C. W. RIPSCH AND J. C. DAWLEY.

SELF LOWERING LIFTING JACK.

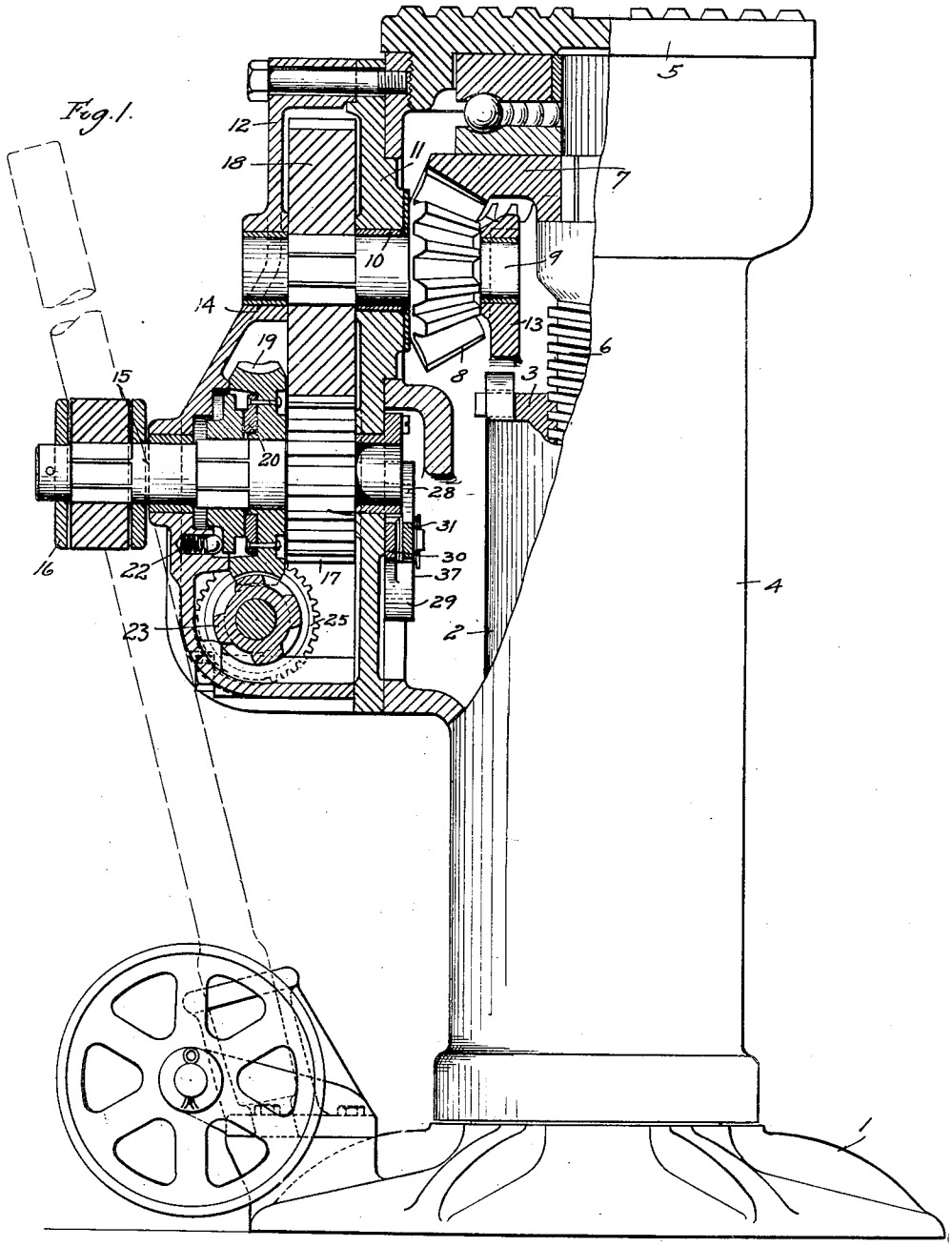
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1,349,101.

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3 SHEETS—SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 2.

