Dec. 13, 1927. 1,652,455

L. D. NILSON

LIFTING JACK

Filed Aug. 16, 1926 2 Sheets-Sheet 1

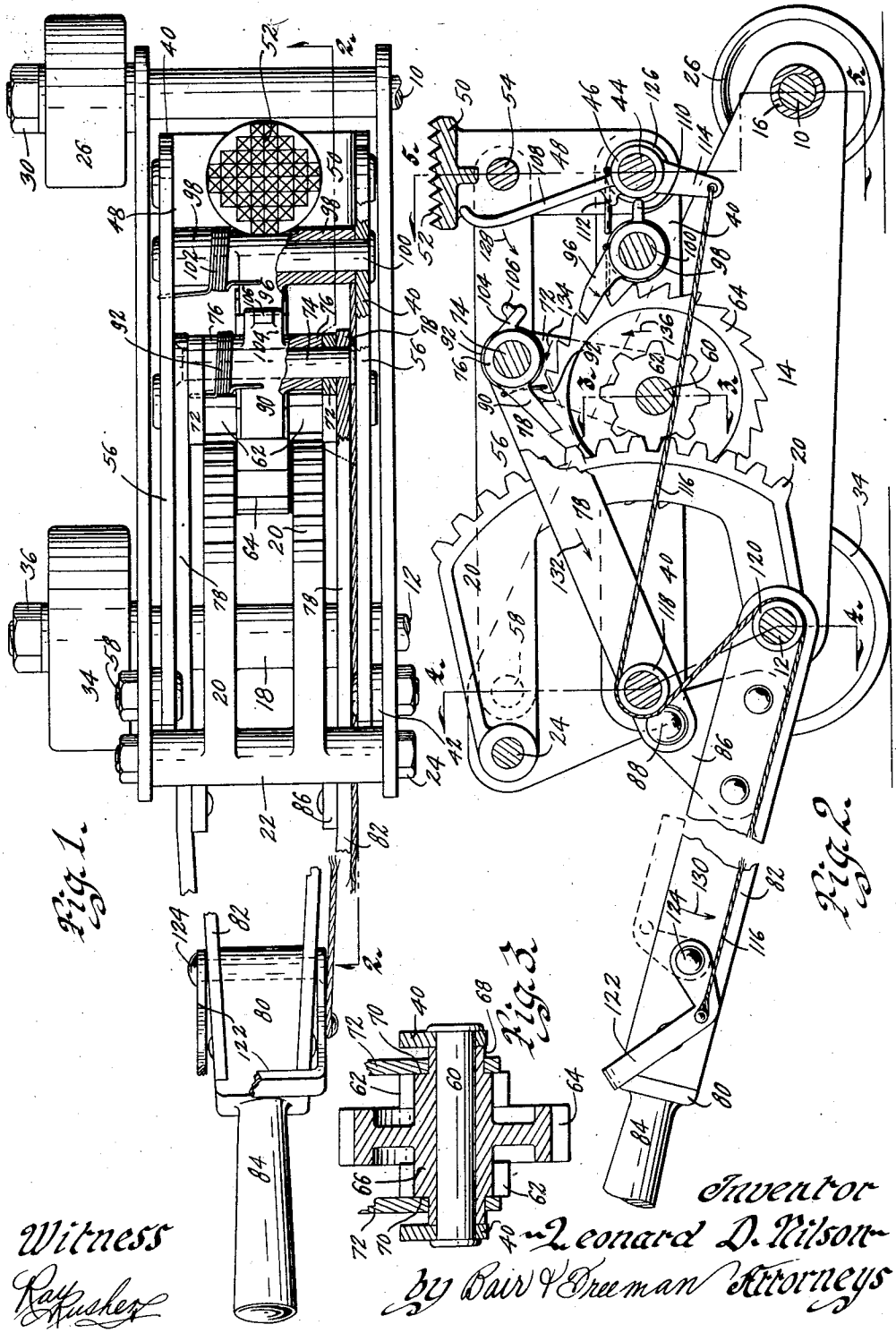


Fig. 1.

Fig. 2.

Fig. 3.

