No. 779,633. PATENTED JAN. 10, 1905.

E. WÜSTNER.

LIFTING JACK.

APPLICATION FILED MAR. 17, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

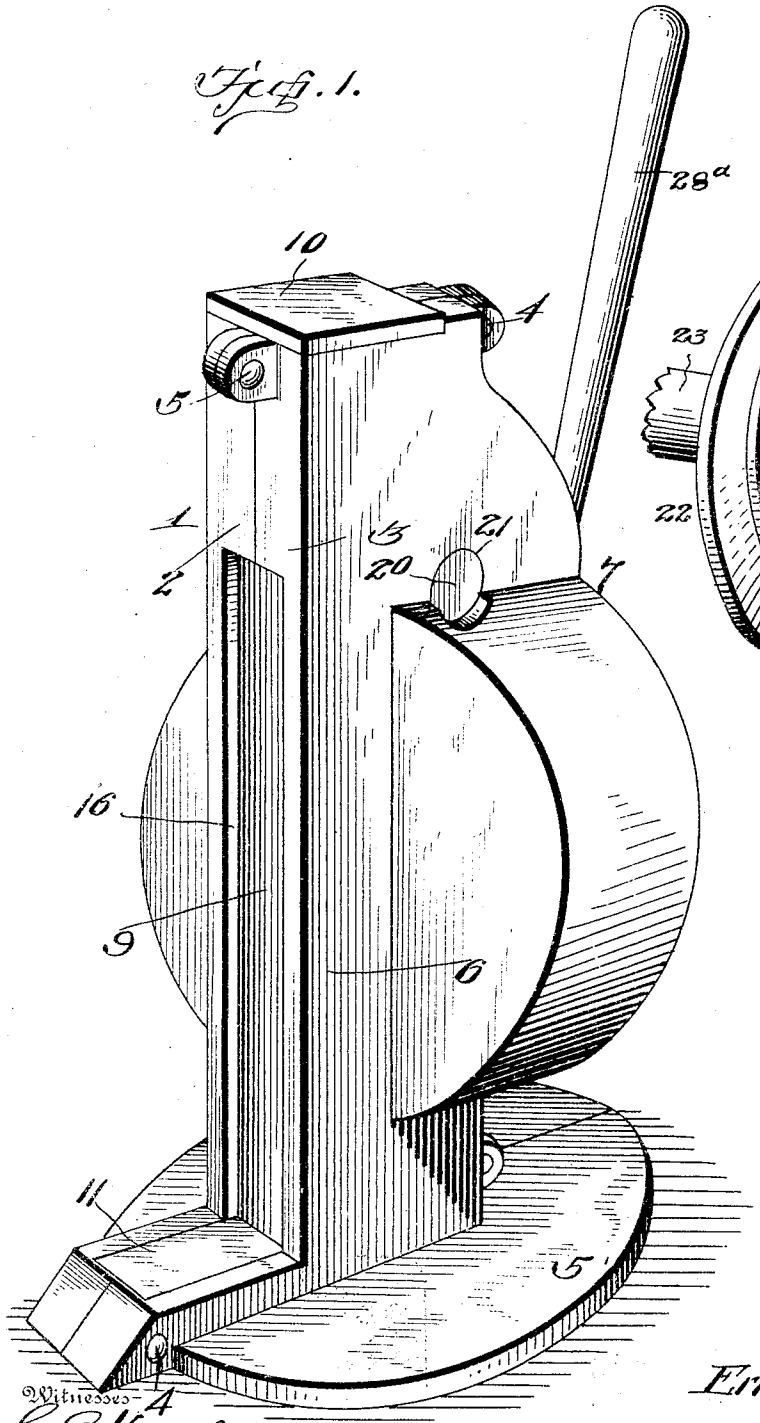
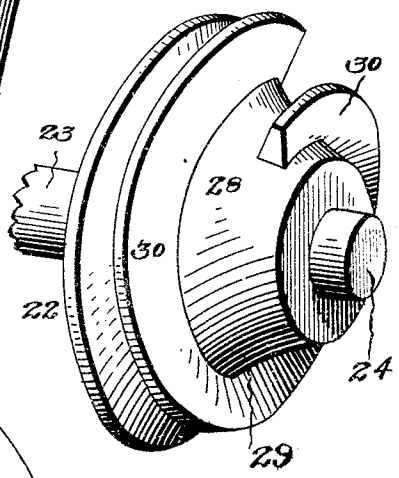


Fig. 5.



