No. 817,637. PATENTED APR. 10, 1906.

W. E. GASTON.

LIFTING JACK.

APPLICATION FILED NOV. 10, 1902.

2 SHEETS—SHEET 1.

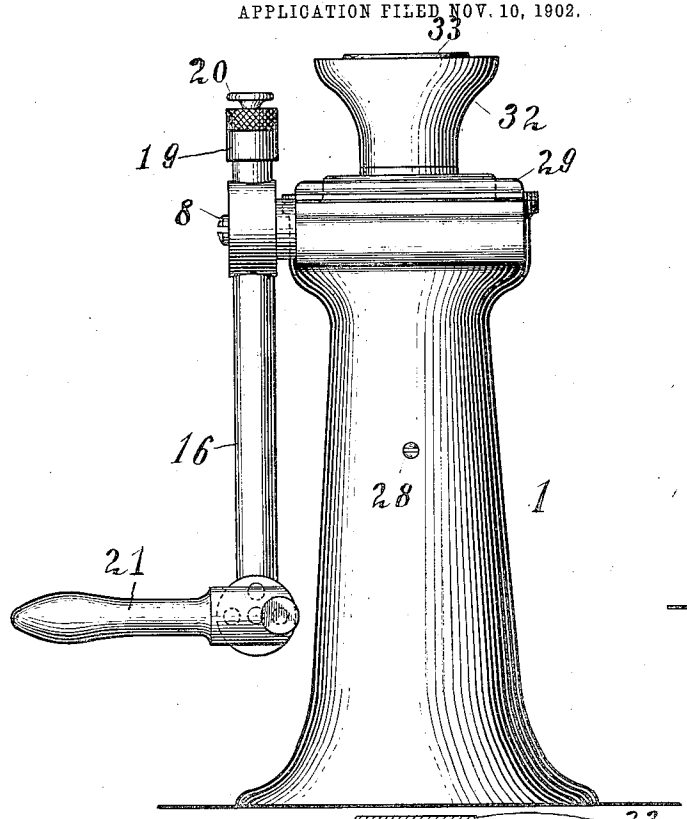

Fig. 1

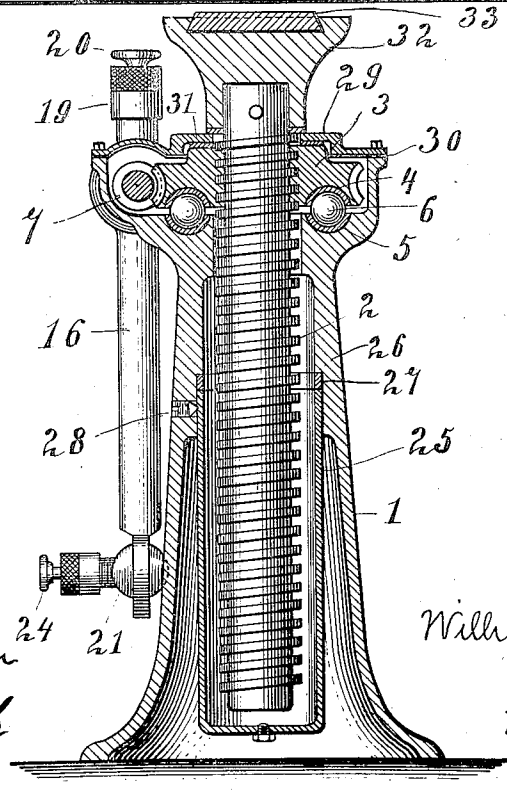

Fig. 2

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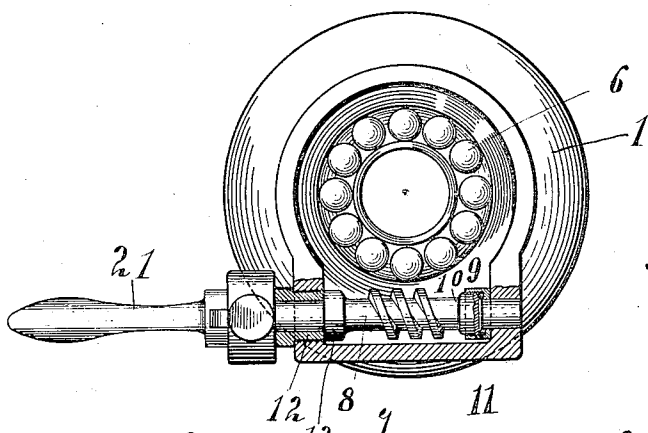