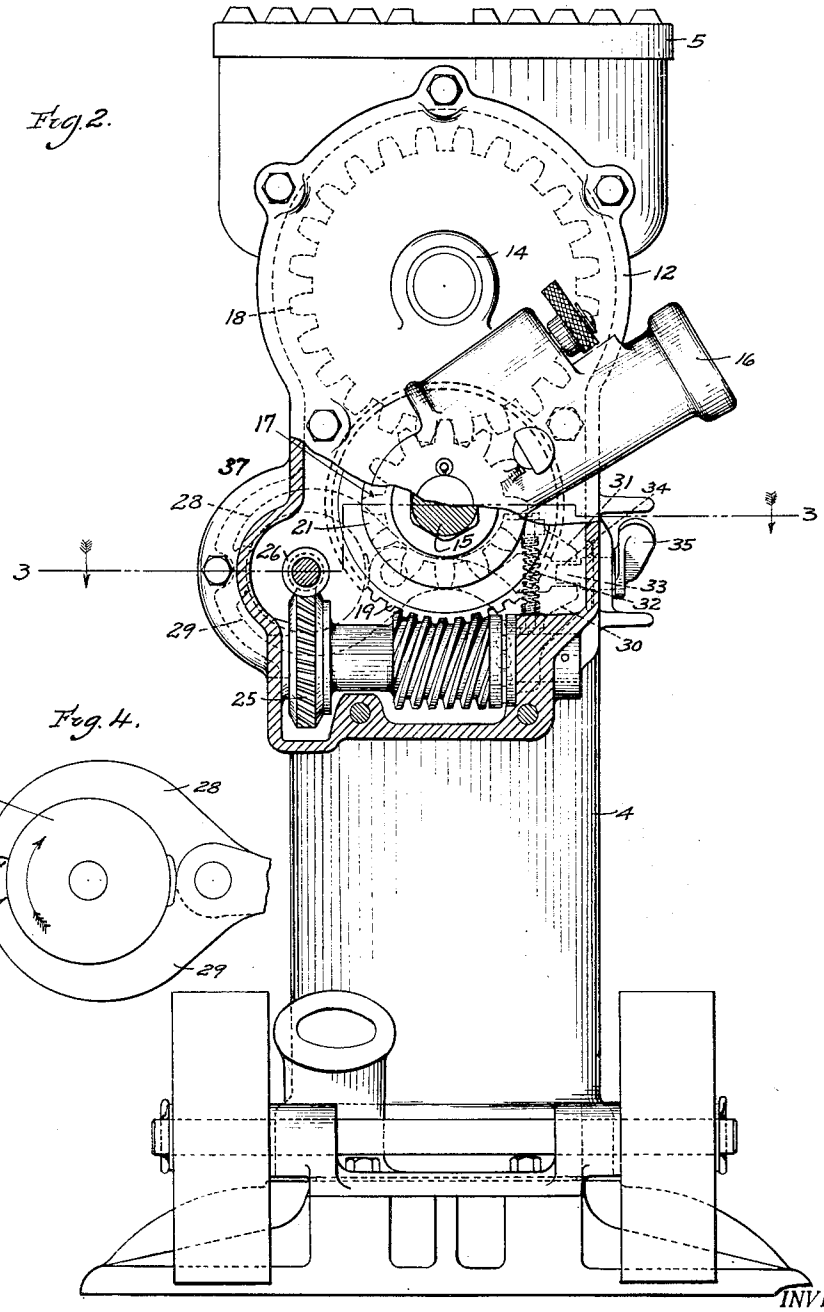


Fig. 4.

