J. H. DORMAN.

JACK.

APPLICATION FILED MAY 27, 1919.

1,338,682. Patented May 4, 1920.

Fig. 2.

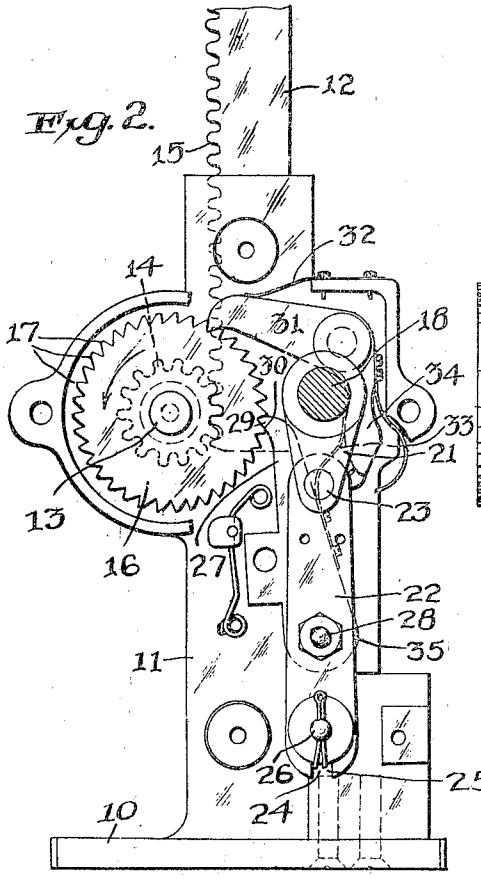


Fig. 1.

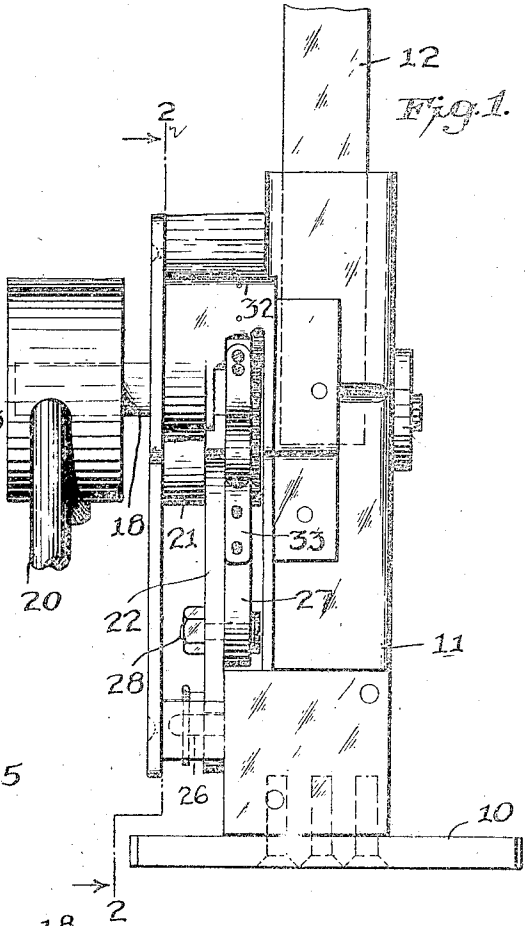


Fig. 3.

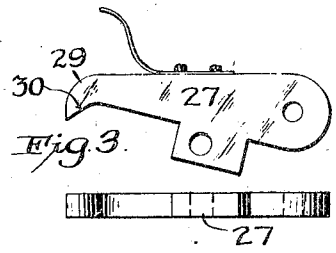
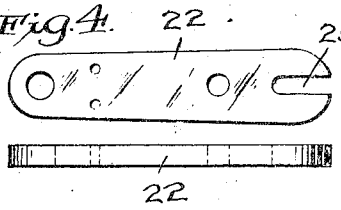


Fig. 4.



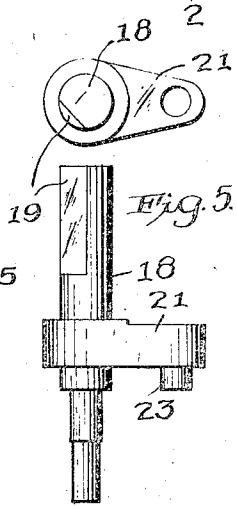
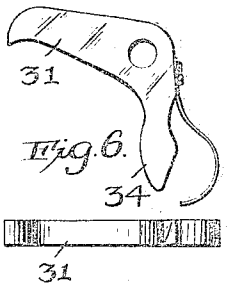


Fig. 5.

