June 12, 1956 M. B. LUCKER 2,750,150

LIFTING JACK

Filed Jan. 25, 1954 2 Sheets-Sheet 1

Fig. 1.

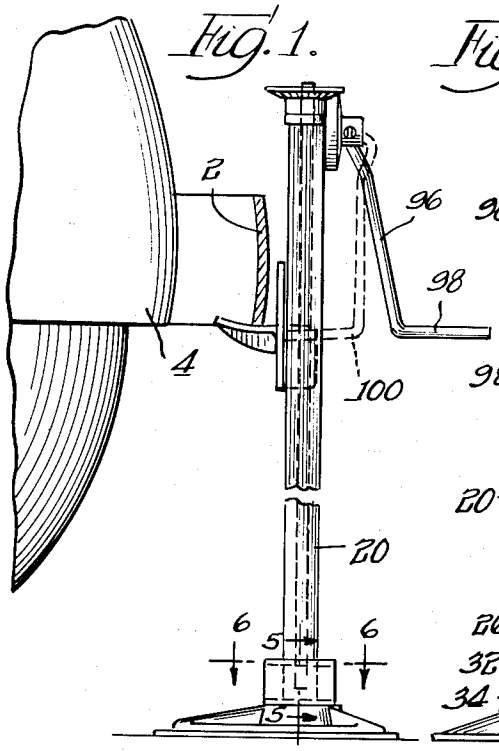
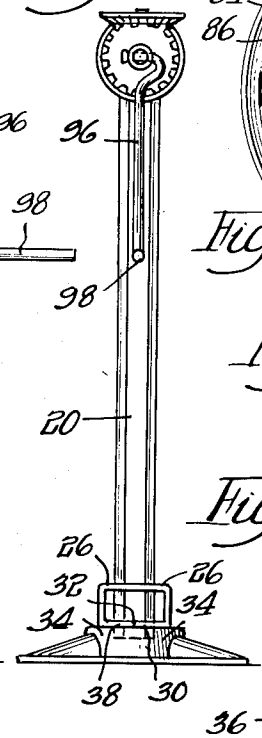


Fig. 2



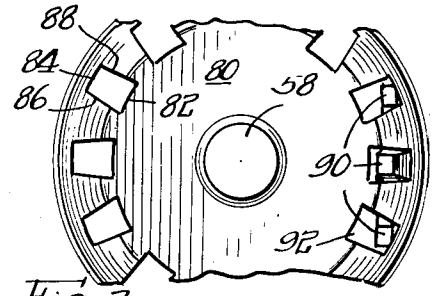


Fig. 7.

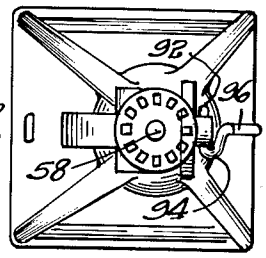


Fig. 3.

Fig. 5.

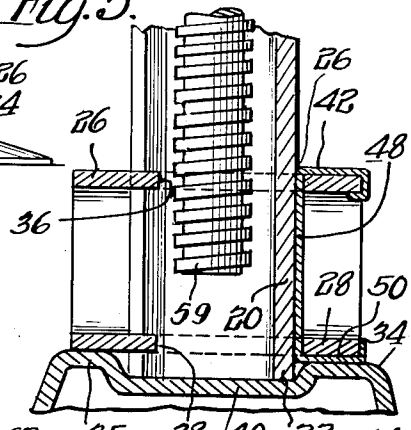


Fig. 4.