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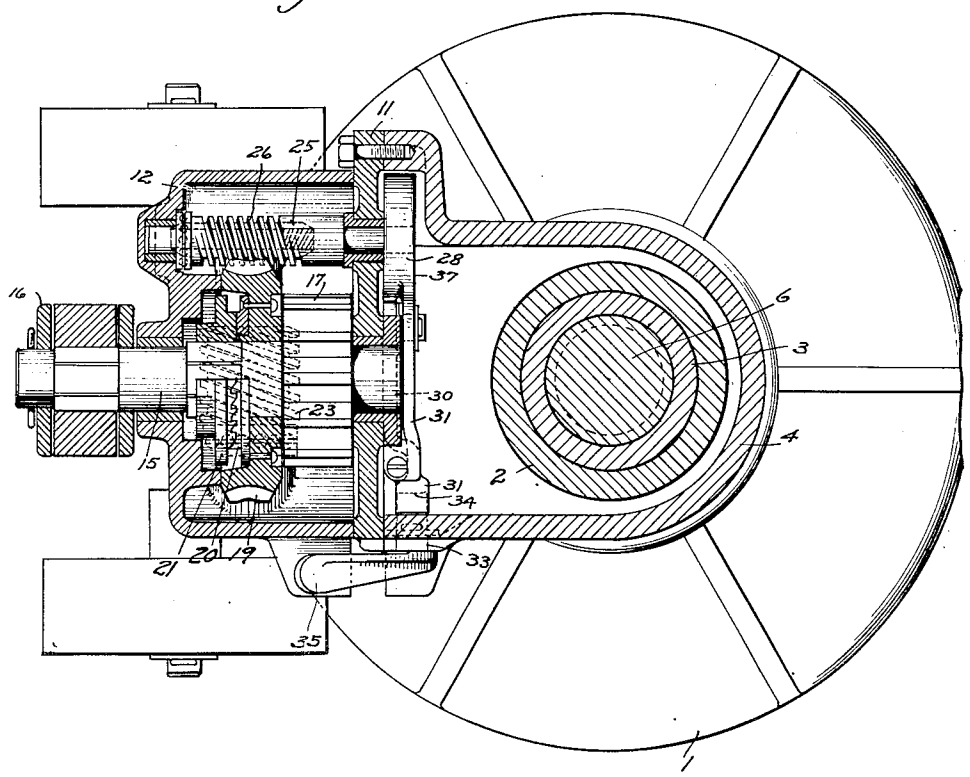
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3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES W. RIPSCH AND JAMES C. DAWLEY, OF DAYTON, OHIO, ASSIGNORS TO THE JOYCE-CRIDLAND COMPANY, OF DAYTON, OHIO, A CORPORATION OF OHIO.

SELF-LOWERING LIFTING-JACK.

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To all whom it may concern:

Be it known that we, CHARLES W. RIPSCH and JAMES C. DAWLEY, citizens of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Self-Lowering Lifting-Jacks, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a self lowering lifting jack.

The object of the invention is to provide a jack of this kind with which loads of great weight can be easily raised and which will lower such loads rapidly and under perfect control.

A further object of the invention is to provide a jack of this kind which will have the operating and controlling devices so arranged as to be readily accessible when the jack is under the load.

It is also an object of the invention to provide a strong, powerful jack which will be simple in its construction and operation and which will comprise a relatively small number of parts.

Other objects of the invention will appear as the mechanism is described in detail.

In the accompanying drawings Figure 1 is a front elevation, partly in section, of a jack embodying our invention; Fig. 2 is a side elevation, with the casing partly broken away, of such a jack; Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 2, and Fig. 4 is a view of the brake shoes showing means for removing surplus oil.

In these drawings we have illustrated one embodiment of the invention and have shown the same as applied to a screw operated lifting jack, the principal features of construction of which are well known. It will be understood, however, that this particular type of jack has been chosen for the purpose of illustration only and that the invention may be applied to jacks of various kinds.

In that embodiment of the invention here shown, the jack comprises a base 1 to which is rigidly secured a hollow standard 2 within which is mounted a nut 3. Mounted upon the base, or stationary part of the jack, is a movable member which is here shown in the form of a housing 4, which surrounds the standard 2 and is guided thereby in its movements. At its upper end this movable member is provided with a cap, or load engaging part 5. Rotatably mounted within the standard 4 and threaded into the nut 3 is a screw 6 which is connected at its upper end with the movable member and which by its rotation will impart movement to said movable member. Rotation may be imparted to the screw in any suitable manner, but preferably beveled gearing is employed for this purpose and in the present construction a beveled gear 7 is rigidly secured to the screw and meshes with a beveled pinion 8, which is secured to the shaft 9, journaled in suitable bearings in the housing 4. It is important that this beveled pinion 8 should be maintained in correct alinement with the gear 7, otherwise friction will develop between the parts which will interfere with their free operation. To this end we have supported the shaft 9 in bearings on both sides of the pinion 8 and, as here shown, the shaft is mounted in a bearing 10 in the side wall 11 of the housing, which side wall forms a partition between the housing proper and a casing 12 in which other parts of the mechanism are mounted, as will be hereinafter described, and the inner end of the shaft 9 is journaled in a suitable bearing in a cross bar 13 which is rigidly secured to and forms a part of the housing 4. In the present construction we have also shown the outer portion of the shaft 9 as journaled in a third bearing 14 in the outer wall of the casing 12. In this manner the shaft is held against all displacement and the pinion is maintained in perfect alinement with the gear 7. Rotatory movement may be imparted to the shaft 9 and consequently to the screw 6 in any suitable manner, but inasmuch as these jacks are designed for raising very heavy loads, the present jack having a capacity of seventy-five tons, it is desirable that the operating mechanism comprise power multiplying devices which will facilitate the operation of the jack. We have therefore shown the operating mechanism as comprising a shaft 15 mounted in suitable bearings in the partition 11 and casing 12, independently of the shaft 9. The shaft 15 may be operated in various ways but in the present construction it is provided with the usual lever socket 16 which is connected by