Witness
Ray Rusher

Inventor
Leonard D. Nilson
by Bair & Freeman Attorneys

Dec. 13, 1927. 1,652,455

L. D. NILSON

LIFTING JACK

Filed Aug. 16, 1926 2 Sheets-Sheet 2

Fig. 6.

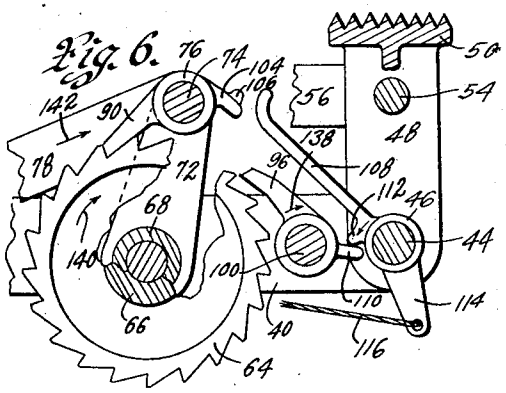


Fig. 7.

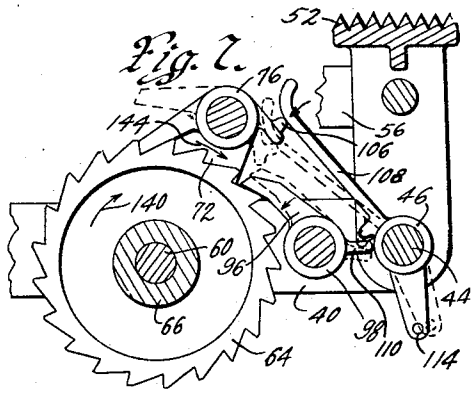


Fig. 8.

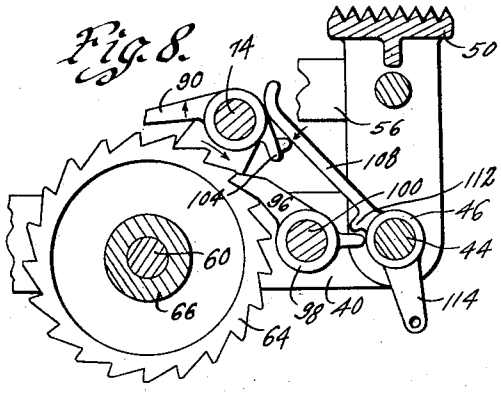


Fig. 9.

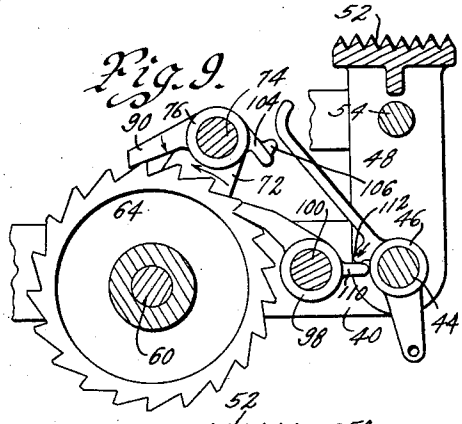


Fig. 4.

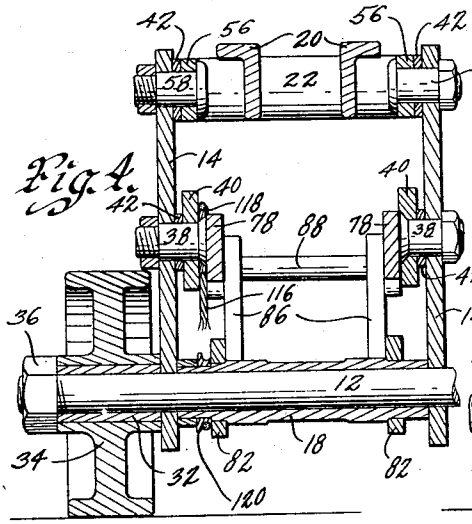
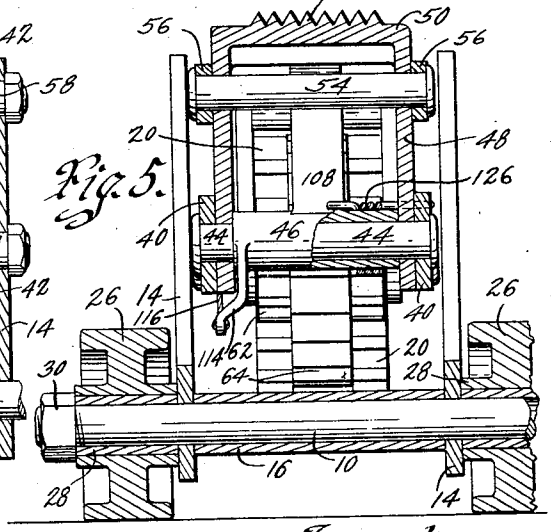


