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

RATCHET MECHANISM.

APPLICATION FILED AUG. 25, 1919.

1,352,631. Patented Sept. 14, 1920.

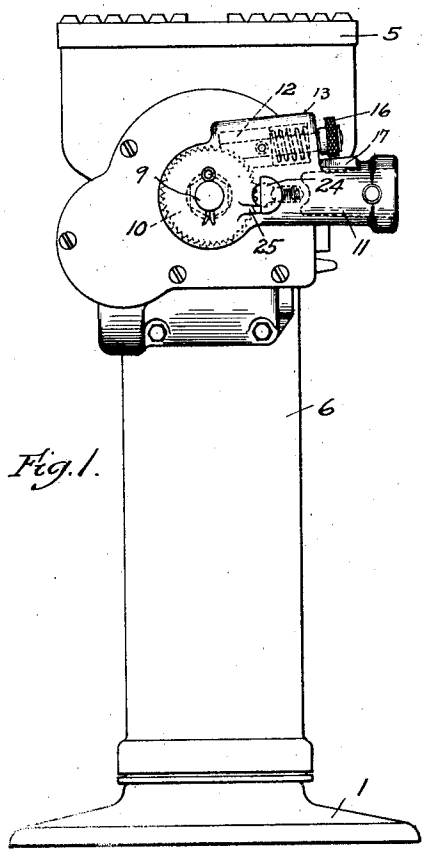


Fig. 1.

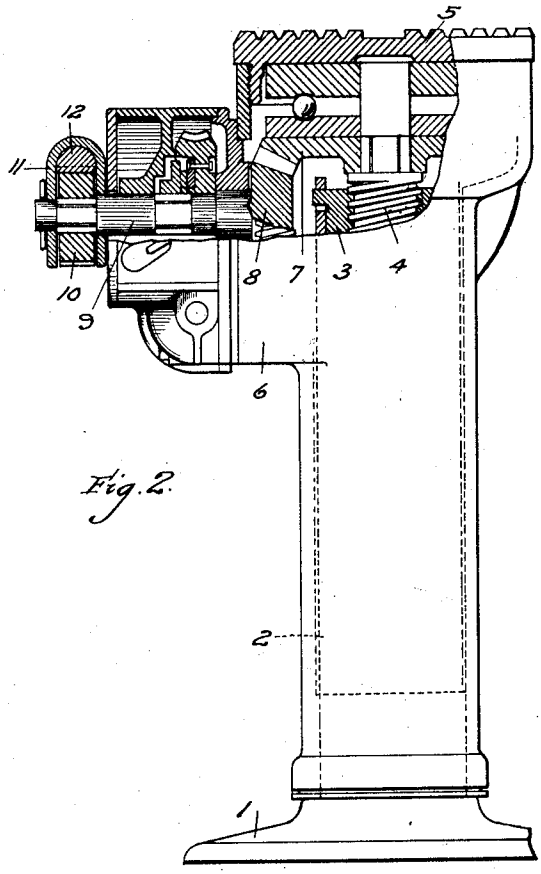


Fig. 2.

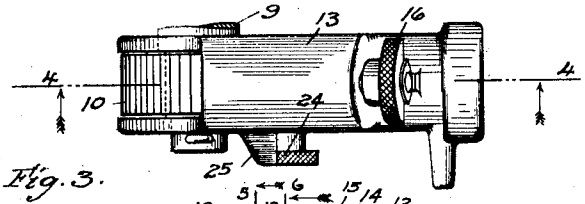


Fig. 3.

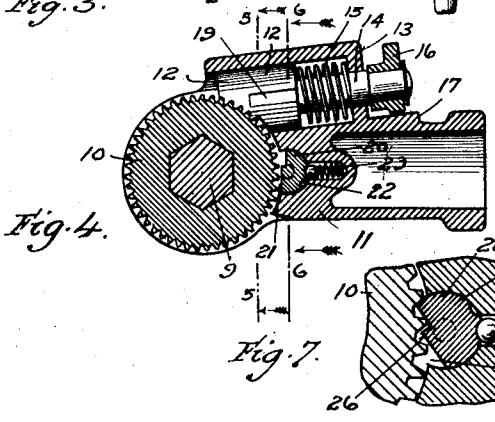


Fig. 4.

