June 23, 1931. A. R. ESMOND 1,810,910

ANTIFRICTIONAL MEANS FOR SCREWS

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Fig. 1.

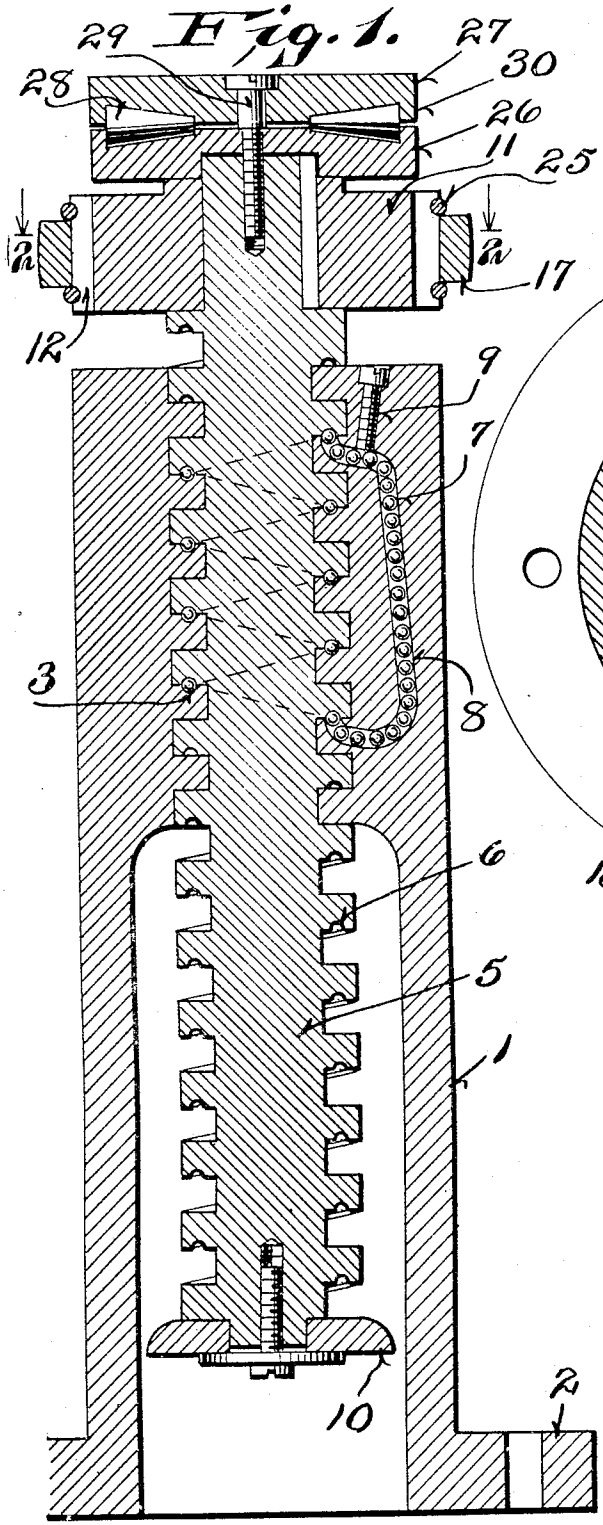
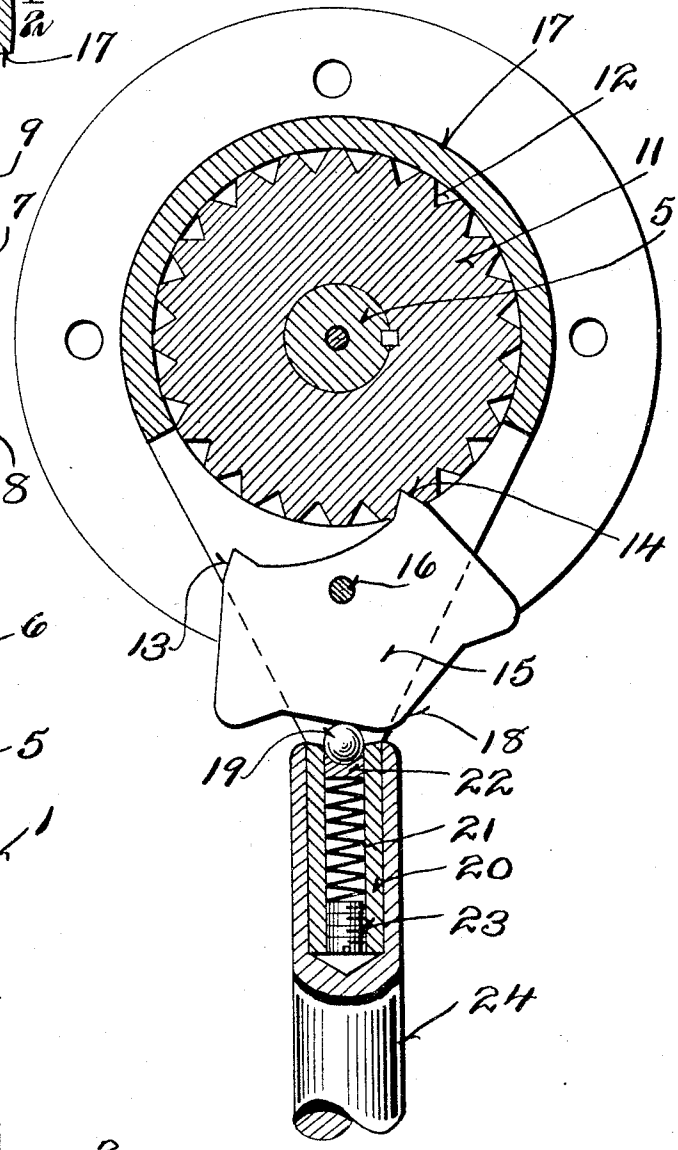