Fig. 3

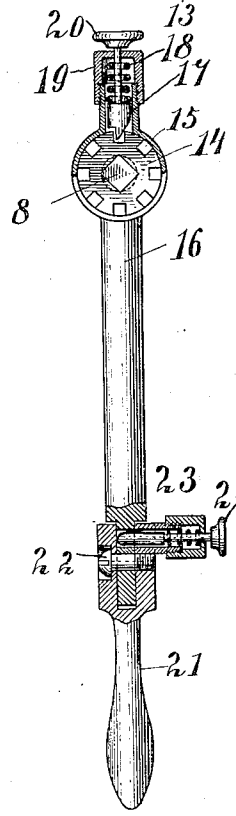

Fig. 4

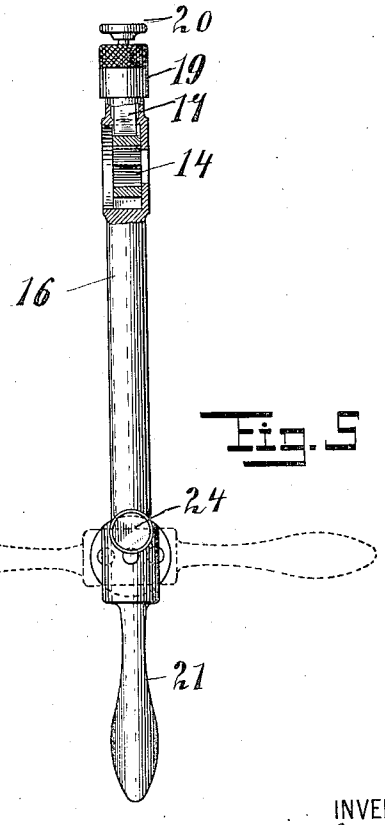

Fig. 5

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LIFTING-JACK.

No. 817,637. Specification of Letters Patent. Patented April 10, 1906.

Application filed November 10, 1902. Serial No. 130,684.

To all whom it may concern:

Be it known that I, WILLIAM E. GASTON, a citizen of the United States, and a resident of Pleasantville, in the county of Westchester, State of New York, have invented new and useful Improvements in Lifting-Jacks, of which the following is a specification.

My invention relates to lifting-jacks, more particularly to that class of lifting-jacks in which the lifting force is obtained by a screw and power mechanism for operating said screw.

The object of my invention is to provide a lifting-jack of the character referred to which shall be powerful and not liable to bind under heavy loads and which nevertheless may be easily and rapidly operated under light loads.

Other objects of my invention are to provide a construction which is simple and not apt to get out of order, also one in which the parts subjected to wear are inexpensive and may be readily removed and replaced by new parts, also a construction which is self-lubricating and in which all bearing-surfaces are continually lubricated from one supply of lubricating material.

These and other objects of my invention will more fully appear from the following description.

My invention consists in the novel parts, improvements, and combination herein shown and described.

The accompanying drawings, which are referred to here and form a part hereof, illustrate one embodiment of my invention and serve, in connection with the description herein, to explain the principles thereof and the best mode in which I have contemplated applying those principles.

Of the drawings, Figure 1 is a side elevation of a lifting-jack constructed in accordance with my invention. Fig. 2 is a vertical central section of the same, and Fig. 3 is a top plan of the base-frame of the lifting-jack with the screw and a portion of the operating means therefor removed, parts being in section to more clearly illustrate certain details of the construction. Figs. 4 and 5 are elevations, partly in section, illustrating one feature of the invention.

Like reference-numerals refer to like parts wherever they appear in the several figures.

Referring to the drawings in detail, 1 represents the base-frame of the jack, and 2 the lifting-screw thereof. While any suitable means may be provided for operating the screw so far as some of the features of my invention are concerned, a worm-wheel journaled in the upper end of base 1 and forming a nut for the lifting-screw is employed in the best embodiment of the invention. As shown, a worm-wheel 3, centrally threaded to form a nut for the screw 2, is provided on its under surface with an annular channel or groove, in which is fitted a removable annular ball-race or ring 4. The upper portion of the base-frame 1 is provided with a corresponding channel or groove in which is fitted an annular ball-race 5. The ball-races 4 and 5 are for the sake of economy preferably formed of pressed sheet-steel, the same being so shaped on their opposing surfaces as to receive a series of antifriction-balls 6.

For the purpose of operating the worm-wheel 3 with the required force a worm 7 is mounted on a shaft 8, which is journaled in the upper end of the base-frame 1 to one side of the worm-wheel 3. For the purpose of taking up the heavy end thrust to which the shaft 8 is subjected during the lifting operation of the jack a removable race 9, preferably formed of pressed steel, is arranged between a fixed and preferably integrally formed ball-race collar on the shaft 8 and the opposing surface of the frame, a series of antifriction-balls 11 being arranged between said ball-races. In order that the shaft 8 may be readily removed from the frame to replace worn parts, the opposite end of the shaft is journaled in a bushing 12, removably secured in the frame. A collar 13 is provided on the shaft to take up the back thrust on the shaft 8 should any occur during a lowering operation of the jack.