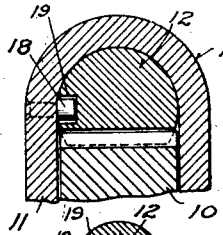


Fig. 5.

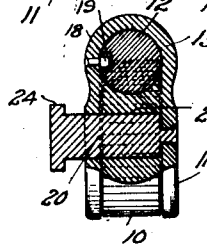


Fig. 6.

Fig. 7.

INVENTORS
CHARLES W. RIPSCH
JAMES C. DAWLEY
BY Edward Reed
ATTORNEY.

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.

RATCHET MECHANISM.

1,352,631. Specification of Letters Patent. Patented Sept. 14, 1920.

Application filed August 25, 1919. Serial No. 319,642.

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 Ratchet Mechanism, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to ratchet mechanism and is designed more particularly as a fine toothed ratchet operating device for lifting jacks and the like.

The object of the invention is to provide a mechanism of this kind in which the operating lever will have a small angular movement and which will be simple in construction, of a strong, durable character, and positive in its operation.

It is also an object of the invention to provide a mechanism of this kind in which the pawl can automtically center itself with relation to the teeth of the ratchet wheel, thus insuring that each tooth of the pawl will have a full bearing upon the corresponding tooth of the ratchet wheel.

It is also an object of the invention to provide a mechanism of this kind with an auxiliary pawl to actuate the ratchet wheel in a direction to lower the lifting element of the jack; and to so construct and arrange such auxiliary pawl that it will be automatically moved into an inoperative position when the operating mechanism is moved in a direction to cause the main pawl to engage the ratchet wheel.

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

In the accompanying drawings, Figure 1 is a side elevation of a lifting jack embodying our invention; Fig. 2 is a front elevation of the same, partly in section; Fig. 3 is a plan view of the ratchet mechanism; Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3; Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4, looking in the direction of the arrows; Fig. 6 is a sectional view taken on the line 6—6 of Fig. 4, looking in the direction of the arrows; and Fig. 7 is a sectional detail view of the auxiliary pawl.

In these drawings we have illustrated one embodiment of our invention and have shown the same as applied to a lifting jack of a well known construction. It will be understood, however, that this particular jack has been chosen for the purpose of illustration only and that the invention cannot only be embodied in jacks of various kinds, but may also be applied to other devices where such a mechanism may be useful.

The jack here illustrated comprises a base 1 having an upwardly extending portion or hollow standard 2, in the upper end of which is mounted a nut 3. Extending lengthwise of the hollow standard and threaded in the nut 3 is a screw 4 which constitutes the lifting element of the jack. Supported on the upper end of the screw is a work engaging member or cap 5, and secured to this cap and embracing the standard 2 is a housing 6, the lower portion of which fits about the standard and constitutes a guide for the screw. Secured to the screw 4, above the threaded portion thereof, is a beveled gear 7, which meshes with a corresponding beveled gear 8 carried by a shaft 9, which is journaled in bearings carried by a laterally extending portion of the housing 6. This shaft 9 extends beyond the housing and has mounted thereon ratchet mechanism by means of which rotary movement is imparted to the shaft 9.

Rigidly secured to the projecting end of the shaft 9 is a ratchet wheel 10 having relatively small teeth, and these teeth are, in the present instance, shown as radial teeth. An operating lever is pivotally mounted on the shaft 9 and carries a plunger or pawl, which operatively engages the ratchet wheel 10. In the present illustration we have shown only the socket member 11 of the lever, which is adapted to receive a spike or bar, as is customary with jacks of this kind. The lever socket 11 is here shown as bifurcated to embrace the ratchet wheel 10, and has the two arms of the bifurcation mounted on the shaft on the respective sides of the ratchet wheel. It will be apparent, however, that the lever may be mounted in any suitable manner so long as it is movable about the axis of the ratchet wheel. Slidably mounted upon the lever 11 is a plunger or pawl 12, having its forward end cut away to give it substantially a wedge shape, and this wedge-shaped portion of the pawl is provided with a series of transverse teeth adapted to engage a corresponding member of the teeth of the ratchet wheel. The pawl is mounted in a guideway, which is so constructed that when operative move-

