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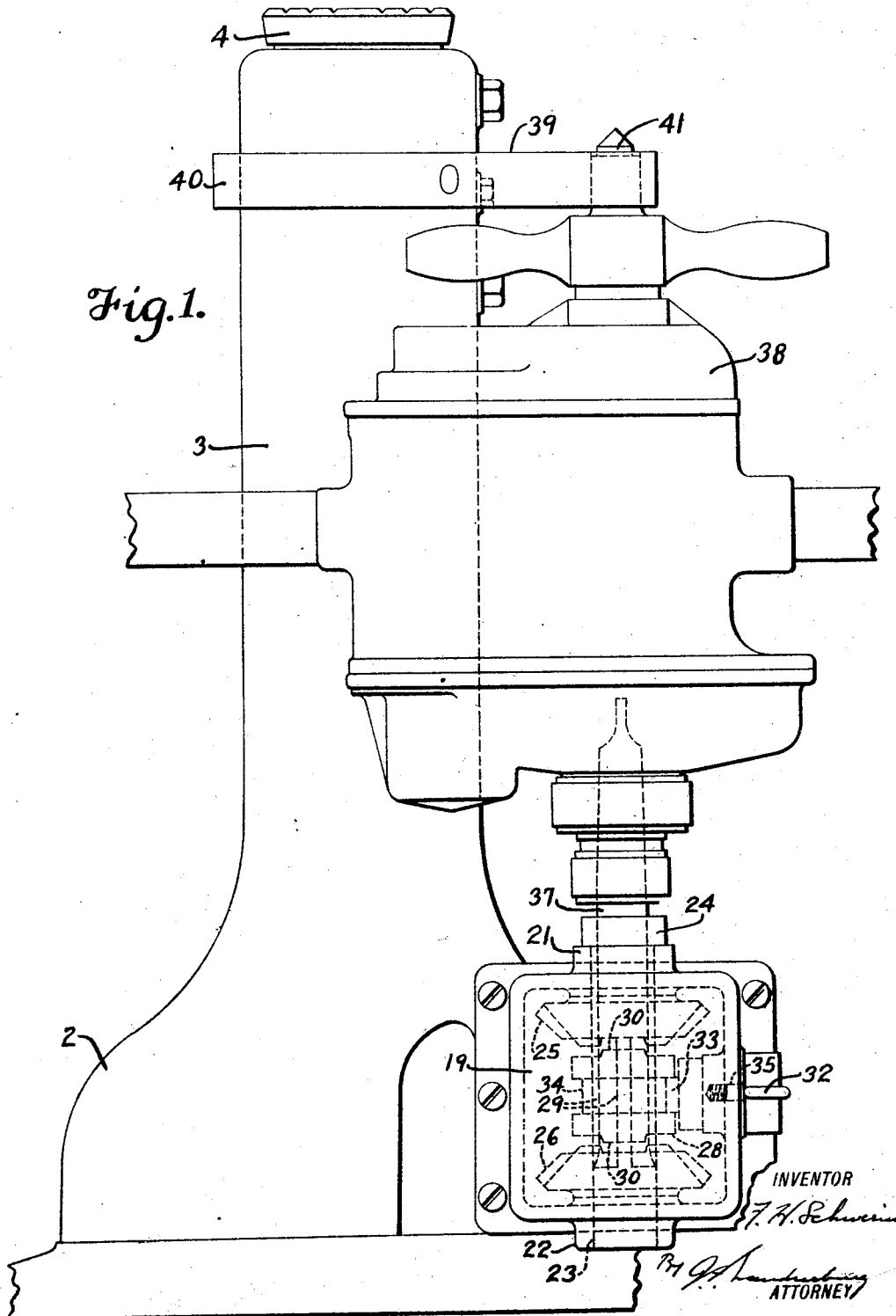
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F. H. SCHWERIN