Fig. 6.



INVENTOR.
John H. Dorman.
BY Warren S. Orton
ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN H. DORMAN, OF NEW YORK, N. Y.

JACK.

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To all whom it may concern:

Be it known that I, JOHN H. DORMAN, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Jacks, of which the following is a specification.

The invention relates in general to a lifting jack of the type designed to constitute an automobile accessory and which is usually provided with an actuating lever which extends horizontally from the power shaft of the jack.

Such forms of jacks in order to be commercially successful must be light in weight, must be compact so as not to take up much space in the tool chest and at the same time must possess a ruggedness sufficient to lift a heavy automobile, if necessary.

The primary object of the invention is to provide a simple form of jack designed to respond to the requirements and which can be actuated to lift a heavy car with a relatively short length of actuating lever.

It is appreciated that a person can exert only a limited muscular effort but the application of this muscular effort on the actuating lever is not uniform for the entire length of the stroke. The power applied per unit distance of travel of the lever toward the end of the depression stroke is maximum.

Accordingly, the invention features a construction which utilizes this maximum power efficiently through the agency of a system of compound levers. The system includes a ratchet feeding pawl organized to exert a powerful leverage effect on the ratchet lifting member of the jack so that the final muscular effort of the operator on the actuating lever is effectively utilized to move the ratchet over one unit of feeding distance. This object is attained broadly first, by mounting the actuating power shaft to which the actuating lever is connected in position offset from the axis of rotation of the ratchet and second, the ratchet is fed by means of a feeding pawl which periodically engages the ratchet and in turn is actuated by a leverage mechanism which includes a crank arm normally depending from the power shaft and arranged to act on the pawl with increasing power as the operator forces the actuating lever downwardly toward the end of the operator's depressing stroke.

The invention further features an organization of ratchet and feeding pawl so arranged that the pawl point is fashioned to fit squarely against each of the succeeding ratchet teeth during the entire length of each of the actuating strokes of the pawl.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawings there is illustrated a preferred embodiment of the invention, it being understood that the parts not necessary to the disclosure of this invention, such for instance, as the usual reversing mechanism have been omitted to facilitate the clearness of disclosure.

In the accompanying drawings:—

Figure 1 is a view in end elevation of one commercial form of lifting jack selected to disclose a physical embodiment of the invention;

Fig. 2 is a vertical transverse sectional view taken on the line 2—2 of Fig. 1 with certain parts of the commercial jack omitted;

Figs. 3 to 6 inclusive are each compound figures showing side and end views of detailed parts; Fig. 3 being a view of the feeding pawl; Fig. 4 a view of the lifting link; Fig. 5 of the power shaft and its crank and Fig. 6 a view of the holding pawl.

In the following description and in the claims, parts will be identified by specific names for convenience of expression but they are intended to be as generic in their application to similar parts as the art will permit.

In the drawings there is shown a lifting jack of the type commercially known as automobile lifting jacks and includes a broad supporting foot 10 from which extends a standard 11 for containing the mechanism for actuating the usual form of rack bar 12.

A rack lifting mechanism includes a ratchet shaft 13 mounted on the standard for rotary movement about a fixed axis of rotation and provided with a relatively small pinion 14 permanently in engagement with the feed 15 of the rack, as is usual with such constructions. A one-way ratchet 16 of relatively large diameter and having a relatively large number of teeth 17 is also fixed to the shaft 13.

A relatively heavy power shaft 18 is mounted in the standard and is offset laterally from the shaft 13 so as to accommodate therebetween the leverage mechanism hereinafter described. The power shaft extends to the outside of the standard 11 and the extended end is provided with a flattened portion 19 designed to be engaged by an actuating lever 20 to oscillate the shaft by the usual up and down movement. In the perfected form of the device this lever is only 14 inches long but the jack is capable of lifting 2,000 pounds when actuated by a man of ordinary physique. A crank-arm 21 is fixed to the power shaft and normally depends from the axis of rotation thereof, as shown in Fig. 2. A lifting link 22 is hung from the crank-arm and has its upper end pivotally connected thereto by means of the pivot pin 23. This lifting link is relatively long and extends toward the bottom of the standard. The lower end of the link is guided in its vertical movement by a slot and pin connection 24 arranged by splitting the lower end of the link to form a slot 25 straddling a pin 26 projecting forwardly from the standard.