ment is imparted to the lever the pawl will be wedged between the wall of the guideway and the ratchet wheel, thus holding the teeth of the pawl firmly in engagement with the ratchet wheel. Further, the pawl is so mounted that it may have a slight movement about its longitudinal axis, thus enabling it to automatically adjust itself with relation to the ratchet wheel and cause all of its teeth to engage the corresponding teeth of the ratchet wheel with a full bearing, thereby preventing the injury to the teeth of the pawl and ratchet wheel which frequently results from an imperfect bearing between the teeth of these two parts. The guideway in which the pawl is mounted may take various forms, but it is preferably made a part of the lever, and is here shown in the form of a tubular housing 13, cast integral with the lever socket, extending lengthwise of the socket and so arranged that the pawl, when mounted therein, will have sliding movement tangentially to the ratchet wheel. As here shown the housing 13 is cylindrical in form and the rear portion of the pawl 12 is circular in cross section, so that it will fit in the housing and will be free to slide therein. The pawl has secured thereto a rearwardly extending pin or portion 14, which projects through the rear wall of the housing. Coiled about the pin 14 and confined between the pawl and the end wall of the housing is a spring 15, which tends to move the pawl toward the ratchet wheel. Rotatably mounted on the outer end of the pin 14 is a finger piece or knurled head 16, by means of which the pawl will be retracted against the tension of the spring. One side of its head is of greater width than the other and when the pawl has been retracted, the head may be rotated to cause the wider portion thereof to engage a shoulder 17 on the lever socket 11 and thus lock the pawl in its retracted or inoperative position. A pin 18 arranged in the wall of the housing 13 extends into a longitudinal groove 19 formed in the side of the pawl 12 and serves to approximately center the pawl. However, this groove is of a width somewhat greater than the thickness of the pin and will permit the pawl to have sufficient movement about its longitudinal axis to accurately center the same and cause the teeth thereof to engage the corresponding teeth of the ratchet wheel throughout their lengths.

It is desirable that means be provided whereby the ratchet wheel may be positively actuated in a reverse direction to lower the lifting element and any load that may be imposed thereon. This, of course, could be accomplished by duplicating the pawl 12 either on the opposite side of the socket 11 or by providing a double pawl. However, we have, in the present instance, provided an auxiliary pawl, which is mounted entirely separate from the main pawl 12. As here shown this auxiliary pawl is in the form of a stud or pin 20, rotatably mounted in a socket 21 formed in the inner portion of the socket and having that side thereof, adjacent to the ratchet wheel, open. As shown in Fig. 4, one side of the inner end of the stud 20 is cut away or flattened so that it will not project beyond the edge of the opening of the socket when it is in its normal position and, therefore, will not interfere with the movement of the ratchet wheel. The pawl, or stud, 20, is provided in its rear side with two recesses 22, either of which may receive a spring-pressed detent 23 to hold the pawl in its adjusted position. The outer end of the stud is provided with a head 24, by means of which it may be rotated to move the pawl into and out of its normal position, the detent 23 yielding under pressure to permit the movement of the pawl. We have also shown the head 24 of the stud as flattened on one side and adapted to engage a stop 25 on the outer surface of the lever socket, to limit the movement of the pawl in one direction and thus prevent the one edge thereof from being brought into engagement with the ratchet wheel. When it is desired to impart reverse movement to the ratchet wheel the main pawl 12 is locked in its inoperative position and the auxiliary pawl 20 is rotated to cause the upper edge thereof to project from the socket 21 and to engage a tooth of the ratchet wheel, when upward movement is imparted to the lever. The arrangement of the pawl is such that upon the downward movement of the lever, the succeeding tooth of the ratchet wheel will engage the front surface of the pawl and force the same into its normal position to permit the teeth of the ratchet wheel to pass the same. When the pawl is thus returned to its normal position, it will be held therein by the detent 23 and must be manually adjusted before it will again engage the ratchet wheel. By thus automatically returning the pawl to its locked normal position upon the downward movement of the lever, we make it impossible for the pawls to operate one against the other. If desired, a tooth, or projection, 26 may be formed on the upper part of the flat surface of the pawl to engage a lower tooth of the ratchet wheel and thus move the main tooth of the pawl into a completely inoperative position. When such second tooth is employed, further clearance may be allowed between the pawl and the ratchet wheel when the former is in its inoperative position. It will be obvious that, if desired, the stop 25 may be eliminated and the lower portion of the pawl 20 caused to engage the ratchet wheel and rotate the same in a direction to elevate the lifting element, the pawl

being provided with such teeth as might be desired.