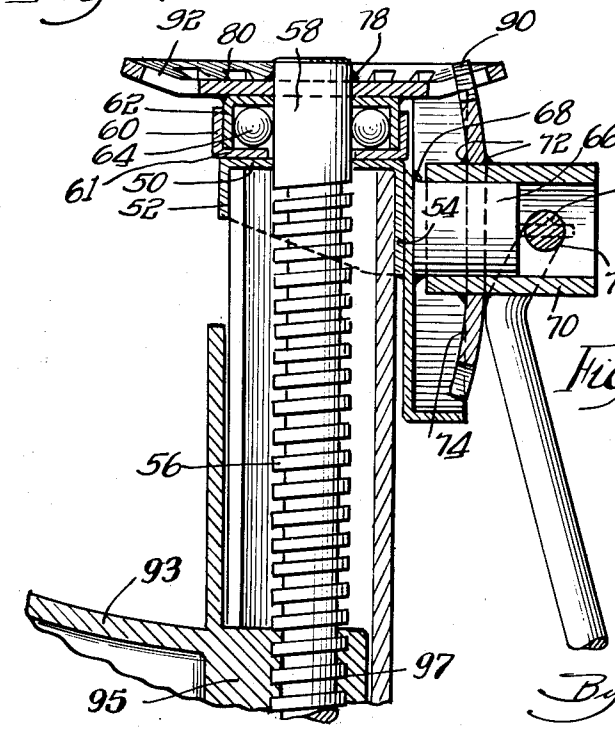
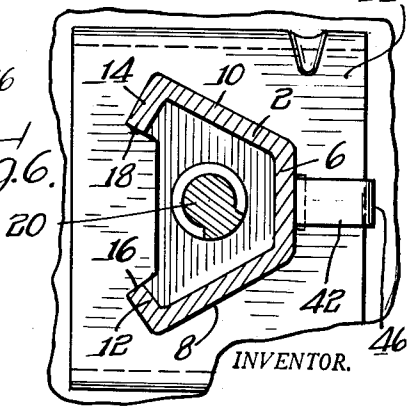


Fig. 6.



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LIFTING JACK

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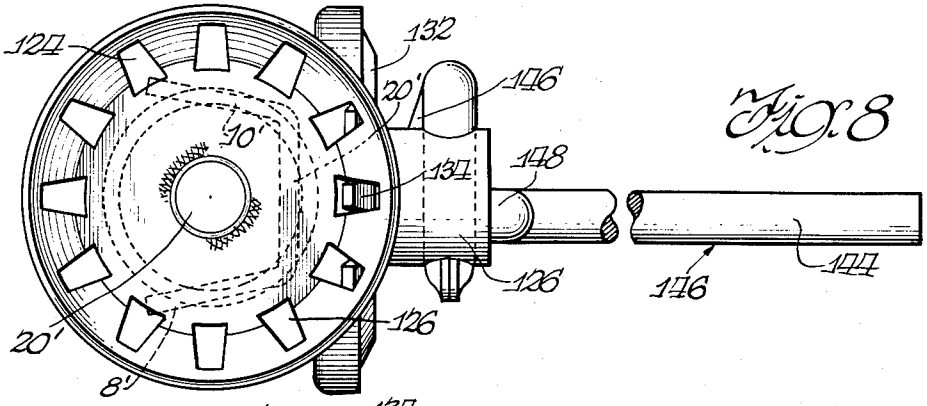