The ratchet is fed intermittently in the direction indicated by the arrow by a relatively long feed pawl 27. The lower end of the pawl is pivotally connected to the lifting link intermediate its ends thereof by means of a pivot pin 28.

It is noted by this arrangement that the feeding pawl is positioned exteriorly of the ratchet and that the parts are so proportioned and arranged that the pawl point 29 engages the ratchet at the beginning of the actuating stroke at, or slightly below, the horizontal diameter through the axis of rotation of the ratchet.

The pawl point is fastened to fit into the space between adjacent ratchet teeth and on its bearing side is provided with a face 30 which is maintained in alinement with the engaged face of the ratchet tooth during the entire time that the pawl point is in operative engagement with the tooth. A holding pawl 31 is pivotally mounted in the standard and is normally held by means of a spring 32 in engagement with the ratchet teeth so as to prevent reverse movement of the ratchet. The feed pawl is likewise maintained in operative engagement with the ratchet by means of a spring 33 carried by the feed pawl and bearing upon an arm 34 of the holding pawl.

In the drawings other parts have been illustrated but it is understood that these parts more particularly relate to other features of the completed disclosure.

In operation and assuming that the rack bar is in its initial depressed position, the operating lever 20 which is usually associated with the jack when stored away in the tool box, is assembled in position on the power shaft as is usual with such devices. With the rack bar in position beneath the object to be raised the actuating lever is pumped up and down. This action will cause the crank arm to swing clockwise periodically from its position shown in Fig. 2 thus lifting the link 22 and swinging the heel 34 of the pawl outwardly and to the right of the position shown in Fig. 2. At the same time the pawl will be raised thus advancing the ratchet in its rotary movement over a short arch. During this movement the pawl point will be maintained in fixed relation to the ratchet so that the face 30 will at all times during the actuating stroke be in fixed engagement with the engaged tooth. There will be thus formed, in effect, a rigid connection between the pawl and the ratchet, minimizing any loss of power or deleterious effect upon the teeth of the pawl and ratchet.

The crank arm and lifting link arrangement constitutes, in effect, a powerful leverage device in which the final downward pressure of the actuating lever is utilized effectively to advance the ratchet over its relatively small rack lifting movement. This arrangement will obviously mean a relatively great number of lever movements to move the rack bar over an appreciable distance. Still this is not an objection and it is not usually required that the rack bar be advanced an appreciable distance.

By means of a device of the class described it is possible to provide a light portable jack which can be operated by one man to lift the heavy cars now in general use.

While I have shown and described, and have pointed out in the annexed claims, certain novel features of my invention, it will be understood that various omissions, substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described my invention, I claim:—

1. In a lifting jack, a standard having a rack bar guided therein for vertical movement, a ratchet shaft mounted in said standard for rotary movement, a relatively small pinion fixed to said shaft and engaging the teeth of the rack bar to move the same, a

relatively large one-way ratchet fixed to said shaft, a power shaft in said standard mounted for oscillatory movement about a fixed axis and offset laterally from said ratchet shaft, an actuating lever engaging said power shaft to oscillate the same, a crank arm fixed to said power shaft, a lifting link hanging from said crank arm, a feed pawl pivoted to said lifting link and engaging said ratchet to feed the same in one direction, a holding pawl engaging the ratchet normally to prevent movement thereof in the opposite direction and resilient means acting on both pawls to maintain the same in operative engagement with the ratchet.

2. In a lifting jack, the combination of a rack bar, a ratchet operatively connected with the bar to raise the same by the rotation of the ratchet, a power shaft mounted for oscillation about a fixed axis and provided with a crank arm normally depending from the shaft, a vertically extending lifting link having its upper end pivotally connected to the crank arm to be raised thereby, an upstanding feed pawl having its lower end pivoted to said lifting link and having its upper end in engagement with said ratchet to rotate the same.

