 extends.

The outer tubular section 4 relatively closely yet freely slidably fits about the inner section 3. Welded or otherwise suitably secured to the upper end of the outer section 4 is a cover plate 11 having an opening 12 in its center. Extending downwardly in the outer section 4 and into the inner section 3 is a rod 13 which has most of its length provided with threads 14. Just above the upper end of the threads 14 is a shoulder 15 and upon this shoulder rests a ball thrust bearing unit indicated generally at 16. The extreme upper end of the rod 13 extends through the opening 12 in the cover plate 11 and is squared as at 17 to removably receive a wrench or handle 18 by means of which the rod can be rotated.

The threaded portion of the rod 13 extends through and interfits with an internally threaded plug 19 which is welded or otherwise suitably secured in the upper portion of the inner tubular section 3. It should be noted that the plug 19 has its upper portion located a considerable distance below the upper end of the inner tubular

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section 3. This provides a chamber or pocket which is adapted to hold a lubricant 20 which is indicated by stippling in Figure 1. It is preferred that the lubricant be a grease having a uniform degree of hardness under considerable temperature ranges and that it be sufficiently hard so that it will not readily flow between the male and female threads of the rod 13 and the plug 19.

The outer tubular section 4 is provided with a hook-like bracket 21 having a split side 22 drawn together by a bolt 23 so that the bracket can be raised and lowered on the outer tubular section 4 when and if desired.

In Figure 2 an enlarged fragmentary detail of the thread arrangement is shown. The male threads are shown at 14 and the female threads at 24. It will be seen that the threads are rather loosely fitted so that a certain amount of lateral play is provided. The lower surface 26 of the male thread 14 constitutes the thrust transmitting surfaces of that thread. This surface is concave radially of the rod 13 on which the thread is formed. The female thread 24 has a thrust transmitting surface 25 which is on the upper side of the thread and contacts the convex surface 25 on the lower side of the male thread. The curvature of the convex surface 26 is sharper than that of the concave surface 25 so that there is relatively limited contact between the thrust transmitting surfaces 26 and 25 of the male and female threads respectively. It is also preferred that the rise of the curve of the concave thread surface 26 be approximately the same on either side of the low point of the curve and that the low point be approximately centered transversely of the thread and in a direction substantially radially of the rod 13.

By reason of this thread construction there is a minimum of drag between the cooperating thrust transmitting surfaces of the two threads 14 and 24 while at the same time the threads themselves can be built sufficiently strong to support heavy loads.

When the handle or wrench 18 is rotated to lift a load imposed on the bracket 21, it is ordinarily difficult to start movement of the jack because of the frictional drag incident to conventional constructions. With the thread construction shown and described there is a minimum of frictional contact between the threads which are lubricated by the lubricant 20 in the chamber at the top of the post. When this initial force is applied to the handle 18, the initial object is to start rotation of the threaded rod 13. Since the handle 18 is opposite from the axis of rotation

and extends only from one side of the axis, there is an unbalanced turning force applied. Consequently, the rod 13 will in some cases tend to tilt slightly relative to the internally threaded plug 19 due to the loose interfitting of the two threads. This tilting action is very slight but is present and causes the convex portion 26 of the male thread to ride upwardly slightly on the concave surface 25 of the female thread. This produces movement of one threaded member relative to the other, whereupon the rod 13 can be started on its rotational movement with a smaller applied force because the stationary inertia has been overcome. When the device is lifting lighter weights the convex screw surface 26 will remain approximately centered in the concave surface 25, but even when heavier weights are lifted a greater force is applied to the handle. There will be shifting of the rod 13 relative to the internally threaded plug 19 but the concavity 25 will constantly tend to return the convexity 26 to a centered position.

In order to permit the above described rocking motion of the threaded rod 13 it should be noted that the thrust bearing unit 16 is slightly spaced from the inner wall of the outer tubular member 4 and that the aperture 12 in the cover plate 11 at the upper end of the tubular member 4 is larger than the upper end of the rod 13.

Reference is again made to the lubricant chamber at the top of the post unit. There is not a great amount of lubricant required to keep the threaded rod 13 properly lubricated. The location of the plug 19 below the upper end of the inner tubular section 3 provides a space into which the lubricant can be contained in addition to the space between the upper end of the tubular section 13 and the thrust bearing unit 16.

It should be noted that the lower end of the outer tubular section 4 will engage the top of a short sleeve section 3a which is fastened to the bottom of the tubular section 3 to prevent collapsing of the tubular sections 3 and 4 beyond that point. This will maintain a space between the lower side of the thrust bearing unit 16 and the upper end of the inner tubular section 3 so that a considerable amount of lubricant can be placed in the lubricant chamber and cannot be forced past the threads by complete collapsing of the jack post.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of my invention.

What I claim is:

1. In a lifting jack, a post unit including a pair of sections, one of which is vertically movable relative to the other, said sections having respective interfitting male and female threaded portions, the thread on one of said portions having a concave thrust transmitting surface, the complementary thrust transmitting surface of the thread on the other threaded portion being in contact with only a part of said concave surface, said threaded portions having a loose fit, and said complementary surface being shiftable on said concave surface.

2. The structure in claim 1 and said concave surface having a substantially equal rise transversely thereof in opposite directions from its low point, whereby said female and male members will tend to automatically center themselves under an axle thrust.

3. In a lifting jack, a post unit including a pair of sections, one of which is vertically movable relative to the other, one of said sections having a female threaded portion, a male threaded portion operably fitting in said female section, the threads of said portions having adjacent thrust transmitting surfaces, the thrust transmitting surface of one threaded portion contacting the adjacent surface of the other threaded portion over a radial distance considerably less than the depths of said threads, and the thrust transmitting portion of one of said threaded portions being convex.

4. The structure set forth in claim 3 and the other threaded portion being concave, the convex threaded portion being on a sharper curve than the concave threaded portion.

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