C. E. LOETZER & W. T. GOODNOW.

LIFTING JACK.

APPLICATION FILED JULY 22, 1909.

971,286.

Patented Sept. 27, 1910.

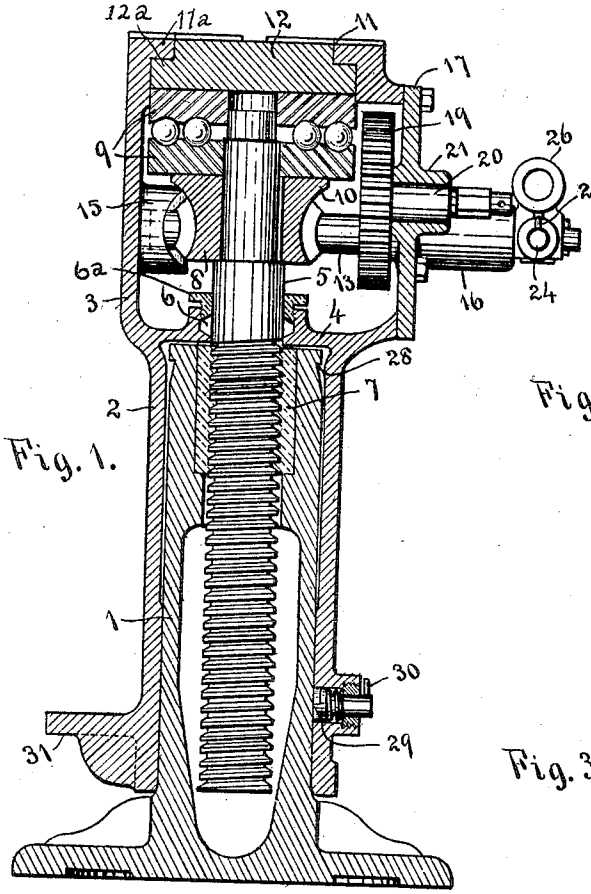

Fig. 1.

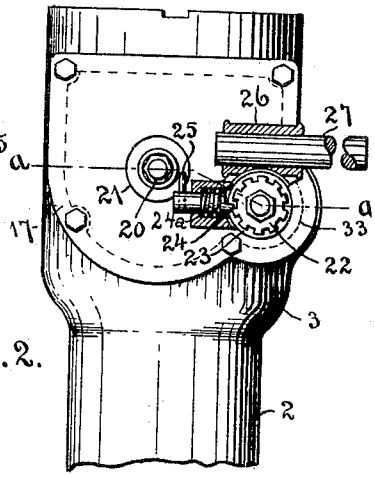

Fig. 2.

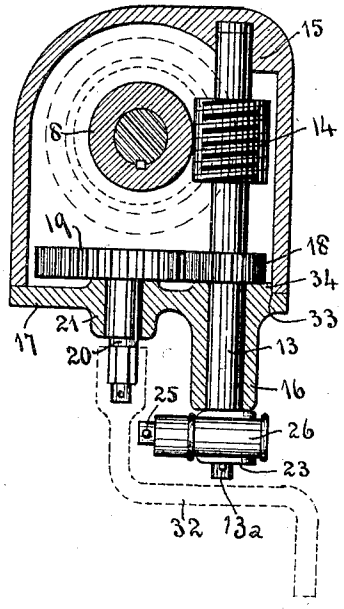

Fig. 3.

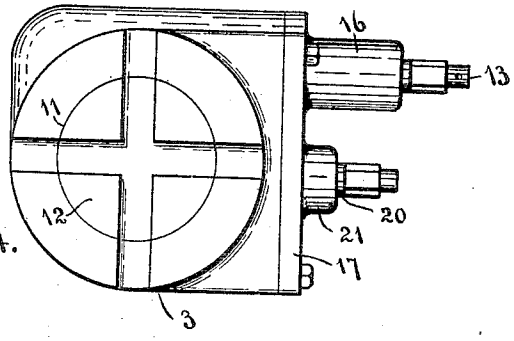

Fig. 4.

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LIFTING-JACK.

971,286. Specification of Letters Patent. Patented Sept. 27, 1910.

