

J. B. SMYTHE.
LIFTING JACK.
APPLICATION FILED FEB. 15, 1919.

1,303,734.

Patented May 13, 1919.
3 SHEETS—SHEET 1.

Fig. 1.

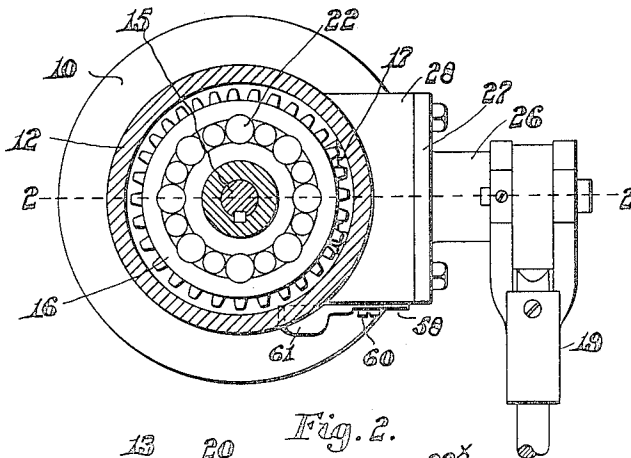
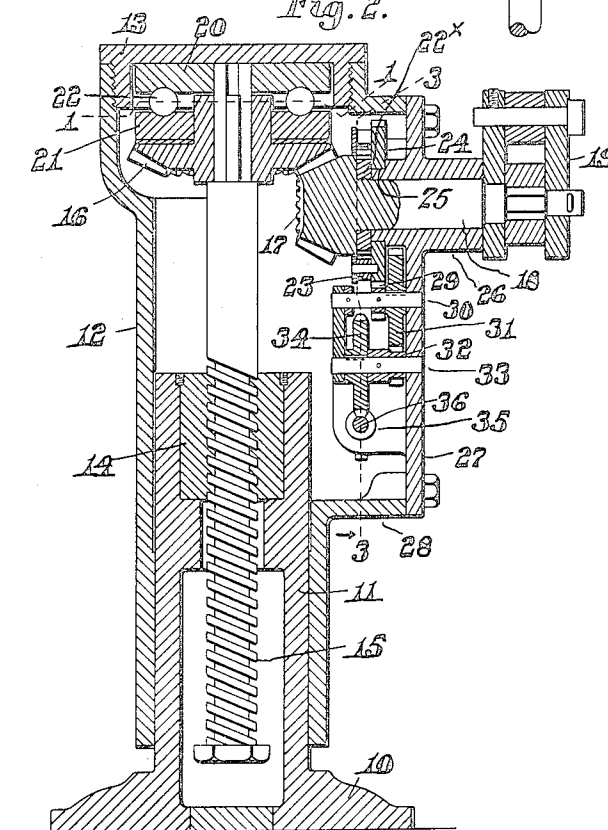


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

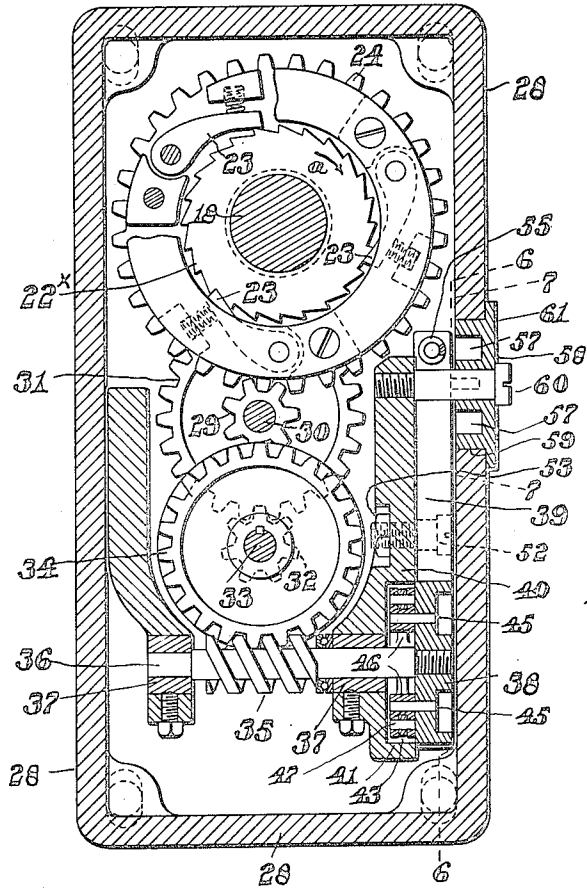


Fig. 4.