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2 SHEETS—SHEET 2.

Fig. 2.

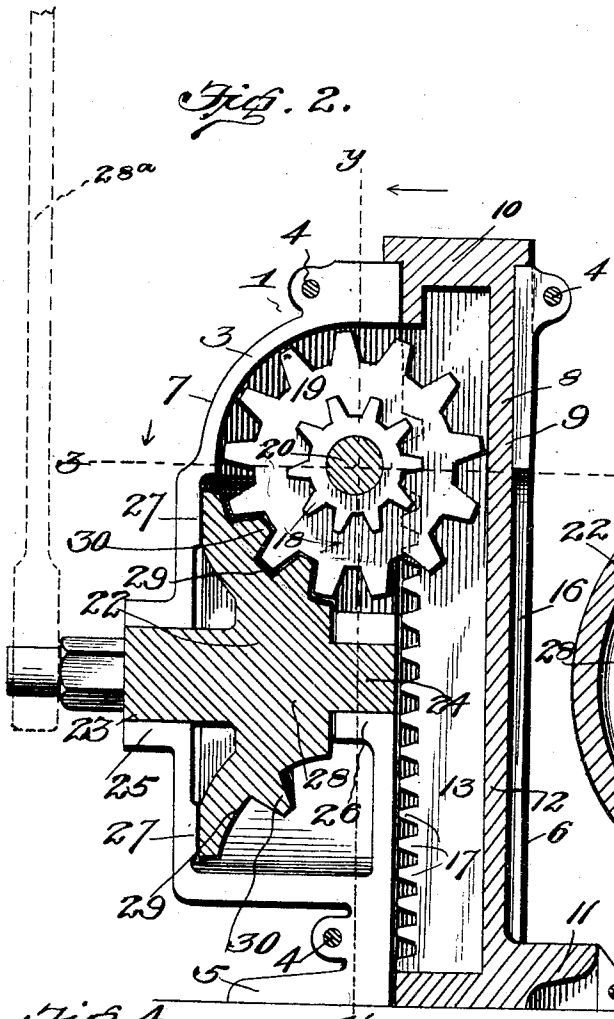


Fig. 3.

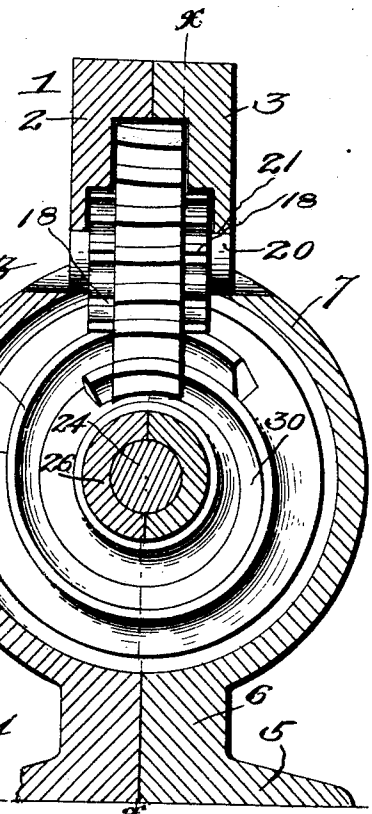


Fig. 4.