Fig. 2.



Inventor
A. R. Esmond

By

Attorneys

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Fig. 3.

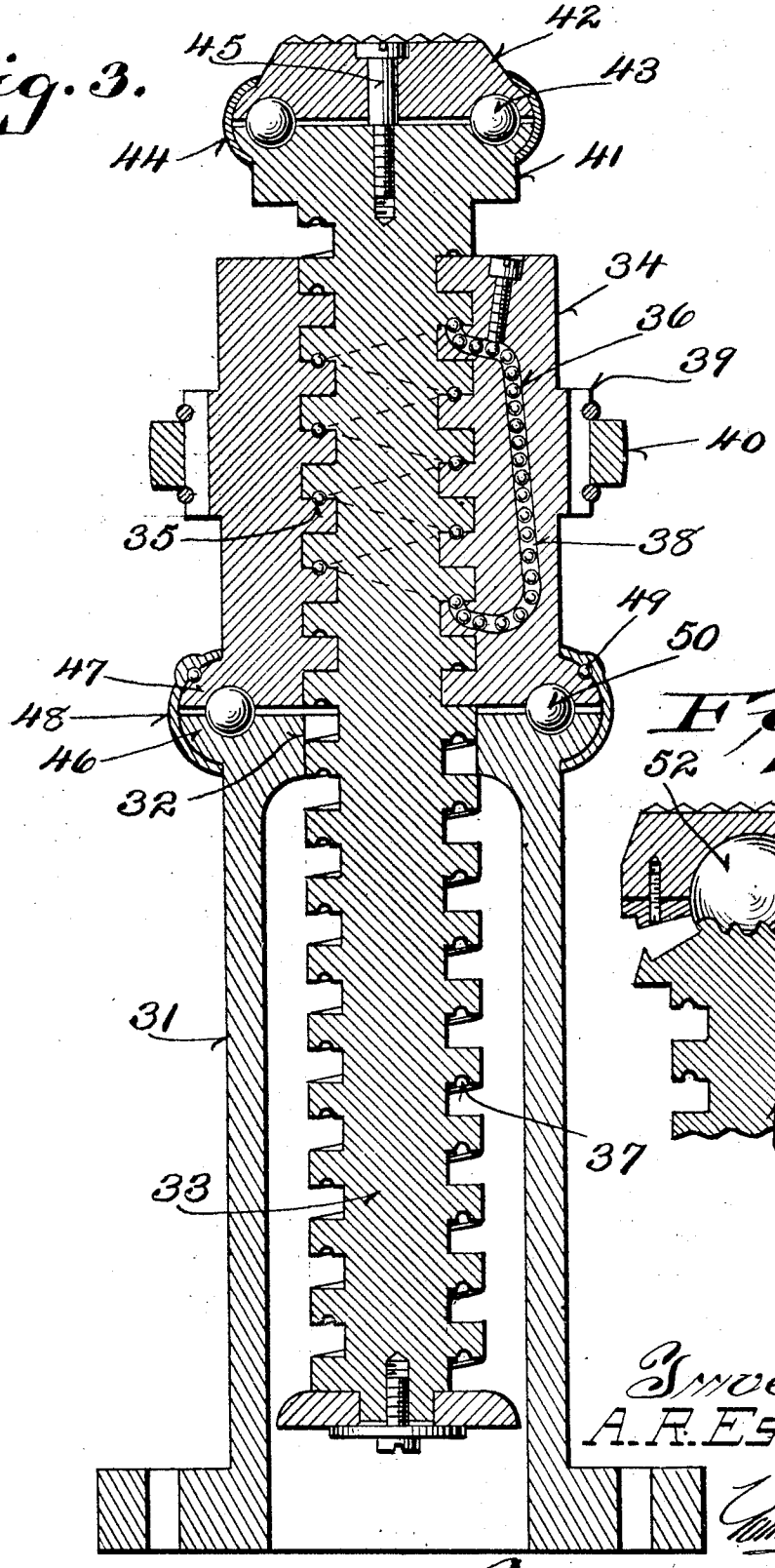
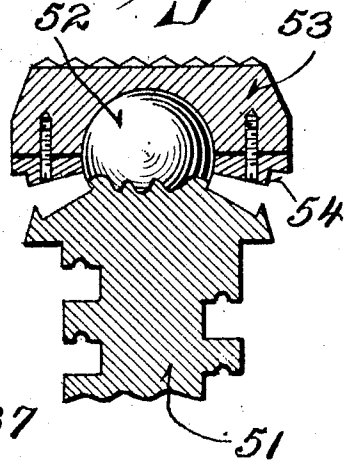