Fig. 8

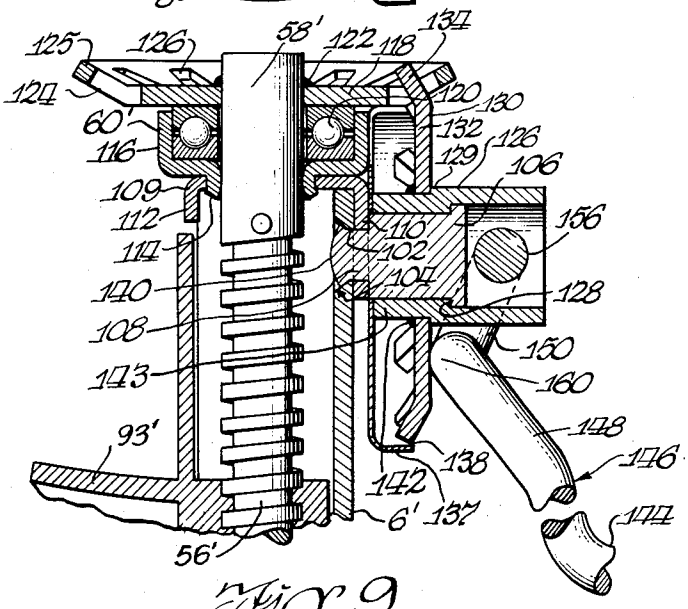


Fig. 9

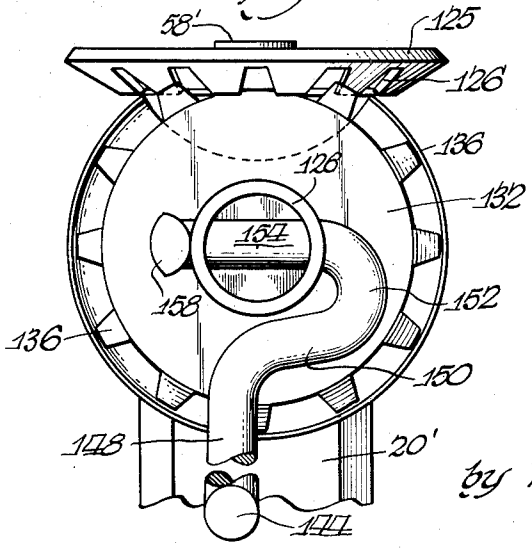


Fig. 10

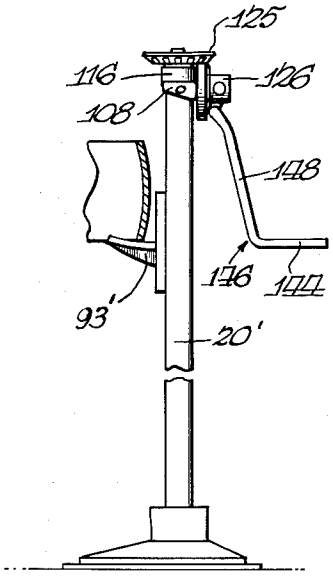


Fig. 11

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LIFTING JACK

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Application January 25, 1954, Serial No. 405,881

7 Claims. (Cl. 254—103)

This invention relates to automobile jacks and more particularly to a gear operated bumper jack.

The objects of the invention are to provide an upstanding bumper type jack or, in fact, any other type of jack wherein the load is lifted by means of a vertically extending operable member actuated progressively to shift the load carrying member upwardly or downwardly, and wherein gear means is provided at the top of the jack for rotating the vertically extending load operating member, which means is adapted to be turned about a horizontal axis so that in certain positions of the load as it is lifted there will be no interference with the load by the rotation of the load actuating member; more particularly, the object of this invention is to provide an upright rotatable screw shaft interconnected with the load lifting member and operable upon the rotation of the substantially vertically extending screw shaft to lift the load, such as the bumper of an automobile, and wherein is provided actuating means turnable about a horizontal axis and interconnected with the upper end of the rotatable screw rod for turning the same in a manner such that the turnable actuator will not interfere or contact the bumper or load during the raising of the load.

Another object of the invention resides in providing a geared actuator disposed at the top of the elongated screw rod which geared actuator comprises a pair of steel stampout gears, one of which is mounted on the upper end of the elongated screw rod and the other of which intermeshes therewith and is actuatable about a horizontal axis by means of an interconnected crank in a manner such that the operation of the crank will not interfere with or contact the raising load, particularly in the upper range of elevation of the load by the jack.

Yet another object of the invention resides in providing an elongated screw operating a load lifting member wherein the upper end of the elongated screw and the jack are provided with a pair of intermeshing steel or other metal gear stampings, one of the stampings being located to rotate about the axis of the screw rod and the other of the stampings being disposed substantially at right angles thereto and actuatable by a crank about a horizontal axis in a manner not to interfere with the load and whereby a very simple type of jack is provided.