LIFTING JACK

Filed May 12, 1922

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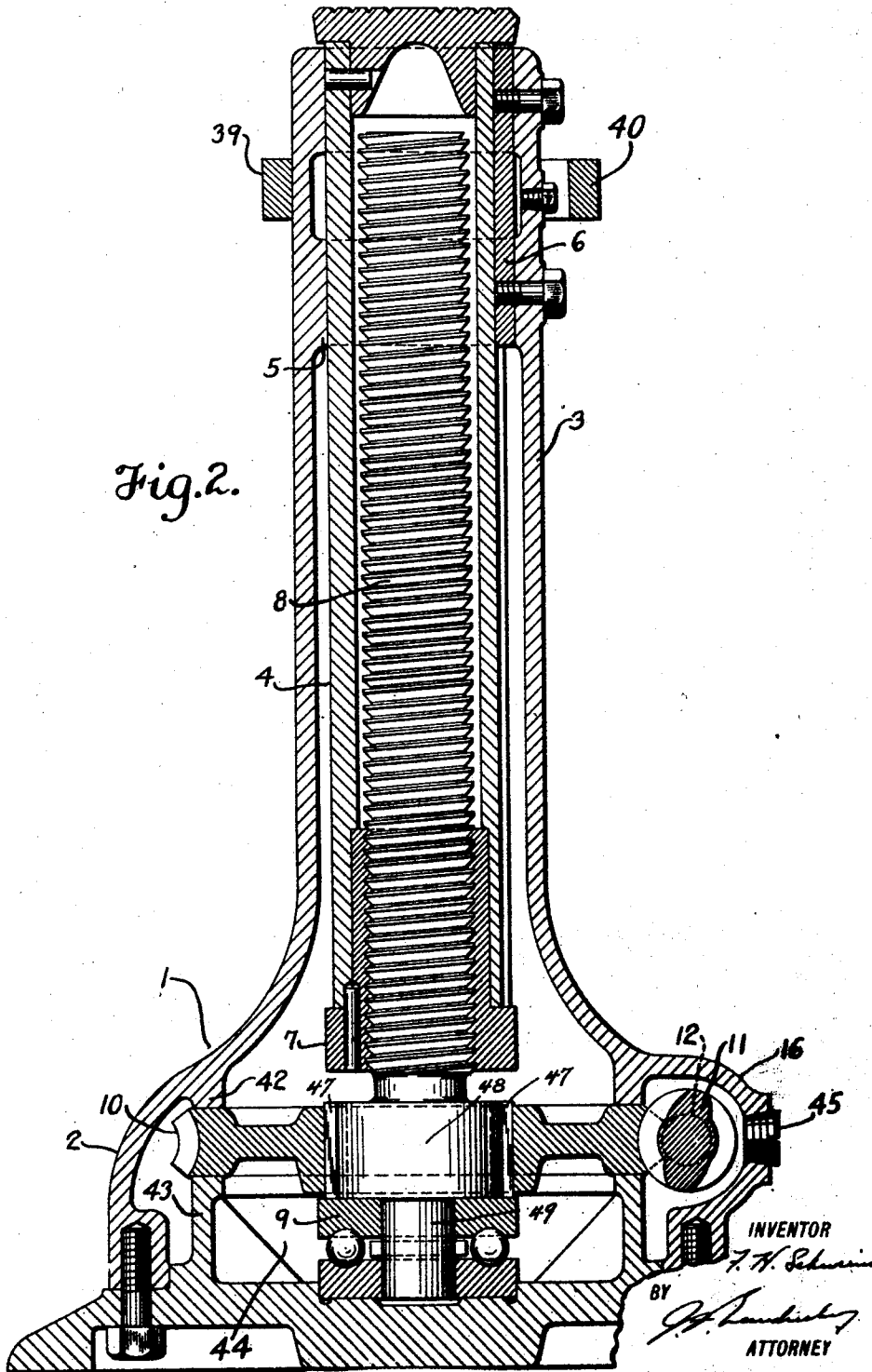