Fig. 5.



Witness
Ray Rusher

Inventor
Leonard D. Nilson
By Bair & Freeman Attorneys

Patented Dec. 13, 1927. 1,652,455

UNITED STATES PATENT OFFICE.

LEONARD D. NILSON, OF WAYZATA, MINNESOTA, ASSIGNOR TO MARQUETTE MANUFACTURING COMPANY, OF ST. PAUL, MINNESOTA.

LIFTING JACK.

Application filed August 16, 1926. Serial No. 129,511.

The object of my invention is to provide a lifting jack especially adapted for automobile service work and more particularly for service in connection with elevating a portion of an automobile for permitting the tire or tires of the automobile to be changed or repaired as the case may be.

Still a further object is to provide a lifting jack capable of use for lifting heavy automobiles such as trucks and busses.

Still a further object is to provide a fixed sector or rack bar adapted to have a gear or pinion coact therewith whereby lifting arms of the jack may be raised or lowered for raising or lowering an automobile or the like.

Still a further object is to provide a pair of rack bars arranged to coact with a pair of gears which are mounted on the lifting arm itself of the jack and which are caused to rotate by a ratchet member also mounted upon the lifting arm of the jack.

Still a further object is to provide locking and lifting pawls mounted upon the lifting arm of the jack and movable therewith, the lifting and locking pawls capable of being rendered inoperative for causing them to disengage the ratchet with which they coact for allowing the load lifting arm of the jack to assume its normal or nonoperative position.

My present invention is related to the subject matter of my copending application on the lifting jack filed July 26, 1926, Serial No. 125,011, patented March 1st, 1927, No. 1,619,304.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my lifting jack, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings in which:

Figure 1, is a top plan view of my improved lifting jack.

Figure 2, is a sectional view taken on line 2—2 of Figure 1, the parts being broken away to better illustrate the construction and arrangement of the parts.

Figure 3, is a detail sectional view taken on line 3—3 of Figure 2 illustrating the assembly of two spaced gears and ratchet and their relation to the lifting arms of the jack.

Figure 4, is a vertical sectional view taken on line 4—4 of Figure 2.

Figure 5, is a sectional view taken on line 5—5 of Figure 2, illustrating the load lifting member of the jack.

Figure 6, is a sectional view illustrating the position of the lifting and holding pawls with the lifting pawl in engagement and the holding pawl held out of engagement with the ratchet.

Figure 7, is a similar view with the lifting pawl still in engagement and the locking pawl released so that it is in position to engage the next notch of the ratchet.

Figure 8, is a similar view with the locking pawl in engagement with the next notch of the ratchet and the lifting pawl released, and

Figure 9, is a similar view with the holding pawl in engagement with the ratchet and the lifting pawl released so that it is in position to engage the next notch of the ratchet.

In the accompanying drawings I have used the reference numerals 10 and 12 to indicate the front and rear axles or supports of my jack. The axles 10 and 12 each project through a pair of spaced triangular frame members 14.

The frame members 14 are spaced apart by a sleeve 16 mounted upon the front axle 10 and by a sleeve 18 mounted upon the rear axle 12. The sleeve 18 is formed integral with a pair of spaced curved rack bars 20.

The sleeve 18 forms the lower mounting or connection for the rack bars 20 and a similar sleeve 22 is formed integral with the rack bars 20 at their upper ends. The sleeve 22 is received between the two frame plates 14 and has a bolt 24 projected therethrough whereby the frame plates are held in engagement with the sleeve 22.