Another object of the present invention resides in providing a jack and more specifically an automobile jack for raising cars by the bumpers or other convenient car parts wherein an elongated rigid channel-like strut is provided having means for maintaining the same in substantially erect position and particularly wherein the top of the channel strut is provided with a cap or support means across the top portion thereof suitably apertured to receive the upper end of an elongated screw rod together with ball bearing means and an upper sheet metal gear rigidly affixed to the upper end of the screw rod and rotatably supported by the ball bearing means and particularly wherein the cap for supporting the ball bearing means has a depending portion lying adjacent to one

of the side walls of the channel-like strut and wherein said strut and said depending portion of the upper closure are provided with registering apertures through which the inner end of a plug-like bearing member is suitably secured for holding a sleeve extending normally to the elongated strut and which sleeve is adapted rotatably to be mounted on said member and to carry an additional sheet metal gear having teeth adapted to mesh with the first mentioned gear.

Another object resides in devising a device of the foregoing character wherein the teeth of the gear mounted directly on the upper end of this threaded rod are in the form of slots disposed in the peripheral portion of the gear which mesh with peripheral teeth formed in the circumference of the second mentioned gear. These and other objects of the invention will be apparent in the following description of the drawings wherein:

Fig. 1 is a side view showing the jack in position and raising a load;

Fig. 2 is a view at right angles to Fig. 1;

Fig. 3 is a plan view of the jack;

Fig. 4 is an enlarged detailed sectional view of the upper end of the jack;

Fig. 5 is a vertical sectional view taken along the line of 5—5 of Figure 1;

Fig. 6 is a horizontal sectional view on line 6—6 of Fig. 1;

Fig. 7 is an enlarged detailed plan view of the upper gear showing the conformation of the slots therein forming one of the sets of teeth.

Fig. 8 is a plan view of the preferred form of my jack;

Fig. 9 is a side sectional view of the upper portion of said jack;

Fig. 10 is an end view of the jack shown in Fig. 9 looking at the jack from the right of Fig. 9 and showing the manner in which the substantially gooseneck handle is connected to the sleeve of the jack; and

Fig. 11 is a view in elevation showing the jack of Figs. 8 to 10 in use.

Referring now to the drawings in detail, this invention is adaptable for lifting the bumper 2 of either end 4 of an automobile in a manner such that during the raising of the load and particularly during the upper lifting movements of the jack the operating or turning crank or handle will not contact or interfere with the bumper or the body of the automobile itself.

Referring further to the drawings in detail, Fig. 1 illustrates the invention as applied to a vertical, single shaft upstanding jack which comprises a vertically extending channel-shaped strut 20, preferably of sufficient height to provide the necessary elevation for lifting the bumper of an automobile. This channel-shaped member is of sufficient thickness to provide a rugged upstanding strut which will adequately carry the load of lifting the rear end of an automobile.

As shown in Fig. 6 the channel comprises a rear wall 6 and two opposed outwardly flaring flanges 8 and 10 each wall of which terminates in an inwardly extending lip 12 or flange 14 and the front inner ends 16 and 18 are suitably spaced apart. This channel-like strut forms a housing for the elongated screw rod 56. As indicated in Figs. 1, 2, 3 and 5, the lower end 22 of the channel-shaped member fits within a correspondingly shaped socket in a rectangularly shaped metal strap 26 which is bent in the form of an open rectangle as shown in Fig. 2, and wherein the lower ends 28 and 30 are placed in confronting position as at 32 and welded to the top of the base 34. The upper and lower strap members 26, 28, and 30 are provided with vertically disposed openings 36 and 38 conformed to the shape of the cross section of the U-shaped strut 20 so that this bottom portion of the strut may be inserted in the hole or slot formed in the upper and lower

strap members 26, 28 and 30, so as to form a socket for holding the strut 20 in firm, upright position. The lower wall 40 of the base member 34 forms an abutment against which the lower end of the upstanding strut column abuts in its vertically assembled position. A suitable leaf spring has its upper end 42 curled about the upper edge of the plate 26 of the stand and extends across the top surface of the plate 26 and thence downwardly in a vertical direction as at 48 (see Fig. 5), and is bent under the inwardly bent surfaces 28 and 30 as at 50 (see Fig. 5) whereby to hold this stand and strut in position. The vertically extending portion 48 of this spring member provides a friction grip for engaging the lower portion of the strut member 20 when inserted in its socket. The top band 26 of the stand is provided with the opening 36 which is exactly the conformation of the cross section of the strut member, which cross section is shown in Fig. 6, so that when the strut member is inserted in the socket of this opening in the upper and lower walls 26, 28 and 30 of the base the strut will be held in substantially vertical upright position. The bottom walls 28 and 30 are welded to the wall portions 35 of the base 34.