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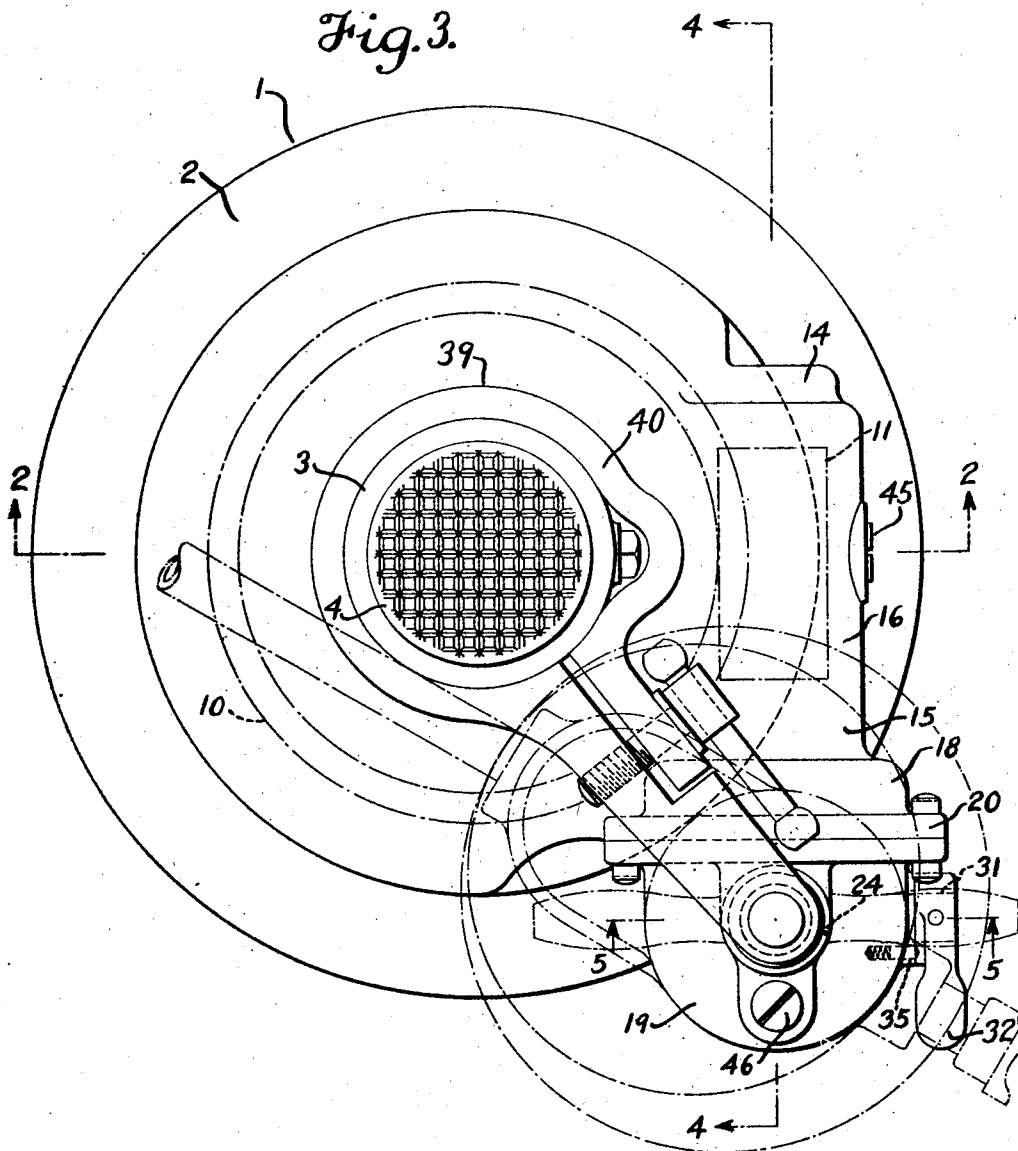
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INVENTOR