The axles 10 and 12 and the bolt 24 serve to hold the frame plates in proper position and the sleeves 16, 18 and 22 hold such frame plates in proper spaced apart position.

The parts just described may be considered the supporting frame for my lifting jack.

A pair of wheels 26 are mounted upon the ends of the front axle 10 which project beyond the two frame plates 14. The wheels

26 are mounted upon sleeves 28 which are interposed between the frame plates 14 and the nuts 30 upon screw threaded ends of the axle 10.

The sleeves 28 are a little longer than the width of the wheels 26, thus permitting free rotation of the wheels 26 without interference with the nuts 30 or the frame plates 14.

Sleeves 32 are also mounted upon the rear axle 12 and upon the sleeves 32 are journalled wheels 34. The axle 12 has its ends screw threaded for receiving nuts 36.

It will thus be seen that I have provided a wheel mounted frame. The rack bars 20 are slightly spaced apart as clearly illustrated in Figure 1 of the drawings and are ribbed so as to be reinforced and of sufficient strength for heavy duty work such as lifting of trucks, busses and the like.

The frame plates 14 are so arranged that the smallest angles of the plates are positioned at the forward end of the jack and receive the axle 10, thus permitting the entire lifting jack to be slid under an automobile or the like which has its axle or the like comparatively low.

Journalled in the frame plates 14 above the axle 12 and below the bolt 24 are a pair of stud bolts or stub axles 38. A pair of lifting arms 40 are pivotally connected at one end to the stub bolts 38. The stub bolts 38 have their screw threaded ends projected out beyond the side bolts 24 and have nuts received thereupon.

Suitable washers 42 are interposed between the arms 40 and the inner surfaces of the plates 14 as clearly illustrated in Figure 4 of the drawings. The arms 40 are spaced apart and have the curved rack bars 20 received therebetween.

The arms 40 have their two forward or free ends connected together by a pivot bolt 44. The pivot bolt 44 in turn has a spacing sleeve 46 mounted thereon.

A lifting head or rod engaging member 48 is pivotally connected to the pivot bolt 44 and the sleeve 46 is received between the two side members of the load engaging head 48.

The side members of the load engaging head 48 are really received between the heads of the pivot bolt 44 and the ends of the sleeve 46.

The load engaging member 48 is substantially yoke shaped in cross section and has its upper or connecting bar 50 cross sectionally ribbed and grooved as at 52 for providing a roughened surface to engage the load to be lifted and prevent possible slipping.

A pivot bolt 54 is journalled in the side members of the load engaging head 48 and upon the ends of the pivot bolt 54 on the outside of the side members of the load engaging head 48 are the stabilizing arms 56.

The stabilizing arms 56 are thus pivotally connected to the load engaging head 48 and in turn have their rear ends pivotally connected to the frame or side plates 14 by the stud bolts 58.

The stabilizing arms 56 and the load lifting arms 40 together with the frame plates 14 and load engaging member 48 form a parallelogram whereby swinging movement of the load lifting arms upon their pivots 38, will always tend to maintain the load engaging member 48 in a vertical swinging position.

In order to impart movement to the load lifting arms 40 relative to the rack bars 20 which are fixed, I mount mechanism upon the load lifting arms themselves which engages the rack bars 20.

The mechanism mounted upon the load lifting arms moves therewith and serves as a medium for imparting the necessary movement to the load lifting arms. Journalled in the two spaced load lifting arms 40 is a pivot or supporting bolt 60 which has mounted thereon a pair of gears or pinions 62.

The pinions 62 are spaced apart and are adapted to coact with the teeth of the rack bars 20. Integrally formed with the pinions 62 is a ratchet wheel 64 which is formed in between the two gears 62 and projects into the space between the two spaced rack bars 20.

The pinions 62 and the ratchet wheel 64 are formed integral with a sleeve 66. The sleeve 66 is formed with contracted ends 68 for defining shoulders 70, the purpose of which will hereafter be more fully set forth.

The sleeve 66 serves as a spacer between the two arms 40. It may be here mentioned that the gears or pinions 62 coact with the rack bars 20 and that rotation of the gears 62 will cause them to move upwardly or downwardly relative to the fixed rack bars 20.