The strut at its upper end is provided with a sheet metal cap in the form of a shell having a top wall 50 and depending skirts 52 and 54. The upper portion of the shell is provided with a central opening through which passes the upper end of the elongated screw rod 56. The upper end of this screw rod is not threaded as at 58 and the lower end 59 of the screw rod just as in Figure 5 depends downwardly into the bottom of the elongated strut 20 where it is held from extreme lateral movement by contacting the inner wall of the strap 26, as shown in Figure 5. Thus the base, when assembled to the strut, forms a confining or stop member for the lower portion of the screw rod.

A cup-shaped shell 60 is provided with a horizontal annular flange 61 and is suitably welded to the upper wall 50 of the top cap for the elongated strut and a counterpart shell 62 of the bearing nests within this horizontally disposed shell 60 to provide a housing. Ball bearings 64 are carried in this housing and lie around the unthreaded upper end 58 of the elongated screw.

A circular stud or support 66 so welded as at 68 to the depending member 54 of the top cap as shown in Fig. 4 and this horizontally extending stud 66 forms an elongated horizontal bearing for the sleeve 70 which slips over the stud 66. Welded to sleeve 70, as at 72, is a dished, stamped sheet metal gear 74. Sleeve 70 is provided with diametrically disposed registering transverse openings 76. At the top of the unthreaded portion 58 of the elongated screw rod 56 there is welded as at 78 another stamped sheet metal gear 80, the bottom portion of which faces and lies snugly against the rotatable shell 62 of the ball bearing hereinbefore described. The outer circumferential portion of this horizontal upper gear 80 is provided with a series of radially extending slots, shown particularly in Figs. 3, 4, and 7. These slots are formed so that their inner cut wall 82 is of greater width than their outer cut wall 84. The two slot sides 86 and 88 converge slightly in the manner shown in Figure 7 so that teeth 90 of the horizontal gear 74 in their rotation sequentially and successively mesh with these recesses 92 formed in this upper horizontal gear whereby upon rotation of the driving gear 74 the gear 80 turns the shaft 56 to raise or lower the vertically extending shiftable load support 93 which is held from rotation and which is internally threaded to engage the screw 56.

Attention is called to the fact that by reason of the arrangement of the converging walls of the slots and the fact that the width of the tooth slots is greater at the zone nearest the vertical axis, the turning of the horizontal gear 80 facilitates the engagement of the teeth 90 on the gear 74 with these tooth slots of the horizontal gear.

A crank handle is shown as being provided with a short length 92' which passes through the registering openings 76 in the sleeve 70 and the outer end of this short length 92 of the crank is flattened as at 77 by a punch operation to maintain it from disengagement from the openings 76. The crank is provided with a gooseneck bent portion 94 terminating in an elongated handle 96 formed with the outer turning end 98. The handle pivots about the short length 92 which passes through the registering openings in the sleeve 70 so that the handle may be swung about into various angular positions, one of which is shown in the down position in dotted lines in Figure 1 at 100; and conversely, the handle may be swung to an open position 180 degrees therefrom as shown in full lines in Figure 1 so that it is capable of being rotated about the horizontal axis of the sleeve 70 for rotating the gear 74. It will be noted that in this last mentioned operating position, as shown in Figure 1, the crank may be turned without in any way interfering with or contacting the bumper.

The load lifting member 93 is provided with an inwardly extending portion 95 having an interior thread 97 engaged with the thread of the elongated threaded screw rod 56 whereby on rotation of the screw rod 56 about its vertical axis the load engaging member 93 will be raised or lowered.