F. H. Schwerin

BY

J. H. Lumberg

ATTORNEY

Sept. 1, 1925.

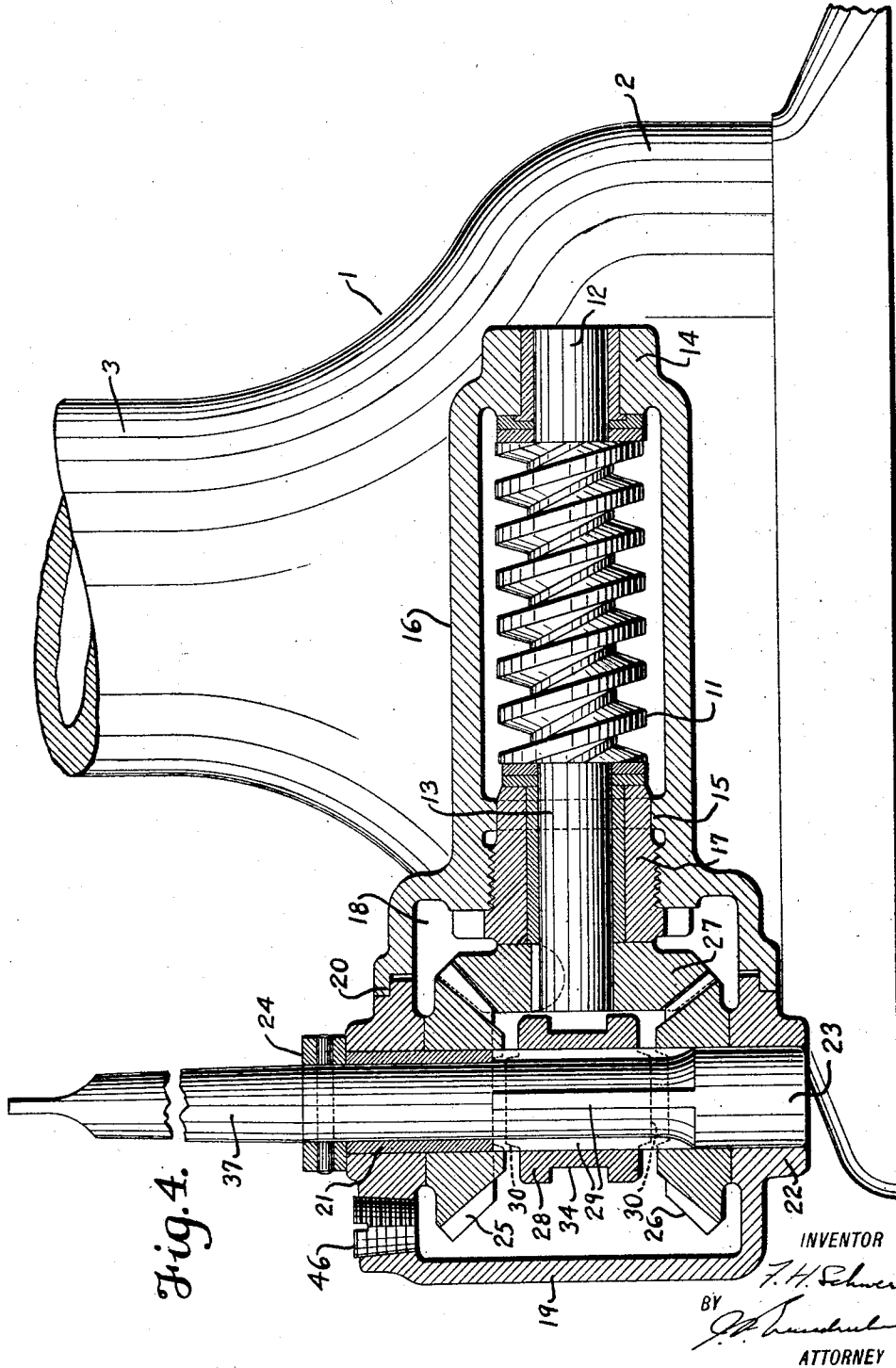
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LIFTING JACK.