Application filed July 22, 1909. Serial No. 508,997.

To all whom it may concern:

Be it known that we, CHRISTIAN E. LOETZER and WILLIAM T. GOODNOW, citizens of the United States, residing at Sayre, in the county of Bradford and State of Pennsylvania, have invented certain new and useful Improvements in Lifting-Jacks, of which the following is a specification.

This invention relates to improvements in screw operated jacks wherein the screw is mounted in a nut fastened in a hollow stand, and motion is transmitted to a load carrying sleeve, which telescopes upon the stand, through a thrust bearing at the top of the screw.

Our objects are to provide an improved drive for the lifting screw; and to combine therewith means for imparting a more rapid motion to the screw when adjusting the jack to and from the load, and when operating on light loads.

A further object is to improve the construction of the jack in certain details which will hereafter be more particularly pointed out and specified in the claims.

We attain our objects by constructing the jack in the manner illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical section through the jack; Fig. 2, a side elevation of the upper portion of the jack; Fig. 3, a transverse section on the line *a*—*a* in Fig. 2; and Fig. 4, a plan view of the upper end of the jack.

Like numerals designate like parts in the several views.

Upon the stationary stand 1 is mounted a telescoping sleeve 2, provided at 3 with an enlargement to form a chamber in which is contained the operating mechanism. This chamber is separated from the sleeve by a diaphragm 4, centrally bored to permit the passage therethrough of the screw 5. Where the screw passes through the diaphragm we provide a stuffing box 6, having a packing gland 6ª, so that oil or grease may be placed in the chamber, and its leakage downward past the screw prevented. The stand, at its upper end, has a nut 7 of suitable metal, preferably bronze, fastened therein, which receives the lifting screw 5. The upper end of the screw has keyed to it a worm wheel 8, the upper portion of which wheel is carried out somewhat at 10 to form a support for the ball bearing through which motion is transmitted from the screw to the sleeve. This ball bearing consists of two grooved rings 9, of hardened steel, between which the balls are located, the lower ring resting upon the worm wheel, and being centered by the upward extension of the screw shaft. The upper ring is also centered by the screw shaft, and upon it rests a cap piece 12, which is adapted to close an opening 11 through the upper end of the sleeve, said opening being provided with an inturned flange 11ª which is engaged by a shoulder 12ª on the cap piece, so that the thrust from the screw is transmitted through the cap piece to this flange when the sleeve is being raised, and vice versa.

A worm 14 to operate the worm wheel is positioned at one side of the chamber 3, and is driven by a shaft 13, the thrust on said shaft, when the screw is operated to lift a load, being transmitted to a suitable thrust bearing contained in the journal box 15, formed within said chamber. The shaft 13 projects at the opposite end through a bearing 16 formed on the coverplate 17, which closes an opening at one side of the chamber. Inside this coverplate, the shaft is provided with a small pinion 18, which meshes with a larger gear 19, mounted upon a shaft 20, which projects through a bearing 21 on the coverplate. The opening which is closed by this coverplate is sufficiently large to permit the insertion and removal of the bearing rings 9, and the cap 12, as well as the worm and gears.

Preferably the shaft 13 and its bearing 16 will be carried out beyond the shaft 20 and a ratchet wheel 22 and operating bar 27 will be applied to the end of the shaft; so that, in turning the worm, the ratchet may be operated with the bar in any position around the shaft, or may be carried completely around with the shaft, if so desired.

For use on this worm shaft we are providing a ratchet device particularly adapted for our purpose. This device consists of the ratchet wheel 22, contained in a frame 23, and having a hexagonal or other suitably shaped opening broached through it to fit a similar shape on the worm shaft, the ratchet being held upon the shaft by means of a cotter pin at 13ª inserted through a hole provided therefor in the projecting end of the shaft. The ratchet is operated in either direction by means of a pawl 24, slidably

mounted in a socket formed at one side of the ratchet frame, and held in engagement with the ratchet wheel by means of a coiled spring 24ª, as shown in Fig. 2. The stem of the pawl projects outside of the socket, and is provided with a turning pin 25, which projects from one side of the stem only, in order that said pin may indicate when the pawl is set to operate the ratchet to the right or left. The ratchet frame is provided with a socket 26, through which the operating bar 27 passes. This socket is so positioned that the bar may be run completely through the socket, and set so as to be operated from either side of the jack, and with any desired leverage. As shown herein this socket is positioned above the ratchet wheel, so that the bar will pass over the worm shaft.