In Figures 8, 9 and 10 of the drawings I have shown a preferred form of my jack. Referring now to the details of construction of the preferred form shown in Figures 8, 9 and 10, the elongated rigid strut 20' is of the construction shown in Figures 1 to 7 of the drawings except that the strut at the top of its rear wall 6' is provided with an opening 102 which opening on the inner wall of the jack is beveled as at 104 circumferentially of the opening, Figure 9. A metal plug 106 of circular cross section is provided with a reduced neck 108 which neck 108 will hereinafter be further described.

The substantially U-shaped channel member 20' (see Figure 8) has the rear wall 6' and two outwardly extending side walls 8' and 10' which slant slightly outwardly one from the other. In this embodiment of the invention it is preferred to omit the marginal inwardly extending flanges that are present on the channel member 6 of Figure 6 hereinbefore described. The channel-like strut 20' is closed at the top by a preferably sheet metal cap 109. This cap 109 is provided with a relatively long depending flange 110 which extends downwardly a substantial distance parallel to and in contact with the rear of wall 6' of the channel-like strut 20'. At the front this cap is provided only with a short flange 112. The flange 110 is provided with an opening which registers with the opening 102 formed in the rear wall 6' of the channel-shaped strut 20'. The opening in the top of the cap 109 through which passes the upper unthreaded end 58' of screw rod 56' is formed sufficiently large to receive the circumferentially flanged portion 114 of the cup 116 of the ball bearing 60'. In short, the ball bearing holder 116 receives an ordinary type of ball bearing member providing a lower thrust plate and an upper thrust plate with intervening balls 120 so that the upper rotatable plate supports the central web of the upper gear 118 hereinafter to be described. The depending circular flange 114 of the ball bearing receptacle 116 has its metal forced, peened, or swaged through the opening formed in the top cap 109 whereby the ball bearing cup 116 is rigidly and firmly united to the cap 109 by means of the flange 114. The top unthreaded end 58' of the screw rod thus passes centrally through the flange 114 and the ball bearing members and also through a central opening in the top, horizontal, sheet metal gear 118. As shown in Figure 9 this gear is welded as at 122 to the upper end 58' of the screw rod.

This upper gear 118 which is preferably formed of a sheet metal stamping is provided with the cutout gear tooth slots 124 which in shape are identical with the teeth 92 of the construction shown in Figures 4 and 7. This blank 118 is formed with an outer circular portion

125 disposed at an inclination to the plane of the central hub portion of the gear 118.

The plug or support 106 has surrounding same a sleeve 126 and this sleeve is provided with an internal shoulder 128 which is adapted snugly to fit the shoulder formed on the plug or support 106. In addition the sleeve is provided with an external circular shoulder 129 which is disposed inwardly of the shoulder 128 and this shoulder is adapted to abut a second sheet metal stamping 130 in the form of a gear having a hub portion 132 and an outer peripheral portion 134 disposed at a slight angle to the plane of the central portion 132 and this inclined portion 134 is provided with radially disposed teeth 136 as shown in Figure 10. These teeth are inclined inwardly toward the central axis of the screw rod 56' and are so configured and arranged to engage in the interdental slots 124 of the gear 118.