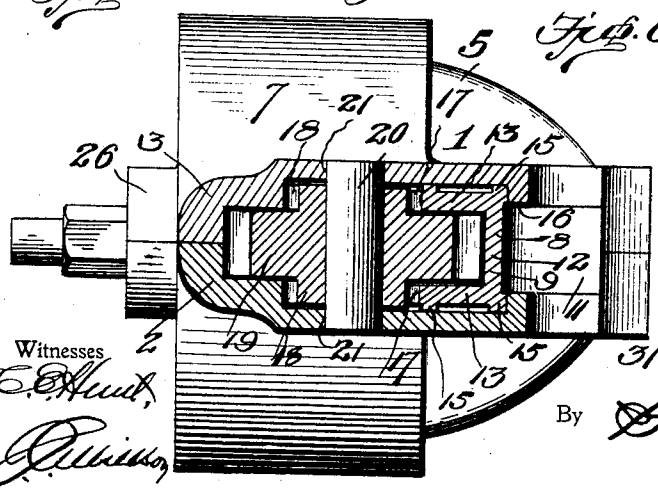
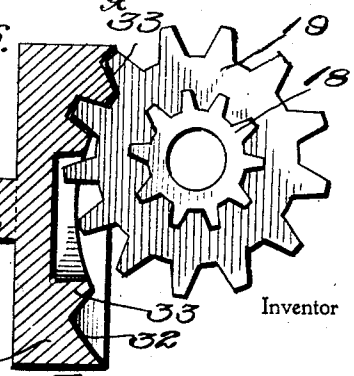


Fig. 6.



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No. 779,633. Patented January 10, 1905.

UNITED STATES PATENT OFFICE.

ERNEST WÜSTNER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE GLOBE JACK COMPANY, A CORPORATION OF PENNSYLVANIA.

LIFTING-JACK.

SPECIFICATION forming part of Letters Patent No. 779,633, dated January 10, 1905.

Application filed March 17, 1904. Serial No. 198,628.

To all whom it may concern:

Be it known that I, ERNEST WÜSTNER, a citizen of the United States, residing at Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Lifting-Jacks; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in lifting-jacks of the rack-and-pinion type; and it consists in certain novel features of construction, combination, and arrangement of parts hereinafter fully described and claimed.

The object of my invention is to provide a device of this character which will be simple and compact in construction, durable in use, efficient and powerful in operation, and comparatively inexpensive to produce. This and other objects, which will appear as the nature of my invention is better understood, I accomplish by means of the construction illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of my improved lifting-jack. Fig. 2 is a vertical sectional view through the same, the plane of said section being indicated by the line $x\,x$ in Fig. 3. Fig. 3 is a similar sectional view taken on the plane indicated by the line $y\,y$ in Fig. 2. Fig. 4 is a horizontal sectional view taken on the plane indicated by the line $z\,z$ of Fig. 2. Fig. 5 is a detail perspective view of my improved worm which is shown in Figs. 2 and 3. Fig. 6 is a detail sectional view showing a modified form of screw or worm.

Referring to the drawings by numerals, 1 denotes a suitable casing, which may be made of any suitable metal and in any desired manner, but which I preferably cast in two similar parts 2 and 3 and unite these half-sections by bolts, rivets, or other suitable fastening means 4, as shown. Said casing comprises a base 5, a body portion 6, projecting vertically from said base, and an enlargement 7, formed at the rear of the vertically-disposed body portion 6 to receive the gearing presently described.

Mounted to slide vertically in the body portion 6 of the casing is a lifting head or member 8 in the form of a shank or bar 9 having a cap or head proper, 10, at its upper end and a laterally-projecting toe 11 at its lower end. Said shank or bar 9 may be circular, rectangular, or of any desired shape in cross-section; but it is preferably hollow and square, as shown, with its rear side or face open to form a three-sided or U-shaped bar. In order to reduce friction between the shank and the casing, I preferably cast upon the outer faces of the front 12 and the two sides or arms 13 of the shank longitudinal ribs 15, which are machined or finished to slide smoothly upon the interior of the casing, as seen in Fig. 4. The shank or bar 9 projects through an opening in the top of the casing, and the cap or head 10, which may be either detachable or integral, is of greater area than the shank and rests upon the top of the casing, as shown in Fig. 1. The toe 11, which projects laterally from the lower portion of the front side 12 of the shank, is preferably formed integral with the latter, as shown, and projects through and slides in a vertically-disposed slot 16, formed in the front of the body portion 6 of the casing.