The shaft 20 for operating the large gear has its projecting end formed in the same manner as the shaft 13; and, if desired, the ratchet may be transferred to this shaft. As, however, it is the intention to use this shaft for the quick adjustment of the jack, to and from the load, we provide a socket crank, as indicated by the broken lines at 32 in Fig. 3, for operating this shaft.

The top of the sleeve, or, rather, the enlargement 3, and the outward face of the cap piece 12, are formed in any desired manner for receiving and supporting the load; and the sleeve will further be provided at its lower end with a projecting foot piece 31, to be used where the jack cannot be inserted beneath the load.

To prevent the screw from being rotated to such an extent as to carry the sleeve above the top of the stand 1, we provide at 29 a latch similar to the pawl 24; which, when the sleeve reaches its upper extension, engages a groove 28, formed around the upper end of the stand 1. The turning pin 30 indicates the position of this latch; and it will be evident that, by reversing the position of this pin, the latch will be turned in a position to be snapped past the groove 28 to permit the removal of the sleeve from the stand, when desired.

By means of our sleeve construction, the thrust of the screw on the ball bearing, (which bearing in itself is not new), is transmitted through the cap piece 12 to the flanged end of the sleeve. The sleeve is otherwise integral, and there is, therefore, no weakening screw joints to receive the thrust, whether the load is carried upon the head of the screw, or by the foot piece 31. Moreover, the openings at the opposite ends of the sleeve materially assist in the proper casting and machining of the sleeve, as will be evident to those skilled in the art.

To assemble the jack, the sleeve is first placed upon the stand; then the screw, with the worm wheel keyed thereon, is inserted through the opening 11, and screwed down until the worm wheel strikes the packing gland for the stuffing box 6. This permits the ball bearing rings and balls to be inserted through the side opening and placed in position upon the worm wheel and screw shaft; after which the cap piece 12 is passed through the side opening and placed upon the upper bearing ring. The screw is then screwed up until the cap piece enters the opening 11 and engages the flange. The stuffing box 6 is then packed, and the gland screwed down to make a tight joint around the screw; after which the jack is turned over upon one side and the chamber 3 filled, or partially filled, with oil or suitable lubricating grease. The coverplate 17, with the gears and gear shaft assembled thereon, is then set in place, the worm being screwed into engagement with the worm wheel until the end of the shaft 13 enters the bearing 15, and the coverplate comes up against the face of the side opening; after which the coverplate is bolted into place, and the jack is ready for use. To make an oil tight joint, a suitable gasket (not shown), or other packing device, will be necessary between the cover-plate and the face of the side opening.

For the purpose of properly alining the shaft 13 we bore the side opening of the chamber, where indicated by the broken lines at 33 in Fig. 2, to the same center as that of the bearing 15, and provide the coverplate at 34 with an inside boss turned to the same diameter, whereby the coverplate will be properly centered with the bearing 15 when it is brought up into place; and the shaft 13 will run true in its bearings.

By our arrangement of the worm drive for the screw, as above described, and a proper proportioning of the worm wheel and worm, and of the pinion and gear, we are enabled to materially reduce the lifting power, or energy, to be applied to the worm shaft in raising the load, and to reduce the number of revolutions of the quick adjustment shaft for a given lift of the screw, as compared with screw jacks now on the market. The power is to be applied directly to the worm shaft when lifting the load. Should, however, power be applied to shaft 20 when the jack is under load to such an extent as to strip the gear teeth, the jack will still remain in commission, since the operation of the jack under load is independent of the gears 18 and 19. The worm also acts in itself as a positive lock for the lifting screw when the jack is under load; so that the screw cannot run down.