The means of operating or rotating the gears 62 will hereinafter be more fully set forth. It will also be seen that any rotation of the gears 62 upon their pivot bolt 60 will cause the lifting arms to which the bolt 60 is secured, to move upwardly or downwardly depending upon the direction of rotation of the gears 62.

The load lifting arms 40 swing upon their pivots 38 and the rack bars 20 are arcuate in form with their center the same as the center of the pivot bolts for the load lifting arms.

A pair of spaced links 72 are mounted upon the sleeve 66 upon the contracted portions 68 thereof and rest against the shoulders 70. The links 72 project upwardly and are connected together by a connecting bolt 74.

The spacing sleeve 76 is mounted upon the bolt 74 and is received between the two

links 72. The links 72 are connected through the bolt 74 to a pair of spaced pull bars 78. The pull bars 78 have their free ends connected to an operating handle which I will now describe in detail.

In order to actuate or operate my lifting jack I provide an operating handle 80 formed of a pair of spaced side members 82 which have their forward ends journalled upon the sleeve 18 mounted upon the axle 12.

The rear ends of the side bars 82 are connected to a hand engaging piece 84 in any suitable manner. A pair of upwardly extending plates 86 are fastened to the side bars 82 and are pivotally connected to the free or rear ends of the pull bars 78.

The connection between the pull bars 78 and the plates 86 is formed by a bolt or the like 88. It may be here mentioned that upward or downward movement of the operating handle 80 will impart a forward or rearward movement to the pull bar 78 which in turn will impart an oscillating movement to the links 72.

It is the movement of the links 72 forwardly or rearwardly or which I have described as oscillatory, that imparts the necessary movement to the mechanism carried by the lifting arms for moving the lifting arms.

The sleeve 76 has formed integral therewith a lifting pawl 90 which is adapted to engage the ratchet wheel 64 as clearly illustrated in Figure 2 of the drawings. A coil spring 92 is mounted upon the sleeve 76 and has one end in engagement with the pawl 90 and its other end in engagement with one of the links 72 thereby yieldingly tending to hold the pawl 90 in engagement with the ratchet wheel 64.

The lifting pawl 90 and the sleeve 76 are adapted to rotate upon the bolt 74 and to move therewith when the bolt 74 is moved.

The lifting pawl 90 is actuated for rotating the ratchet wheel 64 which in turn causes the gears 62 to be rotated. A locking or holding pawl 96 is formed integral with a sleeve 98 mounted upon a bearing or pivot bolt 100.

The pivot bolt 100 has its ends secured in the two spaced lifting arms 40. A coil spring 102 is mounted upon the sleeve 98 and has one end in engagement with the holding pawl 96 and its other end in engagement with the arm 40. Both of the pawls 90 and 96 are designed to normally engage and coact with the ratchet wheel 64.

Means is provided for throwing the pawls 90 and 96 out of engagement with the ratchet wheel 64 and this means will be hereinafter more fully described.

Formed integral with the sleeve 76 is an extension 104 having an upstanding lug 106 which serves as a cam surface for engaging a lever 108 operable for throwing the pawls 90 and 96 out of engagement with the ratchet wheel when the ratchet arms are being lowered.

Upon the sleeve 98 having the holding pawl 96 thereon, is a similar lug or extension 110 which coacts with a cam surface 112 upon the lever 108. The lever 108 is formed integral with the sleeve 46 mounted upon the pivot bolt 44.

A crank arm 114 projects downwardly from one end of the sleeve 46 and has a cable 116 or other flexible element 116 secured thereto. The cable 116 extends around the pulley 118 mounted upon one of the stud bolts 38 as illustrated in Figure 4 of the drawings.

The cable then extends downwardly and around the pulley wheel 120 mounted upon the axle 12 as clearly illustrated in Figure 4 of the drawings. The purpose of arranging the cable 116 so that it passes around the center or pivot point of the lifting arms 40 and around the axle 12, is to permit free movement of the operating handle 80 without in any way affecting the position of the crank arm 114 or the lever 108.

Pivotal movement of the lifting arms 40 will but slightly affect the crank arm 114 or the lever 108. A control handle 122 is pivotally mounted upon the operating handle 80 and has the cable 116 connected thereto below the center or pivot point 124 of the control 122.