The rear ends of each of the sides or arms 13 of the shank 9 are formed with rack-teeth 17, as shown. In order to operate the lifting head or member 8, the racks formed by said teeth 17 are engaged by pinions 18, which are preferably formed integral with and upon opposite sides of a worm-gear 19. Said worm gear or wheel 19 is of greater diameter than said pinions 18 and projects through the open rear side of the shank 9 between its sides 13, as shown. Said worm-gear, with its integral pinions on each side, is preferably mounted to rotate within the enlargement 7 of the casing upon a transverse pin or shaft 20, which has its ends mounted in suitable bearing-openings 21 in the casing; but, if desired, I may form an integral trunnion upon the center of

the sides of said pinions and mount said trunnions in said bearing-openings 21, thus dispensing with the separate shaft or pin 20, as will be readily understood. Said worm-gear 19 is in mesh with a worm 22 of peculiar construction, which is formed, preferably, with integral trunnions 23 and 24, mounted in bearings 25 and 26, formed in the enlargement 7 of the casing, as clearly shown in Fig. 2; but instead of forming said worm and pinions with said integral trunnions I may key or otherwise secure them to a shaft mounted in said bearings 25 and 26. All endwise movement of the worm is prevented by the contact of its front end with the bearing 26 and of its rear face or end with the raised portion 27 of the casing, as shown. Said worm comprises a substantially cone-shaped body 28, having its inclined or tapered face 29 arc-shaped or curved concentrically with respect to the shaft 20 and having a spiral thread or rib 30 upon said inclined arc-shaped face 29, adapted to engage with the teeth of the worm-gear 19, as shown. The said spiral thread or continuous tooth 30 is tapered or beveled similar to an ordinary gear-tooth and projects or inclines toward the center of the shaft 20—that is, it is radially disposed with respect to said shaft—so that it may properly engage the teeth of the gear 19, as will be readily understood upon reference to the drawings. By the peculiar construction and disposition of thread 30 upon the curved or concave face 29 of the worm a thread of very low pitch is placed upon a body of large diameter, and the following advantages are gained: First, a more effective lock between the worm and worm-gear is obtained by reason of the low pitch, so that the head of the jack will be locked or will remain in any elevated position, and, second, owing to the peculiar shape of the body 29 of the worm it occupies less space than an ordinary worm having the same thread would occupy. The worm may be rotated by any desired means; but I prefer to employ a suitable ratchet-lever 28^a. (Indicated by the dotted lines in Fig. 2.)

Instead of driving the worm-gear 19 by the external worm 22 (shown in Figs. 2, 3, and 5 of the drawings) I may employ an internal worm 31, as illustrated in Fig. 6 of the drawings. The said worm 31 comprises a body having a concave face 32, upon which is formed a spiral thread or tooth 33, similar to the thread or tooth upon the worm 22. It will be seen that said thread 33 engages with the teeth of the gear 19 and will impart the motion of the worm to said gear when the former is rotated.

The operation and advantages of my invention will be readily understood from the foregoing description, taken in connection with the accompanying drawings. It will be seen that when the worm is rotated by the ratchet-lever 28^a by a crank-handle or by any other suitable means its motion will be imparted to the lifting head or member 8 by reason of the engagement of the worm-gear 19 with said worm and of said pinions 18 with said racks 17 upon the shank of said head. The load to be lifted may be applied to either the toe 11 or the cap 10, as desired, and in whatever position said head is left it will remain, owing to the lock formed by the engagement of the worm with the worm-gear. The necessity of locking-pawls or other locking devices to hold the head 8 elevated is thus obviated. By forming the shank 9 of the head hollow to receive the worm-gear 19 and by having the pinions 18 engage the racks 17, as shown, a very powerful and compact device is provided, and it will be seen that the force is applied, as far as it is possible to do so, in line with the center of the head. It will be further noted that the device is of simple, strong, and durable construction and may be manufactured at a comparatively small cost.