By providing the oil chamber for the operating parts, there will always be a thorough lubrication of the gears and bearings, and the worm gear will run at all times in a bath of oil or lubricant, thereby reducing the friction of the worm against the teeth of the worm wheel to a minimum. We thus

facilitate the ease of operation of the jack, and prevent wear between the worm and worm wheel; which hitherto have caused trouble in the use of a worm gear for jack purposes.

By this construction we are further enabled to materially reduce the weight of the jack for transmitting any given power; since the stand may be made small in diameter, and the sleeve, where it telescopes upon the stand, correspondingly small, as the screw and working parts can all be assembled through the end opening 11, and the side opening to the chamber 3. Moreover, the operating mechanism is condensed into small space, thereby reducing the size and weight of the upper parts of the sleeve.

While we have shown our jack as arranged with the quick adjustment gear, we do not limit ourselves to this construction; since the worm and worm gear only may be used and the gears 18 and 19 omitted where quick adjustment is not required. Moreover, the opening through the diaphragm 4, through which the screw 5 passes, may be arranged in any suitable manner for retaining the oil or grease within the chamber; and we do not limit ourselves to the stuffing box construction, as shown herein by way of illustration. The oil chamber may also be omitted and the other features of our invention retained.

What we claim as our invention and desire to secure by Letters Patent is—

1. A lifting jack comprising a stand, a screw mounted in a fixed nut carried by the stand, an open topped sleeve telescoping on the stand, said sleeve being provided with an inwardly extending flange at the top thereof, a diaphragm in the sleeve above the top of the stand through which the screw passes with an oil tight joint, an oil containing chamber in the sleeve above the diaphragm, a cap arranged to close the top opening and provided with a shoulder extending under said flange, a thrust bearing between the screw and said cap, and means within the oil chamber for turning the screw, said means being operable from outside the sleeve.

2. A lifting jack comprising a stand, a screw mounted in a fixed nut carried by the stand, an open topped sleeve telescoping on the stand, said sleeve being provided with an inwardly extending flange at the top thereof and a lateral opening adjacent the top, a diaphragm in the sleeve above the top of the stand through which the screw passes with an oil tight joint, an oil containing chamber in the sleeve above the diaphragm, a worm wheel on the upper end of the screw adapted to pass through the top opening, a cap arranged to close said opening and provided with a shoulder extending under said flange, said cap being adapted to be inserted through the side opening, a thrust bearing between the screw and the cap, a worm and shaft mounted in the oil chamber in mesh with the worm wheel, means outside the chamber for operating the shaft, and a cover-plate for the side opening.

3. A lifting jack comprising a stand, a screw mounted in a fixed nut carried by the stand, an open topped sleeve telescoping on the stand, said sleeve being provided with an inwardly extending flange at the top thereof and a lateral opening adjacent the top, a worm wheel on the upper end of the screw adapted to pass through the top opening, a cap arranged to close said opening and provided with a shoulder extending under the flange thereof inside the sleeve, said cap being adapted to be inserted through the side opening, a thrust bearing between the screw and the cap, a worm and shaft mounted in the sleeve in mesh with the worm wheel, means outside the sleeve for operating the shaft, and a cover-plate for the side opening.

4. A lifting jack comprising a stand, a screw mounted in a nut carried by the stand, an open topped sleeve telescoping on the stand, said sleeve being provided with an inwardly extending flange at the top thereof, a cap arranged to close said opening and provided with a shoulder extending under the flange thereof inside the sleeve, a thrust bearing between the screw and the cap, and means inside the sleeve for turning the screw, said means being operable from outside the sleeve.

5. A lifting jack comprising a stand, a screw mounted in a nut carried by the stand, an open topped sleeve telescoping on the stand, said sleeve being provided with an inwardly extending flange at the top thereof and with a side opening adjacent thereto, a cap arranged to close the top opening and provided with a shoulder extending under the flange thereof inside the sleeve, said cap being adapted to be inserted through the side opening, a gear wheel on the screw adapted to be passed through the top opening, a thrust bearing between the screw and the cap, and means operable from outside the sleeve for turning said gear wheel.

In testimony whereof we have affixed our signatures, in presence of two witnesses.

CHRISTIAN E. LOETZER.
WILLIAM T. GOODNOW.

Witnesses:
CHAS. C. WEST,
GEO. E. LUCE.