3. In a lifting jack, the combination of a rack bar, a ratchet operatively connected with the bar to raise the same by the rotation of the ratchet, a power shaft mounted for oscillation about a fixed axis and provided with a crank arm normally depending from the shaft, a vertically extending lifting link having its upper end pivotally connected to the crank arm to be raised thereby, an upstanding feed pawl having its lower end pivoted to said lifting link and having its upper end in engagement with said ratchet to rotate the same, and means at the lower end of the lifting link to guide the same when acted upon by the crank arm.

4. In a lifting jack, the combination of a rack bar, a ratchet operatively connected with the bar to raise the same by the rotation of the ratchet, a power shaft mounted for oscillation about a fixed axis and provided with a crank arm normally depending from the shaft, a vertically extending lifting link having its upper end pivotally connected to the crank arm to be raised thereby, an upstanding feed pawl having its lower end pivoted to said lifting link and having its upper end in engagement with said ratchet to rotate the same, and a holding pawl engaging said ratchet to prevent reverse rotary movement.

5. In a device of the class described, a ratchet feed including a ratchet mounted for rotary movement about a fixed axis of rotation, a crank arm offset from said ratchet and mounted for oscillatory movement about another axis of rotation, a lifting link hung from said crank arm and lifted thereby, means for guiding said link and a feed pawl offset from the axis of rotation of the ratchet pivoted to said link and engaging said ratchet to rotate the same.

6. In a lifting jack, a supporting foot, a lifting element thereon and means for raising said lifting element including a ratchet mounted for rotary movement about a fixed axis, a pawl, and means for raising the pawl bodily in substantially a right line parallel to that along which the lifting element is moved.

7. In a jack, a supporting foot, a lifting member thereon, a ratchet rotatably mounted on the foot, and an operating pawl for the ratchet, means pivotally carrying the pawl for moving it to rotate the ratchet, the pawl being normally located wholly below the axis of rotation of the ratchet and positioned substantially parallel to the line of movement of the lifting member.

8. In a device of the class described, a ratchet feed including a ratchet mounted for rotary movement, and means for rotating said ratchet step by step, including a power shaft off-set from said ratchet and a pivoted pawl, the lines from the axis of the power shaft to the pawl pivot and to the axis of rotation of the ratchet being substantially at right angles to each other with the engaging end of the pawl substantially on the line between the axis of the power shaft and the axis of the ratchet.

9. In a device of the class described, a ratchet feed including a ratchet mounted for rotation about a fixed axis, and means for operating said ratchet including an oscillating member and a pawl moved thereby, the ratchet engaging head of the pawl being located substantially on a line between the axis of rotation of the ratchet and the axis of oscillation of the member.

10. In a device of the character described, a ratchet feed including a ratchet mounted for rotary movement and means for rotating said ratchet step by step, including an oscillating power shaft off-set from said ratchet, a pivoted pawl, and means actuated by the power shaft for giving said pawl a movement substantially at right angles to the line joining the axis of rotation of the ratchet and the axis of oscillation of the power shaft.

11. In a device of the class described, the combination of a toothed ratchet mounted for rotary movement, a feed pawl mounted to one side of said ratchet and having a tooth fashioned to fit in the spaces between adjacent teeth of the ratchet and means for actuating the pawl to rotate the ratchet in one direction, said means including mechanism for maintaining the face of the pawl tooth fixed in position relative to the coacting face of the ratchet tooth engaged there-

by during the entire period of the engagement.

12. In a device of the class described, the combination of a toothed ratchet mounted for rotary movement, a crank arm offset laterally from said ratchet depending from its axis of rotation and mounted for a pendulous movement, a ratchet feeding mechanism including a pawl operatively connected to said crank arm to be actuated thereby, said pawl having a point provided with a face adapted to engage a face of the tooth of the ratchet, said point being immovable relative to the engaged ratchet tooth during the entire period of its engagement with said tooth.

13. In a lifting jack, the combination of a ratchet, a relatively long ratchet-feeding pawl pivotally mounted in spaced relation to the axis of rotation of the ratchet and having a pawl point fashioned to fit in the spaces between adjacent teeth of the ratchet and a pawl actuating mechanism including means for maintaining the pawl point in fixed relation to the engaged ratchet tooth during the entire actuating stroke of the pawl.

Signed at New York city, in the county of New York and State of New York, this 19th day of May, A. D. 1919.

JOHN H. DORMAN.