The shaft 8 may be rotated in any suitable manner. In accordance with the best embodiment of the invention, however, the shaft 8 is provided with a ratchet-wheel 14, which is preferably provided with recesses 15, forming working surfaces facing in opposite directions. Any suitable form of reversible pawl mechanism may be employed for connecting the ratchet 14 with an operating-arm 16, loosely pivoted on the shaft 8 adjacent to the ratchet-wheel. As shown, the reversible pawl consists of a plunger 17, which is provided at its inner end with a radial working face and an inclined retracting-face, as shown.

The pawl 17 is normally pressed toward the ratchet 14 by a compression-spring 18, which is confined between a shoulder on the plunger and a cap 19, screwed onto the end of the arm 16. In order to replace the pawl, it is only necessary to retract it by means of the head 20, turn it through an angle of one hundred and eighty degrees, and then release it. The engagement of the working and retracting faces of the pawl with the working faces of the ratchet will prevent the pawl from being accidentally misplaced during the operation of the jack.

With the object in view of enabling the shaft 8 to be rapidly rotated when a light load is being lifted or when a load is being lowered and at the same time to permit the shaft 8 to be powerfully operated or to be rotated within a limited space the arm 16, in accordance with the best embodiment of my invention, is provided with a handpiece 21, which may be secured to the arm 16, so as to project to one side of the path of the movement thereof to form a crank-handle, as shown in Figs. 1 and 3, or as to form an alined extension thereof, as shown in Figs. 4 and 5. In accordance with the construction shown this is accomplished by pivoting the handle 21 to the end of the arm 16, as by a pivot-screw 22, which passes through one side of the slotted end of the handle, the flattened portion of the end of the arm 16, and is threaded into the opposite side of the handle. For the purpose of firmly locking the handle 21 in either of its operative positions the handle-piece is provided with a spring-press plunger 23, adapted to enter either of a series of suitably-located openings in the flattened portion of the arm 16, said plunger being provided with a head 24, by means of which it may be released from the opening in the arm 16 when it is desired to change the position of the handle 21. With the object in view of getting the handpiece 21 out of the way when the jack is not in use, and at the same time of making it useful as a handle for carrying the jack from place to place, it is, in accordance with the best embodiment of my invention, so pivoted to the end of arm 16 that it may be turned to either side of the path of the movement thereof, as shown in dotted lines in Fig. 5, as well as into alinement therewith, three openings being to this end provided in the end of the arm 16 to receive the locking-plunger 23.

For the purpose of preventing the collection of dust and grit on the lower end of the lifting-screw 2 and at the same time to form a receptacle for lubricating material for the screw and other parts a grease-cup 25 is fitted to the interior of the hollow base 1, so as to inclose the lower end of the screw 2. With the object in view of making a liquid-tight connection between the grease-cup 25 and the base the latter is, in accordance with the construction shown, provided with an interior annular shoulder 26, between which and the upper end of the cup 25 a ring 27, of packing material, is confined. The cup 25 is held in place by means of a set-screw 28.

The worm-wheel 3 and worm 7, together with the bearings for each of these parts, are confined within the upper end of the base 1, so as to prevent the accumulation of dust and grit thereon by means of a cap 29, which is bolted to the upper end of the base 1, preferably with an interposed packing 30. A packing-ring 31 is also interposed between the upper surface of the worm-wheel 3 and the under surface of the cap 31. The packings 30 and 31 not only serve to keep dust and dirt from the interior bearing-surfaces, but they prevent the escape of the lubricating material should the jack happen to be tipped over.

The upper end of lifting-screw is provided with a head 32, in the upper or contact surface of which an undercut recess is provided. A piece of yielding material 33 is forced into the recess of the head 32, so as to project slightly above the upper or contact surface thereof. When the jack is used with the contact-surface of the head 32 in contact with a metallic surface, there is usually not enough friction between the head 32 and the surface which it comes in contact with to prevent the rotation of the screw until a considerable load is supported by the jack. The object of the yielding material 33 is to supply the necessary friction to prevent the turning of the screw until the friction between the metallic surfaces is sufficient. The yielding material, preferably felt, is not sufficiently firm to support any substantial load.