Filed May 12, 1922

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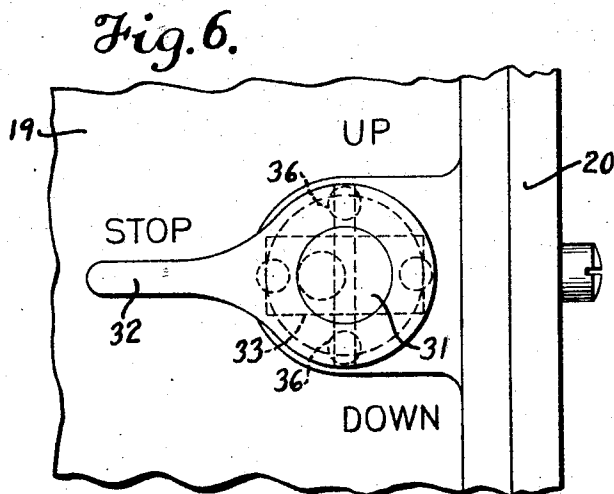
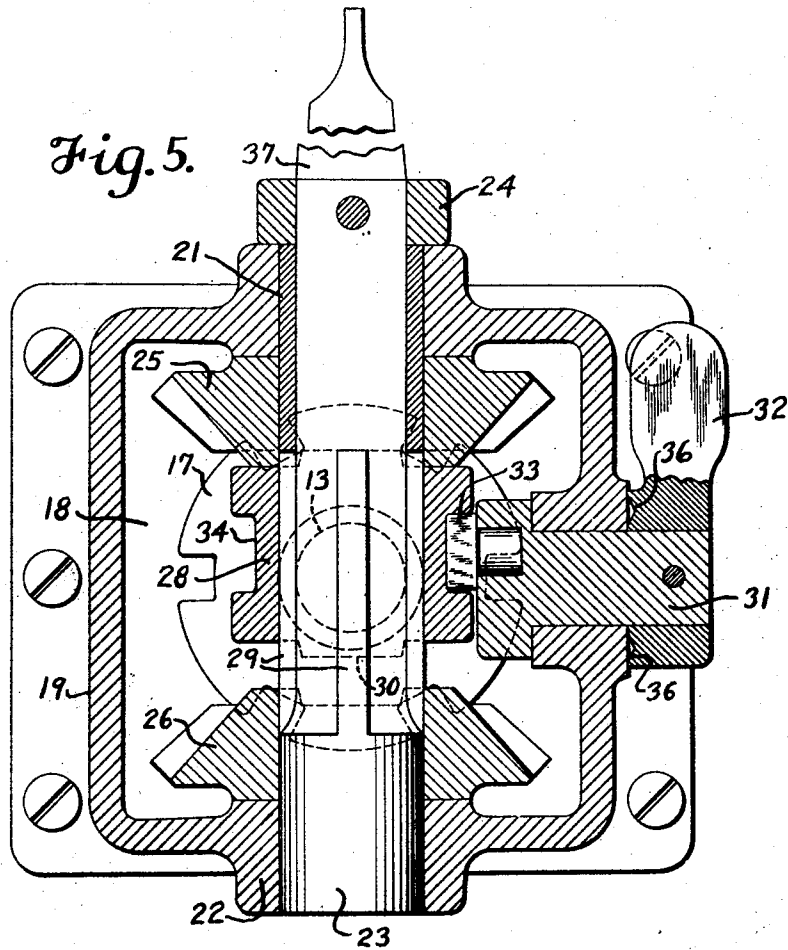
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LIFTING JACK

Filed May 12, 1922

5 Sheets-Sheet 5



INVENTOR
F. H. Schwerin
BY *J. H. Schwerin*
ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK H. SCHWERIN, OF WEST VIEW, PENNSYLVANIA, ASSIGNOR TO THE DUFF MANUFACTURING COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

LIFTING JACK.

Application filed May 12, 1922. Serial No. 560,350.

To all whom it may concern:

Be it known that I, FRANK H. SCHWERIN, a citizen of the United States, and a resident of West View, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Lifting Jack, of which the following is a specification.

The object is to provide an improved screw jack operated by a motor, more particularly by air-drill motors such as are commonly in use in railroad yards and elsewhere where the jack may be employed, the invention not being necessarily limited, however, to the one embodiment herein described. The invention also provides an improvement in worm-gear screw jacks advantageous in but not limited to motor-operated jacks, since it may also be employed in hand-operated jacks. The invention accordingly comprises the parts, improvements and combinations herein illustrated and more particularly pointed out in the claims.

In the accompanying drawings forming a part hereof:

Fig. 1 is a side elevation of the jack with the motor, the reversing gearing inside the jack frame being shown in broken lines in the neutral position;

Fig. 2 is a central vertical section looking in the same direction as Fig. 1, the plane of the section being indicated by the line 2—2 of Fig. 3;

Fig. 3 is a top plan, indicating with broken lines the outline of the motor;

Fig. 4 is an enlarged sectional elevation of the lower part of the jack, the section being taken on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged vertical section on the line 5—5 of Fig. 3; and

Fig. 6 is a fragmentary elevation showing the external starting, stopping and reversing device.