pawl and ratchet mechanism with the shaft. The rotary movement of the shaft 15 is transmitted to the shaft 9 through a spur gear 17 rigidly secured to the shaft 15 and meshing with a spur gear 18 rigidly secured to the shaft 9, the gears being in such ratio as to reduce the speed of rotation and multiply the power as applied to the pinion 8.

When the shaft 15 is released and no restrictions are placed upon the rotation thereof the weight of the load on the jack will rotate the screw and cause the movable member, or housing, 4, to move downwardly and means are provided for controlling this movement so that it can be utilized to automatically lower the load. This we preferably accomplish by suitable worm gearing and in the present construction we have shown a worm gear 19 rotatably mounted upon the shaft 15 and have provided suitable means for connecting this worm gear with the shaft when the latter is rotated by the downward movement of the load. In the present construction the worm gear is provided on its outer face with a clutch member 20 which is preferably provided with ratchet teeth and with which coöperates a second clutch member 21 slidably mounted on the shaft 15, held against rotation relatively thereof, and having ratchet teeth on its inner face to coöperate with the teeth of the clutch member on the worm gear. Suitable yieldable devices, such as the springs 22, hold the slidable clutch member in engagement with the clutch member on the worm gear and permit the ratchet teeth of the slidable clutch member to ride over the teeth of the other clutch member when the shaft 15 is rotated in a direction to raise the load. The worm gear 19 meshes with a worm 23, mounted on a shaft 24, which in turn is mounted in suitable bearings in the casing 12. The spirals of the worm gear and the worm are so arranged that the worm gear when rotated by the downward movement of the load, will impart rotation to the worm, but the relative angles of these spirals are such that the worm will offer resistance to the rotation of the worm gear and will absorb much of the power applied thereto. At the same time the worm will be rotated at an increased speed. Suitable devices are provided for retarding, or breaking, the movement of the worm, thereby enabling the movement of the load to be controlled. To facilitate this control we prefer to further absorb the power and to further increase the speed of rotation and we have therefore utilized a second set of worm gears which are interposed between the worm 23 and the braking devices. As here shown, a second worm gear 25, is rigidly connected with the worm 23 and meshes with a worm 26 which is journaled in suitable bearings in the partition 11 and in the casing 12. Connected with this worm and rotatable therewith is a brake wheel, or drum, 37, with which coöperates brake shoes 28 and 29. These brake shoes may be manipulated in any suitable manner but preferably they are provided with intersecting lever extensions, 30 and 31, which are acted upon by a spring 32 which tends to move them one toward the other and thus press the brake shoes 28 and 29 against the brake drum 27. To release the brake and permit the lowering of the load a stud 33 is journaled in the wall of the casing 12 and has its inner end flattened as shown at 34 and arranged between the ends of the levers 30 and 31, whereby the rotation of the stud will force the levers apart against the tension of the spring 32 and thereby release to a greater or less extent, the brake drum. The outer end of the stud is provided with a lever, or finger piece, 35, by means of which it may be manipulated. The braking devices may be arranged in any suitable position, but in the present instance we have placed them on the inner side of the partition 11, within the housing 4, as in this manner the mechanism can be rendered more compact and the depth of the casing 12 reduced.