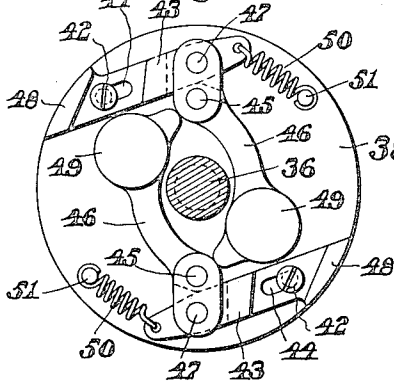
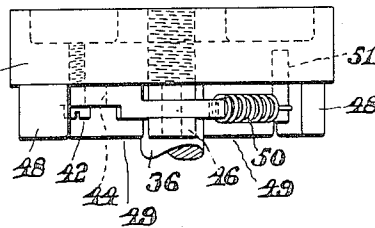


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

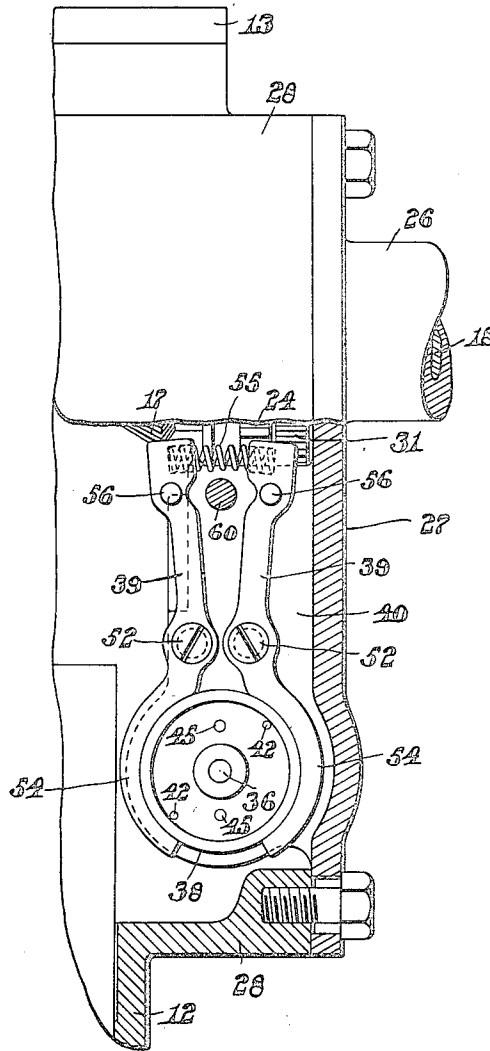
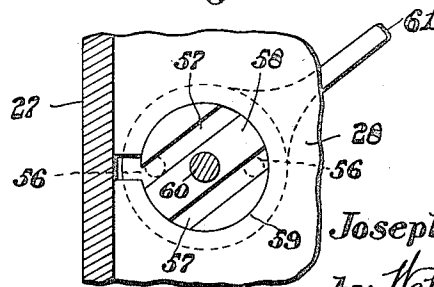


Fig. 7.



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UNITED STATES PATENT OFFICE.

JOSEPH B. SMYTHE, OF COATICOOK, QUEBEC, CANADA.

LIFTING-JACK.

1,303,734.

Specification of Letters Patent.

Patented May 13, 1919.

Application filed February 15, 1919. Serial No. 279,299.

To all whom it may concern:

Be it known that I, JOSEPH B. SMYTHE, a subject of the King of England, and a resident of Coaticook, Province of Quebec, Dominion of Canada, have invented certain new and useful Improvements in Lifting-Jacks, of which the following is a specification.

This invention relates to lifting jacks, and particularly to that class of jacks known as ratchet screw jacks.

Its object is to improve and perfect the type of quick action, self lowering jack described and claimed in Patent No. 1,131,286 issued to Joseph O. St. Pierre, March 9, 1915, in which a supplemental train of spur gears were connected by ratchet mechanism to the main operating gear spindle, or shaft, so that they would be rotated by the latter when driven in a reverse direction to that taken by it in raising the jack.

In the above mentioned patent, the high speed end of the train of gearing actuated a worm gear and worm, the threads of the latter being so pitched that the jack would start the descent under its own load automatically when the brake is released.