While we have 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 a person 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 device of the character described, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel and having a guideway tangential to said wheel, a pawl slidably mounted in said guideway and having teeth to engage said toothed wheel, said pawl being so arranged that the movement of said operating member in one direction will cause said pawl to be gripped between said guideway and said toothed wheel with a wedging action, and said pawl also being capable of movement about a longitudinal axis to adjust its teeth with relation to the teeth of said toothed wheel.

2. In a device of the character described, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel, and having a guideway tangential to said wheel, a pawl slidably mounted in said guideway to engage said toothed wheel and so arranged that the movement of said operating member in one direction will cause said pawl to be gripped between said guideway and said toothed wheel with a wedging action, said guideway having a curved surface to form a seat and said pawl having a curved portion to engage said seat, to enable said pawl to automatically adjust itself about a longitudinal axis.

3. In a device of the character described, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel, a housing carried by said operating member and having a curved wall, a pawl slidably mounted in said housing and so arranged that the movement of said operating member in one direction will cause said pawl to be gripped between said guideway and said toothed wheel with a wedging action, said pawl having its surface curved to correspond with the curve of said housing and having teeth to engage said toothed wheel, and means to hold the teeth of said pawl in yielding engagement with the teeth of said wheel.

4. In a fine toothed ratchet mechanism, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel and having a guideway tangential to said wheel, a pawl having a wedge-shaped end portion provided with a plurality of teeth to engage a corresponding plurality of teeth on said toothed wheel, said pawl being slidably mounted in said guideway and so arranged that the movement of said operating member in one direction will cause said pawl to be gripped between said wheel and said guideway with a wedging action, and said pawl being capable of movement about a longitudinal axis to adjust its teeth with relation to the teeth of said toothed wheel.

5. In a fine toothed ratchet mechanism, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel and having a guideway tangential to said wheel, a pawl having a wedge-shaped end portion provided with a plurality of teeth to engage a corresponding plurality of teeth on said toothed wheel, said pawl being slidably mounted in said guideway and so arranged that the movement of said operating member in one direction will cause said pawl to be gripped between said wheel and said guideway with a wedging action, said guideway having a portion of its wall curved about a longitudinal axis to form a seat, and said pawl having a curved portion to engage said seat, whereby said pawl may automatically adjust itself about a longitudinal axis.

6. In a fine toothed ratchet mechanism, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel and having a guideway tangential to said wheel, a pawl having a wedge-shaped end portion provided with a plurality of teeth to engage a corresponding plurality of teeth on said toothed wheel, said pawl being slidably mounted in said guideway and so arranged that the movement of said operating member in one direction will cause said pawl to be gripped between said wheel and said guideway with a wedging action, said guideway having a portion of its wall curved about a longitudinal axis to form a seat, and said pawl having a curved portion to engage said seat, said guideway and said pawl having coöperating parts to limit the movement of said pawl about a longitudinal axis without interfering with its longitudinal movement.

7. In a fine toothed ratchet mechanism, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel and having a guideway tangential to said wheel, a pawl having a wedge-shaped end portion provided with a plurality of teeth to engage a corresponding plurality of teeth on said toothed wheel, said pawl being slidably mounted in said guideway and so arranged that the movement of said operating member in one direction will cause said pawl to be gripped between said wheel and said guideway with a wedging action, said guideway having a portion of its wall curved about a longitudi-

nal axis to form a seat, and said pawl having a curved portion to engage said seat, and means to hold the teeth of said pawl in yielding engagement with the teeth of said wheel.

8. In a device of the character described, the combination with a toothed wheel, and an operating member mounted for movement about the axis of said toothed wheel, of a housing carried by said operating member and having a curved wall, a pawl slidably mounted in said housing and having its surface curved to correspond to the curve of said housing and having teeth to engage said toothed wheel, one of said parts having a longitudinal guideway, and a pin carried by the other of said parts and extending through said guideway, said pin being of a diameter less than the width of said guideway and serving to approximately center said pawl with relation to said toothed wheel but to permit it to have a limited movement about a longitudinal axis.