It will be seen that by reason of the large antifriction-bearing provided for the worm-wheel 3 and for the end thrust of the shaft 8 the jack may be operated to lift heavy loads without liability of binding. At the same time, by reason of the construction of the operating lever and handle, the jack may be either powerfully operated for heavy loads or rapidly operated for light loads. All of the bearing-surfaces, including the threaded connection between the worm and the screw and between the worm and the worm-wheel and the bearings for the worm-wheel and the worm-shaft, are constantly lubricated by the lubricating material which is carried up to the bearing-surfaces by the screw 2. It will be seen also that the jack may be readily taken apart for cleaning or repairs, and that the bearing-surfaces which are most subjected to wear are cheap in construction and may be readily replaced and removed by new parts.

My invention in its broader aspect is not limited to the precise construction shown nor to the particular construction by which it may be carried into effect, as many changes may be made in the details of the construc-

tion without departing from the main principles of the invention and without sacrificing its chief advantages.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a lifting-jack, the combination of a base-frame, a lifting-screw, a nut mounted in said base-frame for operating said screw, the opposing surfaces of said nut and frame having annular concave channels or grooves formed therein, annular concave ball-races removably mounted in and fitted to said channels or grooves, antifriction-balls confined between said ball-races, and means for rotating said screw.

2. In a lifting-jack, the combination of a base-frame, a lifting-screw, a worm-wheel mounted in said base-frame and forming a nut for said screw, the opposing surfaces of said worm-wheel and frame having annular concave channels or grooves formed therein, annular concave pressed-steel ball-races removably mounted in and fitted to said channels or grooves, antifriction-balls confined between said ball-races, a worm for operating said worm-wheel, a shaft carrying said worm and journaled in the base-frame, and means for rotating said shaft.

3. In a lifting-jack, the combination of a base-frame, a lifting-screw, a worm-wheel journaled in said frame and forming a nut for said screw, a worm for driving said wheel, a shaft carrying said worm, a thrust-bearing for one end of said shaft, said bearing consisting of a removable ball-race between which and a ball-race on the shaft antifriction-balls are confined, and a bushing forming a bearing for the other end of said shaft, said bushing being removable to permit the withdrawal of said worm-shaft.

4. In a lifting-jack, the combination of a base-frame, a lifting-screw, a worm-wheel mounted in said base-frame and forming a nut for said screw, the opposing surfaces of said nut and frame having annular concave recesses formed therein, annular concave ball-races removably mounted in and fitted to said recesses, antifriction-balls confined between said ball-races, a worm for driving said wheel, a shaft carrying said worm, a thrust-bearing for one end of said shaft, said bearing consisting of a removable ball-race between which and a ball-race on the shaft antifriction-balls are confined, and a bushing forming a bearing for the other end of said shaft, said bushing being removable to permit the withdrawal of said worm-shaft in a direction away from said thrust-bearing.

5. In a lifting-jack, the combination of a hollow base-frame, a lifting-screw, means for operating said screw, a grease-cup removably secured within the lower part of said base and having a liquid-tight connection therewith, said cup and base being adapted to inclose the lower end of said screw.

6. In a lifting-jack, the combination of a hollow base-frame having an interior annular shoulder at an intermediate point, a lifting-screw, means for operating said screw, and a grease-cup removably fitted to the interior of the base with a packing between its open end and the shoulder on the base.

7. In a lifting-jack, the combination of a hollow base-frame having an interior shoulder at an intermediate point, a lifting-screw, a worm-wheel journaled in said base and forming a nut for said screw, a worm-shaft for operating said wheel, a cap inclosing said worm and worm-wheel, and a grease-cup removably fitted to the interior of the base with a packing between its open end and the shoulder on the base.

8. In a lifting-jack, the combination of a base-frame, a lifting-screw, a nut journaled on the base-frame for operating said screw, means for turning said nut, a head carried on said screw, said head having an undercut recess in its contact-surface, and a piece of yielding material pressed into said recess and projecting beyond the surface of said head.

9. In a lifting-jack, a base or standard having an opening extending vertically therethrough, a lifting-screw vertically arranged in said opening, a wheel threaded onto said screw and rotatable thereon, and a lubricating cup or receptacle extending upwardly into said opening from the base of the standard and surrounding the lower portion of the screw, said receptacle being closed at its lower end.

10. In a lifting-jack, the combination of a base-frame, a lifting-screw, a worm-wheel and means for driving said wheel including a worm, a shaft carrying said worm, a thrust-bearing for one end of said shaft, means for turning said shaft connected to the other end thereof, a bushing forming a bearing for said shaft between the worm and said means for turning the same, said bushing being larger in diameter than said worm and removably screw-threaded to the frame whereby the worm-shaft may be removed by simply screwing out the bushing, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM E. GASTON.

Witnesses:

RICHARD T. HIGGINS,

KATHLEEN KENNAUGH.