Fig. 4.



Inventor
A. R. Esmond
By
Attorneys.

Patented June 23, 1931 1,810,910

UNITED STATES PATENT OFFICE

ALVA RAY ESMOND, OF UNION GROVE, WISCONSIN

ANTIFRICTIONAL MEANS FOR SCREWS

Application filed November 18, 1927. Serial No. 234,110.

This invention pertains generally to the provision of anti-frictional means for screws, and more particularly for pressure or jack screws.

In instances, where pressure or weight is exerted upon a screw, the less friction between the threads, naturally, the less amount of energy required to overcome the same. For instance, in lifting jacks, it is well known that an enormous loss of energy occurs due to the frictional resistance offered by the screw threads.

This invention is designed to overcome the foregoing disadvantages, and an object of the same is to provide a novel form of anti-frictional means between the adjacent faces of male and female threads, so that the load is carried by the anti-friction members, thus reducing friction to a minimum.

For the purpose of illustrating one application of this invention, a novel form of jack is shown, in which the relatively movable threaded members are provided with continuous ball races or channels formed in their adjacent faces, and in which one of the members is provided with a return channel, whereby the balls may continually pass along the races and through the channel.

Further objects are to provide a novel form of lifting jack in which a double acting, simple type of pawl is employed, so that it may be snapped into either of two positions to rotate the revoluble member in the desired direction.

Further objects are to provide a novel form of head for the jack so constructed that it will permit relative motion of the load engaging head with respect to the adjacent portion of the jack, and also so made that it will not break off, but will transmit the stresses throughout an extended area.

Embodiments of the invention are shown in the accompanying drawings in which:

Figure 1 is a vertical sectional view through one form of jack;

Figure 2 is a sectional view on the line 2—2 of Figure 1;

Figure 3 is a vertical sectional view through a further form of jack;

Figure 4 is a sectional detail showing a still further form of head.

Referring to Figure 1, it will be seen that the jack comprises a base 1 which may be provided with outwardly projecting feet or flanges 2. This base is internally threaded and the inwardly projecting threads are provided with a groove or channel 3 on their upper faces. The screw 5 which passes into the base is externally threaded and provided with a groove or channel 6 on the underside of its threads. These channels 6 and 3 cooperate to form races for the anti-friction members or balls 7.

Further, it is to be noted that the body portion is provided with a channel 8 which extends from adjacent the lower portion of the threaded part of the base to adjacent the upper portion thereof. This channel carries the balls 7, as shown in Figure 1, and permits the balls to pass downwardly and reenter the raceway formed between the adjacent threaded portions. The balls are fed outwardly at the upper portion of this raceway into the channel 8 and pass downwardly through the channel and reenter the raceway.

In filling the device with the balls 7, a screw 9 is removed. The removal of this screw, it will be noted, provides a passageway through which balls may be poured into the channel 8. The screw 9 is rotated while the balls are being supplied and are thus worked into the raceway. This filling operation continues until the balls completely fill the raceway and the channel 8. Thereafter, the screw 9 is repositioned, as shown in Figure 1.

If desired, the screw 5 may be provided with an enlarged washer or collar 10 which is positioned at its lower end and prevents complete removal of the screw.