The casing 12 is oil tight and we are enabled to run the gearing in an oil bath, the construction being such that a fluid oil may be used, thereby avoiding the objectionable features of the heavy grease commonly employed for this purpose, which in use tends to thicken and harden on the parts and thereby "gum up" the gearing. While the braking devices are not arranged within the casing 12, the brake drum will receive more or less oil, through the inner bearing for the worm 26 and from other sources, and we have therefore provided means for removing the surplus oil from the face of the drum. To accomplish this the end of the upper shoe 28, toward which the brake drum rotates, is provided with an edge which will scrape the surface of the drum, and the outer portion of this end of the shoe projects beyond this edge so that the oil which is removed thereby will tend to flow along this downwardly extending portion of the shoe and will thus be carried away from the drum. The upper end of the other shoe 29, is beveled rearwardly so that any oil dropping thereon from the lower end of the upper shoe will be deflected away from the drum. In this manner we remove from the drum all but a thin film of oil and provide a uniform lubrication of the brake drum and therefore a uniform action of the braking devices as a whole.

It will be noted that in the operation of the device the load is lifted and lowered through the same train of reducing gearing, gears 17 and 18, and that these gears serve to multiply the power during the raising

of the load and to multiply the speed of rotation of the controlling devices during the lowering of the load, thus facilitating both the raising of the load and the controlling of the downward movement thereof. By means of this train of gearing we are enabled to provide not only a device which is easily operated and the lowering of which is easily controlled, but also a device which is very compact in its form, which comprises but a few parts, and in which all the mechanism for raising and lowering is located on the same side of the jack. This arrangement of the raising and lowering mechanism not only eliminates an additional pinion meshing with the gear 7 and offering additional resistence to the movement thereof, but also enables all the operating and controlling devices to be so arranged that they are readily accessible when the jack is under the load, thereby avoiding the necessity of the operator placing himself beneath the load, or in other dangerous positions, in order to manipulate some part of the jack mechanism.

While we have here shown and described one embodiment of our invention, we wish it to be understood that we do not desire to be limited to the details thereof as various modifications may occur to one skilled in the art.

Having now fully described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. In a lifting jack, a base, a movable member mounted on said base, a rotatable member to actuate said movable member, a gear connected with said rotatable member, a shaft journaled in said movable member, a pinion carried by said shaft and meshing with said gear, a second shaft journaled in said movable member, reducing gears connecting said shafts one to the other, means for rotating said second shaft, a worm gear rotatably mounted on said second shaft, means to cause said worm wheel to rotate with said second shaft when said movable member moves downwardly, a worm meshing with and rotatable by said worm gear, and a brake to control the rotation of said worm.

2. In a lifting jack, a rotatable actuating member, a shaft having geared connection with said actuating member, a gear rigidly secured to said shaft, an operating shaft mounted independently of the first mentioned shaft, a gear secured to said operating shaft and meshing with the gear on the first mentioned shaft, means to actuate said operating shaft to cause movement to be transmitted through said gears to said actuating member, a worm gear rotatably mounted on said operating shaft, means for connecting said gear with said shaft only when the latter is rotated in reverse direction, a worm driven from said worm gear, and means for retarding the movement of said worm.

3. In a lifting jack, a rotatable actuating member, a shaft having geared connection with said actuating member, an operating device to impart lifting movement to said rotatable actuating member, a retarding device for controlling the downward movement of said actuating member, and a single train of gearing to connect said shaft with said operating device and with said retarding device.

4. In a lifting jack, a rotatable lifting screw, a beveled gear rigidly secured thereto, a pinion meshing with said beveled gear, a shaft carrying said pinion, an operating shaft, means for actuating said operating shaft, gear connection between said operating shaft and the first mentioned shaft, a controlling device, and means for connecting said operating shaft with said controlling device only upon the downward movement of said screw.

5. In a lifting jack, an actuating member for raising the load, a shaft having geared connection with said actuating member to impart lifting movement thereto and adapted to be rotated thereby upon the downward movement of said load, operating mechanism comprising a rotatable shaft having geared connection with the first mentioned shaft, controlling devices to control the downward movement of the load, and means for connecting the shaft of said operating mechanism with said controlling devices only when said shaft is rotated in the reverse direction by the downward movement of the load.

6. In a lifting jack a base, a member movably mounted on said base, a rotatable screw for actuating said movable member, a beveled gear secured to said screw, two bearings carried by said movable member, a shaft journaled in said bearings, a pinion mounted on said shaft between said bearings and meshing with the beveled gear on said screw, operating mechanism for said shaft, controlling devices and means for connecting the said shaft with said controlling devices upon the downward movement of the load.