A coil spring 126 is mounted upon the sleeve 46 and has one end in engagement with the lever 108 and has its other end in engagement with the lifting arm 40. The end of the spring 126 simply extends through a small opening formed in the lifting arm 40 as illustrated by dotted lines in Figure 5 of the drawings.

The tendency of the spring 126 is to move the lever 108 in the direction indicated by the arrow 128. The action of the spring 126 is counteracted by the cable 116 and the control 122.

When it is desired to release the inactive spring 126 all that is necessary is to throw the control device 122 from the position shown in solid lines in Figure 2 to the position shown in dotted lines. This releases the cable 116 and gives it enough slack as to allow the functioning of the spring 126.

Practical operation for lifting movement of my jack.

During the upward or lifting movement of my jack, the parts are as illustrated in Figure 2 of the drawings. That is, the lever 108 is held in inoperative position. In order to raise the arms 40 it is necessary to move the operating handle 80 downwardly in the direction indicated by the arrow 130.

Movement of the operating handle in the direction indicated by the arrow 130 will impart movement to the pull bars 78 in the

direction indicated by the arrow 132. The pull bars 78 being connected to the links 72 through the pivot bolt 74 will cause such links 72 to move in the direction indicated by the arrow 134.

The links 72 pivot upon the pivot bolt 60. The lifting pawl 90 being carried by the pivot bolt 74 is caused to move in the direction indicated by the arrow 132 imparting rotation to the ratchet wheel 64 in the direction indicated by the arrow 136.

The pinions 62 which are integral with the ratchet wheel 64 rotate in the same direction or as indicated by the arrow 134. Rotation of the pinions 62 in the direction indicated by the arrow 136 will cause such pinions to travel over the rack bars 20, thereby swinging the lifting arms 40 upon their pivots.

After the lifting pawl rotates the ratchet wheel 64 corresponding to the length of one of the teeth thereon, then the operating handle is moved in the direction opposite from the direction indicated by the arrow 130. Such movement causes the pull bars to move in the direction opposite the arrows 132.

A forward or movement opposite that indicated by the arrows 134 is imparted to the links 72, causing the pawl 90 to simply fall back against the ratchet wheel until it is in position to engage another tooth of the ratchet wheel.

The holding pawl 96 retains the ratchet wheels against possible rotation when the load is applied upon the load lifting arms 40. During the rotation of the ratchet wheel 64 in the direction indicated by the arrow 136, the holding pawl 96 simply presses against the ratchet wheel and follows along until it assumes the next below notch.

It will be seen that when upward movement is desired, the ratchet wheel 64 is practically fixed to the links 72 through the pawl 90 and when it is necessary for the pawl 90 to assume another notch for imparting another stroke to the ratchet wheel, then the ratchet wheel 64 is held against movement in one direction by the holding pawl 96.

The holding pawl 96 as well as the ratchet wheel 64 is mounted upon the load lifting arm 40 and is always in such position as to permit proper engagement of the holding pawl 96 with the ratchet wheel 64 at all times.

The operation of the operating handle 80 is repeated a sufficient number of times until the gears or pinions 62 have traveled the entire upward length of the rack bars 20, thus elevating or raising the load lifting end of the arms 40.

Practical operation for lowering movement of my lifting jack.

In order to impart a downward movement to my load lifting jack it is necessary to swing the control device 122 from the position shown in solid lines in Figure 2, to the position shown in dotted lines in the same figure.

The movement of the control device 122 permits the coil spring 126 to throw the lever 108 rearwardly or against the cam surfaces 106 and 110 respectively. The lever 108 when permitted to operate first assumes the position as illustrated in Figure 6 of the drawings.

The cam surface 112 is shown in engagement with the cam 110. The spring 126 is much stronger than the springs for holding the lifting and holding pawls in engagement with the ratchet 64.

The result of the stronger spring 126 is to cause the pawls 90 and 96 to be thrown out of engagement with the ratchet wheels when the pawls are engaged by the lever 108. The cam surface 112 being in engagement with the cam 110 on the pawl 96, forces the pawl 96 out of engagement with the ratchet wheel 64 and causes it to rotate in the direction indicated by the arrow 138.