The jack has a base-frame 1 in the form of a closed shell having an expanded lower portion 2 to rest on the ground and to house parts to be described, and a standard portion 3.

A lifting member or ram 4 is slidably guided in a bearing 5 in the top of the frame and held against rotation by a key 6. In the lower end of the lifting member, which is hollow, is a nut 7. A vertical screw 8, constituting a rotary lifting screw member, is rotatably supported on the bot-

tom of the base upon a suitable step-bearing 9 and extends through the nut, with which it coacts, upward within the lifting member. The screw members are of self-holding pitch, so as to be capable of sustaining the load at any height to which it may be raised. Rotation of the screw in one direction raises the lifting member and load, and rotation in the opposite direction lowers them.

A large-diameter horizontal worm-wheel 10 is fixed as to rotation to the lower portion of the screw, above the bearing 9, and is meshed by a horizontal worm 11 having shaft or journal portions 12, 13 rotatable in bearings 14, 15 in the ends of a side chamber 16 of the expanded lower portion of the closed base-frame. The bearing 15 is afforded by a gland 17 which permits insertion and removal of the worm. Outside of this gland is an outer chamber 18 formed by an enlargement of the integral chamber structure and by a bolted-on hood 19, the hood being centered and vertically sustained by a tongue and rabbet joint 20.

Alined bearings 21, 22 in the bottom and top of the outer chamber receive a vertical shaft 23, which is sustained against downward thrust by a collar 24. Loose on the said vertical shaft, within the chamber 18, are opposed bevel gears 25, 26, both of which mesh constantly with a bevel gear 27 on the end of the worm shaft portion 13, which projects into the said chamber. A double-ended clutch member 28 keyed to the vertical shaft by splines 29 is slidable up and down between the gear elements 25, 26, and has formations 30 at both ends for alternate driving engagement with suitable complementary formations on the gears. In the neutral position the clutch member engages with neither gear element, and consequently the jack is not operated though the vertical driving shaft continue to operate. By shifting the clutch member up or down, one or the other of the gears 25, 26 is connected to the shaft and drives the gear 27, and thereby the worm, worm-wheel and lifting screw, in one direction or the other, for lifting or lowering, as the case may be.

The reversing clutch member 28 is held and operated by an attendant's device comprising a turn-button 31 (Fig. 5) having a stem passing rotatably through a side wall of the chamber 18 and provided at its

outer end with a thumb-piece 32, the turn-button having an eccentric projection 33 which enters a circumferential groove 34 in the clutch member. A non-positive, spring-pressed locking plunger 35 (Fig. 3) in the frame snaps into any one of a plurality of positioning recesses 36 (Fig. 5) in the hub of the thumb-piece according to the different positions.

The projecting upper end 37 of the shaft 23 is formed for engagement with the socket of an air-drill motor 38, a motor-bottom-rest and power-intake being provided upon which the motor can be simply placed, the attendant not being required to sustain the weight of the motor. As seen in Fig. 3 this part is offset by virtue of the construction at such distance from the center or standard of the jack, and sufficiently above though near the bottom, as to accommodate a motor of customary size. The nature of such motors, being well understood, does not require explanation.

In order to stay the motor laterally, a top steady-rest 39 is provided, the same comprising an arm having a clamp collar 40 to embrace the standard and a vertical opening in its outer end which is disposed over the motor-bottom-rest to receive the projection 41 at the top of the motor.