7. In a lifting jack, a base, a member movably mounted on said base, a rotatable screw for actuating said movable member, a beveled pinion secured to said screw, two bearings carried by said movable member, a shaft journaled in said bearings, a pinion mounted on said shaft between said bearings and meshing with the beveled gear on said screw, an operating shaft, reducing gearing to connect said operating shaft with the first mentioned shaft, a worm gear rotatably mounted on said operating shaft, means to connect said worm gear with said

shaft when the latter is rotated in a reverse direction by the downward movement of said load, a worm meshing with said worm gear, and braking devices connected with said worm.

8. In a lifting jack, a rotatable actuating member, a shaft having geared connection with said rotatable member, a gear secured to said shaft, an operating shaft, a gear secured to said operating shaft and meshing with the gear on the first mentioned shaft, a worm gear rotatably mounted on said operating shaft, means for connecting said gear with said shaft when the latter is rotated in a reverse direction by the downward movement of the load, a worm meshing with said worm gear, a second worm gear rigidly connected with and rotatable by said worm, a second worm meshing with said second worm gear, a brake drum rigidly connected with said second worm, and brake shoes coöperating with said brake drum.

9. In a lifting jack, a rotatable actuating member, a shaft having geared connection with said rotatable member, a gear secured to said shaft, an operating shaft, a gear secured to said operating shaft and meshing with the gear on the first mentioned shaft, a worm gear rotatably mounted on said operating shaft, means for connecting said gear with said shaft when the latter is rotated in a reverse direction by the downward movement of the load, a worm meshing with said worm gear, a second worm gear rigidly connected with and rotatable by said worm, a second worm meshing with said second worm gear, a brake drum rigidly connected with said second worm, and brake shoes coöperating with said brake drum, one of said brake shoes having a scraping edge to remove surplus oil from the surface of said drum.

10. In a lifting jack, a rotatable actuating member, a shaft operatively connected with said actuating member, means for rotating said shaft, a worm gear normally disconnected from said shaft, means for connecting said worm gear with said shaft when the latter rotates in a reverse direction, a worm meshing with said worm gear, a brake drum connecting with said worm, and brake shoes coöperating with said brake drum, one of said brake shoes having a scraping edge and having an outer portion projecting beyond said scraping edge whereby the oil will be removed from the face of said drum and conveyed away from the same.

11. In a lifting jack, a rotatable actuating member, a shaft having geared connection with said actuating member, an operating device to impart lifting movement to said actuating member, gearing interposed between said shaft and said operating device, a device connected with said shaft through said gearing to retard the downward movement of said rotatable actuating member, and means for controlling said retarding device.

12. In a lifting jack, a rotatable actuating member, an operating device to impart lifting movement to said rotatable actuating member, a train of gearing interposed between said operating device and said actuating member, a device arranged adjacent to said operating device and connected with said rotatable actuating member through said gearing to retard the downward movement thereof, and means for controlling said retarding device.

13. In a lifting jack, a lifting member, an operating device to actuate said lifting member, reducing gearing interposed between said operating device and said lifting member, a worm gear, means to connect said worm gear with said lifting member through said reducing gearing when said lifting member moves downwardly, a worm meshing with and rotatable by said worm gear, and a controlling device connected with said worm.

14. In a lifting jack, a lifting member, an operating device to actuate said lifting member, reducing gearing interposed between said operating device and said lifting member, a worm gear, means to connect said worm gear with said lifting member through said reducing gearing when said lifting member moves downwardly, a worm meshing with and rotatable by said worm gear, a brake connected with said worm, and devices interposed between said worm and said brake to absorb power and accelerate the speed of the mechanism at said brake.

15. In a lifting jack, a lifting member, an operating device to actuate said lifting member, reducing gearing interposed between said operating device and said lifting member, a worm gear, means to connect said worm gear with said lifting member through said reducing gearing when said lifting member moves downwardly, a worm meshing with and rotatable by said worm gear, a second worm gear connected with said worm for rotation therewith, a second worm meshing with and rotatable by said second worm gear, and controlling devices connected with said second worm.

In testimony whereof, we affix our signatures hereto.

CHAS. W. RIPSCH.
JAMES C. DAWLEY.