The lifting pawl is a sufficient distance away from the lever 108 so as not to be affected thereby. In order to impart downward movement to the lifting arms it is necessary to permit the ratchet wheel 64 to rotate in the direction indicated by the arrow 140.

The pull bars 78 are moved in the direction indicated by the arrow 142 by the upward movement of the operating handle 80. The load upon the load engaging member 48 tends to hold the ratchet wheel 64 in engagement with the lifting pawl 90.

The pull bars 78 being moved in the direction indicated by the arrow 142 simply allows the load to be lowered as the lifting pawl and ratchet wheel are moved.

The normal locking pawl 96 is held out of engagement by the lever 108. As the lifting pawl moves forwardly or towards the direction of the lever 108, it will engage the lever 108 through the cam surface 106.

This movement forces the lever 108 against the action of its spring 126 and this movement in turn causes the cam surface 112 to be disengaged from the cam surface 110, allowing the holding pawl 96 to fall in engagement with the ratchet wheel 64 due to the spring 102.

The link 72 as illustrated in Figure 7, is being moved in the direction indicated by the arrow 142. The locking pawl 96 is shown in Figure 7 as just about in engagement with the ratchet wheel 64.

Further movement of the link 72 in the direction indicated by the arrow 144 will cause the parts to assume the position shown in Figure 8 of the drawings, at which time the cam surface 106 is just about to disengage the lever 108 and the load is being sup-

ported against downward movement for the time being by the holding pawl 96.

As soon as the load is received upon the holding pawl then the lifting pawl due to the spring 126 of the lever 108, is thrown out of engagement with the ratchet wheel 64. The pull bars are then moved rearwardly or in a direction opposite from that indicated by the arrow 142 and this frees the cam 106 from the lever 108 and allows the spring 92 to throw the lifting pawl into engagement with the ratchet wheel 64 as illustrated in Figure 9 of the drawings.

The lever 108 is held against throwing the holding pawl out of engagement by the load itself which retains the ratchet wheel and holding pawl in engagement.

The lifting pawl is brought to a position where it will engage one of the teeth in the ratchet wheel 64 and as soon as it picks up the load it releases the load upon the holding pawl 96.

As soon as the load is released from the holding pawl 96 then the lever 108 and its spring 126 pressing against the cam 110 force the locking or holding pawl out of engagement with the ratchet wheel 64.

This cycle of operation is repeated and the load is lowered in a step by step relation. It will be remembered that the load itself allows the lever 108 to function upon only one of the pawls at a time.

When the load is no longer upon the load engaging member 48, then the spring 126 forces the lever 108 into engagement with both of the cam surfaces 106 and 110 upon the pawls 90 and 96, forcing them to assume the position shown in dotted lines in Figure 7 of the drawings, at which time the entire load lifting arm assembly will be permitted to drop and assume its normal starting position.

Both of the pawls being held out of engagement with the ratchet wheel 64, permits it to simply rotate and allows the pinions 62 to travel downwardly upon the rack bars 20.

It will be noted that I have a pair of rack bars 20 and this enables my lifting jack to be used for heavy duty work. The two spaced gears being connected together prevents any possible teetering of one gear relative to another and insures the load as remaining fixed and firmly supported upon the load lifting head or member 48.

I have illustrated the load lifting arms and stabilizing arms as made of a pair of members preferably of strap iron, although, it will be understood that the lifting arms as well as the stabilizing arms may be formed integral with each other and made out of cast iron material.

One of the advantages of my jack resides in the arrangement of the ratchet wheel and pinions 62 whereby a reduction is had for increasing the amount of leverage obtained for lifting of the load.

It will be further noted that the entire load lifting mechanism or mechanism whereby movement is imparted to the load lifting arms is supported and carried upon the load lifting arms themselves.

The arrangement of parts is such as to permit everything to be compactly arranged and to be practically received between the two side plates 14.