9. In a device of the character described, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel, a housing carried by said operating member and having a curved wall, a pawl slidably mounted in said housing and having its surface curved to correspond to the curve of said housing, and having teeth to engage said toothed wheel, means to hold the teeth of said pawl in yielding engagement with the teeth of said wheel, said pawl having a longitudinal groove, and a pin mounted in the wall of said housing and extending loosely into said groove to approximately center said pawl with relation to said toothed wheel, but to permit it to have a slight movement about a longitudinal axis.

10. In a device of the character described, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel, a housing carried by said operating member arranged tangentially to the toothed wheel, a pawl slidably mounted in said housing, having teeth to engage the teeth of said wheel and capable of a limited movement about a longitudinal axis, a spring to hold said pawl in yielding engagement with said teeth, and means for moving said pawl into an inoperative position and locking it in that position.

11. In a device of the character described, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel, a housing carried by said operating member, a pawl slidably mounted in said housing and having teeth to engage the teeth of said wheel, a spring to hold said pawl in yielding engagement with said teeth, a pin secured to said pawl and projecting through the end wall of said housing, and a head rotatably mounted on said pin, said operating member having a part adapted to be engaged by said head to hold said pawl in its retracted position.

12. In a device of the character described, a toothed wheel, an operating member mounted for movement about the axis of said toothed wheel and having a guideway, a pawl slidably mounted in said guideway, and having teeth to engage said toothed wheel to rotate the latter in one direction, and a normally inoperative auxiliary pawl to engage said toothed wheel and rotate the same in the opposite direction.

13. In a device of the character described, a lever having a bifurcated end portion embracing said wheel, a pawl slidably mounted on said lever and having teeth to engage said toothed wheel to rotate the latter in one direction, a pawl mounted in said lever and having means for moving the same into and out of a position to engage the teeth of said wheel, and a yieldable detent to retain said pawl in its adjusted position.

14. In a device of the character described, a toothed wheel, a lever having a bifurcated end portion embracing said wheel, a pawl slidably mounted on said lever and having teeth to engage the teeth of said wheel, said lever having a recess opening into the space between the arms of said bifurcation, a pawl rotatably mounted in said recess and having one side flat, means for rotating said pawl to cause it to lie wholly within said recess or project beyond the same, and a resilient device to hold said pawl in its adjusted position.

15. In a device of the character described, a toothed wheel, a lever having a bifurcated end portion embracing said wheel, a pawl slidably mounted on said lever and having teeth to engage the teeth of said wheel and rotate the latter in one direction, a second pawl mounted on said lever and adapted to be moved into the space between the arms of the bifurcated portion of said lever and into the path of the teeth of said wheel, whereby, when said lever is moved in one direction, the pawl will impart movement to the wheel and when the lever is moved in the opposite direction the teeth of the wheel will move said pawl to an inoperative position, and means for automatically securing said pawl in its inoperative position.

16. In a device of the character described, a toothed wheel, a lever having a bifurcated end portion to embrace said wheel, a housing formed integral with said lever and extending lengthwise thereof, a pawl slidably mounted in said housing and having teeth to engage the teeth of said wheel, means to hold said pawl yieldingly in engagement with the teeth of said wheel, said lever having recesses therein opening into a space between the arms of said bifurcated end portion, a stud rotatably mounted in said recess and having one face flattened, so that when in

one position it will lie wholly within the recess and when in another position one edge thereof will project into the path of the teeth of said wheel, means for manually adjusting said stud, and a yieldable detent to retain the same in adjusted positions.

17. In a device of the character described, a toothed wheel, a lever socket mounted for movement about the axis of said wheel, a cylindrical housing cast integral with said socket and extending lengthwise thereof and tangentially to said toothed wheel, a pawl slidably mounted in said housing and having one end wedge shaped and provided with teeth to engage said toothed wheel, said pawl being capable of a limited movement about a longitudinal axis, and means for holding said pawl in yielding engagement with said toothed wheel.

In testimony whereof, we affix our signatures hereto.

CHARLES W. RIPSCH.
JAMES C. DAWLEY.