A gear guard 137 of relatively thinner sheet metal is provided with a flange 138 and the arrangement is such that the flange substantially enclosed the inwardly facing teeth 136 of the gear 130. This guard 137 is provided with a centralized opening to overlie the central portion of the plug 106 and to engage against the outer face of the depending portion 110 of the top cap 109. Since the neck 108 of the plug 106 is inserted through the opening in the depending tongue 110 of the top cap and through the centralized opening in the guard 137 and also through the opening 102 in the rear wall 6' of the channel-shaped member, when the projecting end of the neck of this plug is peened over as at 140 all these members are rigidly and securely fastened together. The gear 130 is welded as at 142 to the sleeve portion 143 and against the shoulder 129. The peripheral teeth 136 of this vertically disposed gear 130 are arranged to intermesh with the tooth slots 124 of the top gear so that upon rotation of the handle 144 of the crank 146 the top gear will be rotated to rotate the screw rod 56'. Figure 10 shows the preferred form of the crank for turning the gear 130 and comprises an elongated handle section 148 having a substantially right angle bend 150 and a U-shaped bend 152 extending from the curved portion 150 and terminating in a leg 154 which passes through registering openings 156 in the outer end of the sleeve. The outer end of the handle is peened and enlarged as at 158 to secure it to the outer end of the sleeve as shown clearly in Figure 10. This handle thus formed is capable of swiveling to a position shown in Figure 9 wherein the bend 150 may lie substantially in contact with the flat face of the center portion 132 of the vertically disposed gear with the handle section 148 of this crank extending outwardly at a downwardly inclined direction away from the jack as shown in Figures 8, 9 and 10. This handle portion is of the general form shown in my prior patent entitled "Lifting Jack," Serial Number 299,119, filed July 16, 1952, which is in turn a continuation-in-part of my prior application 63,367, filed December 3, 1948, now Patent No. 2,630,295. It will be noted that the crank 146 is so formed that the handle as shown in Figure 1 of the jack lies substantially parallel to the strut 20 when in folded position and extends downwardly and outwardly or will lie at an angle to the strut when swung to an operative position so that it can be used as a crank as shown in Figures 1 and 9 to rotate the gear 130 about the central axis of the sleeve 126 so that from a convenient height the load support 93 or 93' (see Figures 1, 4 and 9) will be raised or lowered on rotation of the crank. The crank 96 or 146 as shown in Figures 1 and 9 is located on the opposite side of the strut 20 or 20' from the load to be lifted and therefore in rotating the crank about its horizontal axis the bumper 2 of the automobile or other load being lifted or lowered by the load support 93 or 93' will not interfere with the rotation of the crank to operate the gears to so raise or lower the load support.

The preferred form shown in Figure 9 has substantial advantages over the construction shown in Figure 4 in that it is not necessary to weld the stud for the vertical gear to the top cap for the main strut nor to weld the top cap to the rear wall of the strut as shown in Figures 4 and 6. Since by passing the neck 108 of the plug through the registering holes of the guard 137, the depending flange 110 of the cap 109 and through the hole in the rear wall 6' of the strut, the plug and the sleeve are rigidly secured to the rigid strong strut. In this manner a very rigid strong support for the gear 130 is provided which support holds the peripheral teeth 136 in meshed engagement with the tooth slots of the upper horizontal gear while at the same time this construction permits the gears to be made of sheet metal stamped of substantially uniform thickness. By forming these sheet metal gears with tooth slots disposed at an inclination and with peripheral or circumferential teeth 136 disposed at a substantially similar inclination to the disposition of the slots, perfect meshing of the teeth of these two gears is secured and their easy rotation effected.

Thus a very economical type of drive mechanism for the screw rod and the jack is provided for raising and lowering the load member 93 or 93'.

The angle of inclination of the peripheral rim portion 125 of the upper, horizontal gear 118 is 30 degrees and the angle of inclination of the peripheral rim portion 134 to the center portion 132 of the vertically disposed gear is 30 degrees and the hub portions of the two gears are disposed at right angles one to the other. By this arrangement the rim portions of the two gears are also disposed at right angles. This arrangement insures the facile intermeshing of the gears and the rotation of the upper horizontal gear by the vertically disposed side gear. Attention is drawn specifically to the fact that these two gears are of sheet metal stampings and are each of uniform thickness being stamped from a sheet metal stock.

It will thus be seen that I have provided a very simple type of automobile bumper jack which can be operated in a manner so that it will not interfere with the bumper of an automobile during the operation of the jack. I have also provided a very simple type of inter-geared connection for driving the screw rod consisting of a simple type of stamped sheet metal gears which intermesh in the manner disclosed.

While the preferred embodiments of the present invention have been shown and described herein for the purpose of illustration, it is obvious that many changes can be made in the structural details without departing from the spirit and scope of the appended claims.