While I have shown the preferred embodiment of my invention, I wish it understood that I do not limit myself to the precise construction herein set forth, since various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. In a lifting-jack, the combination of a suitable casing, a lifting head or member having a hollow shank slidably mounted in said casing and formed with a longitudinal opening, racks provided upon said shank upon each side of said opening, a worm-gear mounted in said casing and projecting into said longitudinal opening in said shank, pinions upon each side of said worm-gear in mesh with said racks, a worm in mesh with said worm-gear, and means for rotating said worm, substantially as described.

2. In a lifting-jack, the combination of a suitable casing, a lifting head or member having a hollow shank slidably mounted in said casing and formed with a longitudinal opening, racks provided upon said shank upon each side of said opening, a worm-gear mounted in said casing and projecting into said longitudinal opening in said shank, pinions formed integral with said worm-gear upon each of its sides and in mesh with said racks, a worm for rotating said worm-gear, and a ratchet-lever for operating said worm, substantially as described.

3. In a lifting-jack, the combination of a suitable casing, a lifting head or member having a substantially U-shaped shank slidably mounted in said casing, racks formed upon each of the arms or sides of said U-shaped shank, a worm-gear mounted in said casing

and projecting between the arms of said shank, pinions formed integrally upon each side of said worm-gear in mesh with said racks, a worm mounted in said casing in mesh with said worm-gear, and means for rotating said worm, substantially as described.

4. In a lifting-jack, the combination of a casing formed of two half-sections bolted or otherwise secured together and having an opening in its top and a slot or opening in its front, a lifting head or member having a substantially U-shaped shank slidably mounted in said casing and projecting through the said opening in its top, a cap upon the upper end of said shank, a toe projecting laterally from the lower portion of said shank and through said opening in the front of said casing, racks formed upon the arms of said U-shaped shank, a shaft journaled in said casing, a worm-gear secured to said shaft and projecting between the arms of said shank, pinions upon said shaft upon each side of said worm-gear and in mesh with said racks, a worm mounted in said casing in mesh with said worm-gear, and means for operating said worm, substantially as described.

5. In a lifting-jack, the combination of a casing, a lifting head or member slidably mounted therein, a rack upon said head, a pinion in engagement with said rack, a worm-gear connected to said pinion, and a worm for operating said worm-gear, said worm comprising a body having a curved face formed with a spiral thread to engage the teeth of said worm-gear, substantially as described.

6. In a lifting-jack, the combination of a casing, a lifting head or member slidably mounted therein, a rack upon said head, a pinion in engagement with said rack, a worm-gear connected to said pinion, and a worm for operating said worm-gear, said worm comprising a tapered body having its inclined face curved concentrically with said worm-gear, and a spiral thread upon said curved inclined face to mesh with the teeth of said worm-gear, substantially as described.

7. In a lifting-jack, the combination of a casing, a lifting head or member slidably mounted therein, a rack upon said head, a pinion in engagement with said rack, a worm-gear connected to said pinion, and a worm for operating said worm-gear, said worm comprising a frusto-conical-shaped body having its inclined face curved concentrically with said worm-gear, and a beveled spiral thread formed upon said inclined curved face and disposed radially with respect to said worm-gear, substantially as described.

8. A lifting-jack having a worm-gear and a worm coacting with said worm-gear and comprising a tapered circular body having its tapered face curved to conform to the curvature of said worm-gear, and a spiral thread upon said curved tapered face to mesh with the teeth of said worm-gear, in combination with a support for the worm and worm-gear, means to rotate the worm, a lifting element, and operating connecting elements between the worm-gear and the lifting element, said connecting elements being operated by the worm-gear and acting to raise and lower the lifting element, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ERNEST WÜSTNER.

Witnesses:
BENJ. G. COWL,
J. A. GRIESBAUER, Jr.