In the present invention the same worm and mechanism for actuating the same are used as is used in the jack described in the St. Pierre patent, but a new and improved manually operated brake mechanism is used and interposed between the brake mechanism and worm, a governor is provided which will control the speed of rotation of said worm when the manually controlled mechanism is not in operation, said governor preventing the worm from rotating beyond a predetermined speed during the lowering of the jack.

The invention consists in certain novel features of construction and arrangement of parts which will be readily understood by reference to the description of the drawings and to the claims to be hereinafter given.

For the purpose of illustrating the invention, one preferred form thereof is illustrated in the drawings, this form having been found to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized, and that the invention is not

limited to the precise arrangement and organization of the instrumentalities as herein shown and described, except as required by the scope of the appended claims.

Of the drawings:

Figure 1 represents a horizontal section of a lifting jack embodying the features of this invention, the cutting plane being on line 1, 1, on Fig. 2.

Fig. 2 represents a vertical section of the same on line 2, 2, on Fig. 1.

Fig. 3 represents an enlarged vertical section on line 3, 3, on Fig. 2.

Fig. 4 represents an elevation of the governor.

Fig. 5 represents a plan view of the same.

Fig. 6 represents a section on line 6, 6, on Fig. 3, and

Fig. 7 represents a section on line 7, 7, on Fig. 3.

Similar characters indicate like parts throughout the several figures of the drawings.

In the drawings, 10 represents a suitable base supporting a stationary standard 11 over the outer periphery of which is fitted a movable sleeve 12, to the upper end of which is threaded a cap 13. In the upper end of the standard 11 is mounted a nut 14 to which is threaded a lifting screw 15 having splined to its upper reduced end a gear 16 with which meshes a gear 17 formed upon or secured to a revoluble shaft or spindle 18, the outer end of which is provided with a suitable operating mechanism 19 of any well-known construction. Interposed between the upper face of the gear 16 and the inner face of the cap 13 are two annular plates 20 and 21, between which are interposed a plurality of antifriction members 22.

On the shaft, or spindle, 18 is threaded a ratchet 22* with the teeth of which engage a plurality of spring pressed pawls 23 pivotally secured to a spur gear 24 freely revoluble and mounted upon a reduced portion 25 of the cylindrical hub 26 forming a bearing for said spindle or shaft 18. This hub 26 is formed integral with a removable plate 27 secured to the flanged projection 28 forming a part of the movable member 12. The gear 24 meshes with a pinion 29 secured to or formed integral with a revoluble member 30 to which is also secured

a gear 31 meshing with a pinion 32 formed upon or secured to a revoluble member 33 to which is also secured a worm gear 34. This worm gear 34 meshes with a worm 35 secured upon a shaft 36 and interposed between the lugs 37 secured to the plate 27, and in which said shaft 36 is provided with bearings. The pitch of the worm 35 is such that during the rotation of the worm gear 34 rotary movement will be imparted to the shaft 36. This shaft 36 has secured to its outer end a friction disk 38 as indicated in Fig. 3 of the drawings and is adapted to have friction applied thereto by means of the friction members 39 pivoted to the lug 40 extending inwardly from the cover plate 27.

The lug 40 is provided in a side face thereof with a cylindrical chamber 41 which is closed by the friction disk 38.

The rear face of the friction disk 38 has projecting therefrom the headed members 42 acting as guides for the sliding members 43, each member 43 having a slot 44 therein through which extends the shank of one of the members 42.

The disk 38 has also projecting therefrom, the pivot pins 45 on which the weighted levers 46 are mounted, one end of each of said levers being bifurcated and provided with a pin 47 extending through a slidable member 43.

One end 48 of each member 43 is provided with a friction surface adapted to engage the cylindrical wall of the chamber 41 when the rotation of the disk 38 exceeds a predetermined speed and by centrifugal force causes the weights to be thrown outwardly.

The friction surfaces on the ends 48 are separated normally from the wall of chambers 41 by the springs 50 interposed between the opposite ends of said slidable members 43 and the fixed pins 51 mounted on said disk 38.

The brake members 39 are pivotally mounted on the studs 52 the shanks of which extend through the lug 40 and have nuts 53 threaded to their inner ends.

The lower ends 54 of the brake members 39 are curved to fit the periphery of the disk 38 as indicated in Fig. 6, and are normally held in frictional contact therewith by means of the spring 55.