Upper and lower, substantially circular ribs or bearing surfaces 42, 43 formed, respectively, in the lower body part of the base frame and in a separate screwed-on bottom meet the opposite faces of the worm-wheel 10 just inside of its peripheral teeth, and form with the shell wall a circumferential lubricant chamber 44, of which the worm chamber 16 forms a part and enlargement. This chamber can be filled with grease through an opening closed by a plug 45, to lubricate the meshing gear regions, without the necessity of filling the general interior of the shell. An important function of these ribs, and particularly of the rib 43, is to aline the worm-wheel 10 with the worm. Much difficulty has been experienced with worm-gear screw jacks having the worm-wheel on the screw, because of the worm-wheel and worm not being in exact relation, causing serious wear and friction resulting in derangement of the jack. According to this part of the invention I provide an independent alining bearing for the worm-wheel substantially as shown, the worm-wheel being feathered on the screw, as shown at 47, so that there can be slight relative movement between the screw and wheel in directions parallel with the axis, the feathers nevertheless connecting the worm-wheel in driving relation to the screw. In this way the worm-wheel is relieved of the screw-thrust, and it is a simple matter to form the alining ribs so that they positively and accurately hold the

worm-wheel in relation to the worm. The lower part of the screw within the worm-wheel is formed as an enlarged hub or collar 48 to rest on the top plate of the bearing 9, and below this hub the screw shaft is continued as a stub 49 centering the screw in the bearing in the known manner. This feature might also be embodied in screw jacks of specifically different operation. The outer chamber 18 may likewise be filled with lubricant through an opening closed by a plug 46.

From the foregoing, it will be perceived that a simple, compact and efficient jack mechanism has been devised for power operation of the kind described. All that is necessary is to put the air-drill motor on the jack and start it running, after which the jack is caused to lift or lower the load by operating the reversing mechanism in the jack by the thumb-piece 32. The jack can be stopped either by putting the reverse in neutral, or by cutting off the air to the motor. The jack embodies within it a reversing gearing, in the chamber 18, and a speed-reducing gearing (the worm and worm-wheel) which cuts the speed of the motor down to a proper speed of operation of the jack, the gearings being interposed in serial relation between the power-intake and the lifting screw.

While the form of the invention described is the one preferred and deemed most advantageous, other embodiments are not necessarily excluded, as for example other types of motor might be employed or the motor might even be built into the jack. Various details may be altered and there may be rearrangements or reversals without changing the invention.

What I claim as new is:

1. In a lifting-jack, a base-frame, a slidable lifting member, a rotary lifting screw member supported in the base-frame, a worm-wheel connected to said screw member, a horizontal worm and shaft in the lower part of the base frame meshing said worm wheel, a motor-bottom-rest and vertical power-intake shaft in an offset lower part of the base-frame, whereon to place a motor, opposed gear members loose on said vertical power-intake shaft, a clutch member slidably keyed to the shaft adapted for alternate engagement with said gear members and in neutral position to be disengaged from both, an operating device for said clutch member on the outside of the base-frame, and a gear on the worm shaft in mesh with both said opposed gear members.

2. In a lifting-jack, a frame, a rotatable lifting screw, an end-thrust bearing for said screw, a worm-wheel on the screw and a driving worm in the frame meshing the worm wheel, a driving connection between the worm-wheel and the screw which causes

these parts to be free of each other in the vertical sense so that the worm-wheel is free of the load thrust, and independent bearing means on the frame positioning the worm-wheel, substantially as set forth.

5 worm-wheel, substantially as set forth.
3. In a lifting-jack, a frame, an end-thrust bearing therein, a rotatable lifting screw having an enlarged hub resting against said bearing, a worm-wheel feathered on said
10 hub so as to drive the screw while being free thereof in the vertical sense so as to be free of the load thrust, a driving worm in the frame meshing said worm-wheel, and circular bearing means on the frame coacting
15 with the outer part of said worm-wheel, substantially as set forth.

4. In a lifting-jack, a hollow frame hav-

ing an expanded base portion and a separate bottom fastened thereto, a ram slidable in the stationary frame and containing a
20 nut, a rotatable lifting screw engaging the nut of the ram, a bearing on said bottom for the lower end of the lifting screw, a driving worm in the base portion of the frame, a
25 worm-wheel on the lower portion of the screw meshed by said worm and in driving connection with the screw, but free of the screw in the vertical sense so as to be free
30 of the load thrust, and circular bearing surfaces on the base portion of the frame and on the separate bottom respectively confining between them the outer portion of the worm-wheel, substantially as set forth.

FRANK H. SCHWERIN.