The screw has a ratchet wheel 11 keyed thereto and provided with teeth having similar opposite faces 12. These faces make equal angles with radial lines and contact with either the face 13 or the face 14 of a rocking pawl 15. This pawl 15 is pivotally mounted, as indicated at 16, upon a ring-like head 17.

Further, the pawl is provided with a cam face of roughly triangular contour, indicated by the reference character 18. A ball 19 presses against this cam face. The ball is carried within the apertured shank 20 of the head 17 and is urged outwardly by means of a spring 21. Preferably, a backing member 22 is provided for the ball and the spring bears at one end directly against this backing member. At the other end, the spring bears against a threaded plug 23 screwed into the aperture of the shank 20. A handle 24 having a tubular portion is slipped over the shank 20 for operating the head.

The head is held in place in any suitable manner, as for instance by means of the rings 25 (see Figure 1) set within grooves formed in the ratchet wheel 11. The upper end of the screw is provided with a two-part head having a lower portion 26 and an upper portion 27. These portions are separated by means of conical rollers 28 and are joined by means of the central screw 29. Preferably, flanges 30 extend from either the upper or lower portion 27 or 26, or else from both such portions, as shown in Figure 1, to prevent outward sliding of the conical rollers.

It will be seen that as the jack is operated by rocking the handle back and forth that the balls 7 feed upwardly into the raceway formed jointly by the grooves 3 and 6 and rolled around the threaded portions and re-enter the channel 8 at its upper portion. Thus, a continuous circulation of balls is provided and these anti-friction members materially reduce the loss due to friction in the ordinary type of jack. They provide a very easily operated jack and one which also may be readily constructed and is of eminently practical design.

In the form shown in Figure 3, a base 31 is provided having a restricted apertured upper portion 32 through which the lifting screw 33 slidably passes. The lifting screw cooperates with an internally threaded nut 34 and this nut 34 is provided with the grooves 35 to receive the balls 36. The screw is similarly provided with the groove 37, as previously described. Further, the nut 34 is provided with a passageway or channel 38 similar to the channel 8. The nut is provided with a ratchet wheel 39 integral therewith and cooperating with the head 40 similar to the head 17, previously described.

The screw 33 is provided with an enlarged upper portion or lower head member 41, above which is positioned an upper head member 42. These members are separated by means of balls 43 carried within annular channels formed in the opposing faces of these members. Preferably, a ring-like member 44 encloses adjacent projecting portions of the heads 41 and 42. In addition to this, a central screw 45 is provided.

The base 31 and the nut 34 are provided with projecting flanges 46 and 47, which have rounded faces and which are enclosed by a ring-like channel member 48. This member 48 may be rigidly carried by the base, if desired, and the flange 47 and the member 48 may be provided with grooves which receive the small balls 49 to reduce friction between the nut and the base. In addition to this, the nut and the base have annular channels which receive the relatively large balls 50.

In the form shown in Figure 4, the screw 51 is provided with an integral ball head 52. This head is received in a spherical depression formed in the bearing head 53. The bearing head comes to approximately a diametrical plane with reference to the ball 52. A retaining ring 54 is secured by means of screws to the underside of the head 53 and engages the ball 52 below the horizontal diametrical plane. This prevents dropping of the head 53 from the ball 52 when the jack is inverted.

It will been seen that a novel form of lifting jack has been provided by this invention which is of eminently practical construction and which is provided with a ball bearing mechanism so that the actual weight is supported by means of the anti-friction members and consequently a very easy operation of the jack is obtained.

It will be seen further that a simple type of double acting pawl or reversible pawl has been provided.

It will be seen further that the pressure bearing heads are so constructed that they may be freely turned relatively to the screw.

Although the invention has been described in considerable detail, such description is intended as illustrative rather than limiting as the invention may be variously embodied and as the scope of such invention is to be determined as claimed.

I claim:

In a lifting jack, a tubular base member having a restricted apertured upper portion, a rotatable nut member mounted on the base and in operative relation therewith, a lifting screw threaded into the nut and extending into the base, the threads of said nut and said screw having opposed flat faces with semi-annular channel portions, ball members movable through said channel portions, said nut having a passageway with a downwardly extending upper end leading from one of the channel portions and having an upwardly extending lower end opening into said channel portions whereby the balls from said channel portions will enter the downwardly extending upper end from the channel portions and into the channel portions from the up-

wardly extending lower end, a ratchet on the nut, and means cooperating with the ratchet for imparting movement to the nut for raising and lowering the screw.

In testimony that I claim the foregoing I have hereunto set my hand at Union Grove, in the county of Racine and State of Wisconsin.

ALVA RAY ESMOND.