Each brake member 39 is provided near its upper end with a lateral projection 56, said projections extending into parallel slots 57 in an oscillating disk 58 mounted in a cylindrical hole 59 in the side wall of the extension 28.

The disk 58 is held in position by the bolt, or stud, 60, the reduced threaded shank of which is secured in the lug 40.

The disk 58 is provided with a finger pad 61 by which the said disk may be moved about said bolt, or stud, 60 thereby moving

the slots 57 into a position nearer vertical and thus acting on the pins 56 to move them toward each other.

This operation will cause the brake members 39 to be moved about their pivots and cause a separation of the curved ends 54 from the periphery of the disk 58.

When the friction of the brake members 39 is removed from the disk 38, the jack is free to lower under its load.

Should the jack under an excessive load rotate the worm 35 at too great a speed for safety, the weights 49 will move outwardly and force the friction surfaces of the ends 48 into frictional contact with the cylindrical wall of the chamber 41 and thereby retard the speed of the worm shaft 36 to which the governor disk 38 is secured.

As soon as pressure is removed from the pad, or arm 61, the spring 55 will immediately force the ends 54 of the brake members 39 into frictional contact with the disk 58 and prevent any further lowering of the jack.

In the operation of the device when it is desired to raise the movable member 12, the operating mechanism 19 is manipulated to turn the spindle 18 and gear 17 formed thereon in the direction of the arrow *a* on Fig. 3 of the drawings. When this is done, the ratchet 22* will freely pass the pawls 23 without disturbing the train of gearing adapted during the lowering of the jack to be actuated by the driving gear 24 to which the pawls 23 are pivotally secured. During this operation, the friction member 39 is in contact with the friction disk 38. It is obvious, therefore, that during the operation of the jack to lift a load, the operating mechanism 19 will act directly upon the movable member 12 through the gears 17 and 16 and screw 15 without affecting in any manner the operation of the train of gearing hereinbefore mentioned.

When the weight has been lifted sufficiently it will be retained in its elevated position as the friction member 39 is held in frictional contact with the rotatable member 38 and consequently all movement of the said train of gears will be effectually prevented thereby resisting the tendency of said load to actuate this train by the rotation of the spindle 18 in a direction opposite to that indicated by the arrow *a* on Fig. 3, thereby causing the engagement of the teeth of the ratchet wheel 22* and the pawls 23. When it is desired to lower the movable member 12, the friction member 39 may be removed from the rotatable member 38 by pressing on the arm 61 and with the pawls 23 in engagement with the teeth of the ratchet 22*, the train of gearing will be driven by the rotation of the gear 17 and its spindle 18. The pitch of the worm threads are such as to permit the jack to

start automatically to descend under its own load when its brake is released. This train of gearing is geared up to such an extent that the shaft 36 and the rotatable member 5 38 rotate very rapidly, while the inertia of the gearing acts to substantially retard and prevent excessive speed in the descent of the jack. Should an excessive load be upon the cap 13 so that the member 12 moves 10 downwardly too rapidly, its movement may be arrested by the action of the governor. If it is desired to entirely stop the lowering of the jack, pressure is removed from pad 61 and the brake members 39 will be forced 15 into contact with disk 38.

The multiplication of the braking power through the high ratio gearing and through the worm and worm wheel will serve to make possible the quick and easy stoppage 20 by a light pressure of the brake, of the descending jack at any point.

It is quite obvious that when this friction member 39 is in contact with the rotatable member 38, the rotation of the spindle 18 25 will be controlled during the lowering of the jack through a train of gearing or may be arrested completely while during the lifting operation, these mechanisms are entirely unaffected by the rotation of said 30 spindle 18.

It is obvious that when the friction brake disk 38 has reached a certain predetermined speed, the weighted ends 39 of the levers 46 will swing outwardly by centrifugal force 35 and cause the members 43 to advance and press against the cylindrical wall of the chamber 41 thereby retarding the speed of said disk 38. This retarding action balances the load that is being lowered, a heavy load 40 causing more speed and more power exerted by the governor.

Owing to the use of the governor, the accumulation of excessive speed of the friction disk is prevented and consequently it obviates any injury to said disk or the manually 45 actuated brake members coacting therewith when stopping the descent of the loaded jack.