The present application is a continuation-in-part of my prior filed application Serial No. 318,825, filed November 5, 1952, now abandoned.

I claim:

1. A hand operated automobile jack comprising base means, an elongated strut supported by said base means in an upstanding position, an elongated upstanding screw rod rotatably carried by said strut having an upper end portion projecting above said strut, a load lifting member threadedly engaging said screw rod, a sheet metal gear fixed on said upper end portion of said screw rod, said gear having a generally flat annular body portion and an upwardly and outwardly flared annular marginal portion, said gear having circumferentially spaced slots therein extending into said flared marginal portion and terminating short of the peripheral edge of the gear, a second sheet metal gear mounted for rotation about an axis beneath said first gear and extending laterally of said strut, said second gear having circumferentially spaced teeth flared outwardly and toward the strut and meshing with said slots, and handle means interconnected with said second gear for turning said gear and said screw rod to actuate said load lifting feed.

2. A hand operated automobile jack, as defined in

claim 1, wherein said second gear axis is disposed substantially at a right angle to the axis of said first mentioned gear, and wherein said flared annular portion and said flared teeth are disposed substantially at right angles to each other when in meshing relationship.

3. A hand operated automobile jack, as defined in claim 1, which includes a guard member carried by said strut and surrounding the teeth of said second mentioned gear, which guard member has an opening beneath said first mentioned gear through which said teeth project for meshing with said first mentioned gear.

4. A hand operated automobile jack, as defined in claim 1, wherein said load lifting means projects from one side of said strut and said second gear is mounted at another side of said strut, and wherein said handle means is pivotally interconnected with said second gear for movement to and from a folded inoperative position substantially parallel with the strut, and an operative position flaring from the strut, which handle means includes an abutment portion engageable with said second gear when the handle means is in said operative position for maintaining the handle means in said operative position.

5. A hand operated automobile jack, as defined in claim 1, wherein said second mentioned gear is rotatably supported by means including a stub shaft having an end portion projecting through an aperture in a wall of said strut, which end portion is enlarged for preventing removal of the stub shaft from said aperture, a sleeve rotatably mounted on said stub shaft and carrying said second mentioned gear, and interengaging means on said stub shaft and said sleeve for preventing axial separation of the sleeve from the stub shaft.

6. A hand operated automobile jack comprising base means, an elongated channel strut supported by said base means in an upstanding position, an elongated upstanding screw rod rotatably carried within said channel strut and having an upper end portion projecting above said channel strut, a load lifting member threadedly engaging said screw rod and projecting through an open side of said channel strut, a cap member covering an upper end of said channel strut, which cap member has an aperture therein through which said upper end portion of the screw rod projects and a depending portion extending along a back wall of said channel strut, bearing means mounted on said cap member and confining said upper end portion of the screw rod, a sheet metal gear resting on said bearing means and fixed to said upper end portion of said screw rod, said gear having a generally flat annular body portion and an upwardly and outwardly flared annular marginal portion, said gear having circumferentially spaced slots extending into said flared marginal portion and terminating short of the peripheral edge of the gear, a guard member abutting said depending portion of said cap member and having an annular flange interrupted immediately beneath said gear, a generally horizontal stub shaft having an end portion projecting through aligned apertures in said guard member, said depending portion of the cap member and said back wall of the channel strut and terminating in an enlargement for preventing removal of the stub shaft, a sleeve rotatably mounted on said stub shaft, cooperating shoulder means on said sleeve and said stub shaft for preventing axial separation of the sleeve from the stub shaft, a second sheet metal gear fixed on said sleeve and having circumferentially spaced teeth enclosed by the annular flange of said guard member and flared outwardly and toward the strut and meshing with the slots in said first mentioned gear, and handle means interconnected with said sleeve for rotating said gears and said screw rod to actuate said load lifting means.

7. A hand operated automobile jack, as defined in claim 6, wherein said sleeve has an external annular shoulder facing said strut, and wherein said second mentioned gear is disposed in engagement with said shoulder.

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