Some changes may be made in the details of construction and arrangement of the various parts of my invention, without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. A jack comprising a pivoted lifting member and a support therefor, a fixed sector shaped rack bar on said support, a gear journaled on said lifting member and movable therewith and in mesh with said rack bar, means for rotating said gear for travel upon said rack bar and an operating handle pivotally connected to said support and a pivotal connection between said handle and said means and adapted to oscillate across the pivot point of said lifting member.

2. A jack comprising a pivoted lifting member and support therefor, a sector shaped rack bar, a gear carried by said lifting member and forming a connection between said lifting member and said rack bar, a ratchet wheel fixed to said gear and movable therewith, means for ratcheting said ratchet wheel for imparting rotation to said gear whereby the travel of said gear upon said rack bar will impart pivotal movement to said lifting member, said means comprising a link pivoted on the axis forming the axis of the ratchet wheel, a lifting pawl pivoted to said link and an operating handle for oscillating said link.

3. A jack comprising a pivoted lifting member and a support therefor, a load engaging member pivoted on said lifting member, means for preventing the pivoted load engaging member from swinging out of vertical during its movement when the lifting member is swung on its pivot, a curved rack bar fixed on said support, said lifting member being pivoted upon an axis forming the axis of said rack bar, a gear in mesh with said rack bar and movable with said lifting member and means for rotating said gear upon said rack bar for imparting swinging movement to said lifting member.

4. A jack comprising a lifting member and a support therefor, an arcuate rack bar, said lifting member being pivoted upon an axis forming the axis of said rack bar, a

gear in mesh with said rack bar mounted upon said lifting member, and means for rotating said gear whereby the travel of said gear upon said rack bar will impart movement to said lifting member.

5. A jack comprising a pivoted lifting member and a support therefor, a pair of spaced curved rack bars, gears on said lifting member in mesh with said rack bars, a ratchet wheel interposed between said gears and fixed thereto, ratcheting means for said ratchet wheel, said gears thereby travelling upon said rack bars for imparting a swinging movement to said lifting member.

6. A jack comprising a pivoted lifting member and a support therefor, a pair of spaced curved rack bars, gears on said lifting member in mesh with said rack bars, a ratchet wheel interposed between said gears and fixed thereto, ratcheting means for said ratchet wheel, said gears thereby travelling upon said rack bars for imparting a swinging movement to said lifting member, and yielding means for rendering said ratcheting means non-operative when no load is upon the lifting member.

7. A jack comprising a pivoted lifting member and a support therefor, a pair of spaced curved rack bars, gears on said lifting member in mesh with said rack bars, a ratchet wheel interposed between said gears and fixed thereto, ratcheting means for said ratchet wheel, said gears thereby travelling upon said rack bars for imparting a swinging movement to said lifting member, said ratcheting means being operable in either direction for swinging said lifting member in two different directions.

8. A jack comprising a pivoted lifting member and a support therefor, a pair of spaced curved rack bars, gears on said lifting member in mesh with said rack bars, a ratchet wheel interposed between said gears and fixed thereto, ratcheting means for said ratchet wheel, said gears thereby travelling upon said rack bars for imparting a swinging movement to said lifting member, said ratcheting means being operable in either direction for swinging said lifting member in two different directions, and means for rendering said ratcheting means inoperative.

9. A jack comprising a pivoted lifting member and support therefor, a sector shaped rack bar, a gear carried by said lifting member and forming a connection between said lifting member and said rack bar, a ratchet wheel fixed to said gear and movable therewith, means for ratcheting said ratchet wheel for imparting rotation to said gear whereby the travel of said gear upon said rack bar will impart pivotal movement to said lifting member, said means comprising a link pivoted on the axis forming the axis of the ratchet wheel, a lifting pawl pivoted to said link, a pull bar pivoted to said link and an operating handle pivotally connected upon said support and to the free end of said pull bar, the pivot connection of the pull bar and the operating handle being adjacent the pivot point of said lifting member.

10. A jack comprising a lifting member and a support therefor, a fixed sector shaped rack bar on said support, a gear journaled on said lifting member and in mesh with said rack bar, means for rotating said gear for travel upon said rack bar, an operating handle pivotally connected to said support and a pivotal connection between said handle and said means and adapted to oscillate across the axis of the sector shaped rack bar.

Des Moines, Ia. July 23, 1926.

LEONARD D. NILSON.