Without the governor, the disk 38 will attain such an accumulation of speed as to cause intense heat and consequent wear when the brake members 39 are applied to stop the descent of the load after considerable downward travel. 50

With jacks of this character in use, when an engine or other heavy machine is jacked up on both sides, the machine may be lowered evenly since the speed of both jacks will be the same. 55

It is self-evident that with the mechanism described, an accidental lowering of the jack is wholly obviated and whenever it becomes necessary to lower the jack quickly, it may be accomplished with any degree of rapidity 60 desired. 65

It is believed that the operation and many advantages of the invention will be fully understood from the foregoing description.

Having thus described my invention, I claim—

1. The combination of an operating shaft; a ratchet revoluble with said shaft; a gear loosely mounted on said shaft; a pawl on said gear engaging said ratchet; a worm; driving mechanism for said worm actuated 70 by said gear; a fixed member provided with a cylindrical chamber; a cylindrical disk rotated by said worm; a brake member coacting with said disk; manually actuated means for controlling said brake member; and 75 weight actuated members carried by said disk and adapted to be moved into frictional contact with the wall of said chamber when said disk is rotated at a predetermined speed. 80

2. The combination of an operating shaft; 85 a ratchet revoluble with said shaft; a gear loosely mounted on said shaft; a pawl on said gear engaging said ratchet; a worm; driving mechanism for said worm actuated by said gear; a fixed member provided with 90 a cylindrical chamber; a cylindrical disk rotated by said worm; a pivoted brake member coacting with said disk; manually actuated means for controlling said brake member; and weight actuated members carried by said 95 disk and adapted to be moved into frictional contact with the wall of said chamber when said disk is rotated at a predetermined speed.

3. The combination of an operating shaft; a ratchet revoluble with said shaft; a gear 100 loosely mounted on said shaft; a pawl on said gear engaging said ratchet; a worm; driving mechanism for said worm actuated by said gear; a fixed member provided with a cylindrical chamber; a cylindrical disk 105 rotated by said worm; two brake members normally in frictional contact with the periphery of said disk; manually actuated means for moving said brake members from contact with said disk; and weight actuated 110 members carried by said disk and adapted to be moved into frictional contact with the wall of said chamber when said disk is rotated at a predetermined speed.

4. The combination of an operating shaft; 115 a ratchet revoluble with said shaft; a gear loosely mounted on said shaft; a pawl on said gear engaging said ratchet; a worm; driving mechanism for said worm actuated by said gear; a fixed member provided with 120 a cylindrical chamber; a cylindrical disk rotated by said worm; weight actuated members carried by said disk and adapted to be moved into frictional contact with the wall of said chamber when said disk is rotated at 125 a predetermined speed; and braking means coacting with said disk.

5. The combination of an operating shaft; a ratchet revoluble with said shaft; a gear loosely mounted on said shaft; a pawl on 130

said gear engaging said ratchet; a worm; driving mechanism for said worm actuated by said gear; a fixed member provided with a cylindrical chamber; a cylindrical disk rotated by said worm; friction members movably mounted on said disk; pivoted weighted members adapted to move said friction members into contact with the wall of said chamber when said disk is rotated at a predetermined speed; and braking means coacting with said disk.

6. The combination of an operating shaft; a ratchet revoluble with said shaft; a gear loosely mounted on said shaft; a pawl on said gear engaging said ratchet; a worm; driving mechanism for said worm actuated by said gear; a fixed member provided with a cylindrical chamber; a cylindrical disk rotated by said worm; friction members slidably mounted on said disk; pivoted weighted members adapted to move said friction members into contact with the wall of said chamber when said disk is rotated at a predetermined speed; and braking means coacting with said disk.

7. The combination of an operating shaft; a ratchet revoluble with said shaft; a gear loosely mounted on said shaft; a pawl on said gear engaging said ratchet; a worm; driving mechanism for said worm actuated by said gear; a fixed member provided with a cylindrical chamber; a cylindrical disk rotated by said worm and closing said chamber with a portion of its periphery extending beyond the side of said fixed members; a brake member coacting with the projecting portion of said disk; manually actuated means for controlling said brake member; and weight actuated members carried by said disk and adapted to be moved into frictional contact with the wall of said chamber when said disk is rotated at a predetermined speed.

Signed by me at 4 Post Office Square, Boston, Mass., this 1st day of February, 1919.

JOSEPH B. SMYTHE.

Witnesses:

WALTER E. LOMBARD,
NATHAN C. LOMBARD.