FOREIGN PATENTS OR APPLICATIONS
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ABSTRACT
A load lifting jack comprising a support member, a screw shaft rotatably located within the support member, a lifting arm supported at the substantially middle portion by a link and connected at its end to a threaded nut engaged with the screw, the nut being adapted to be displaced along the length of the screw shaft in order to raise or lower the lifting arm, the link being pivotally connected to the lifting arm at one end and having means for engaging the other end with any selected one of a plurality of recesses provided on the support member so that engagement thereof easily and quickly locates the lifting arm in its desired position. A rotatable jack base may be provided for lifting inclined loads to prevent undesired lateral movement of the load lifting jack.

6 Claims, 6 Drawing Figures
LOAD LIFTING MECHANISM

This invention relates to load lifting jacks, and more particularly relates to jacks which employ a load lifting arm of the cantilever type.

Conventionally, there have been presented lifting devices of the above generally indicated type which comprise a support member having a ground engaging member, a screw shaft rotatably mounted within the support member, a lever-type lifting arm mounted on a bush engaged with the screw, and a link pivotally connected to the arm at one end and to the ground engaging member at its other end. In operation, by rotation of the screw shaft the engaged bush is displaced along the length of the screw and in consequence the end of the lifting arm is pivoted about its interconnection with the link. This construction is undesirable because it is necessary to raise the lifting arm from its completely collapsed position until the load engaging member of the arm reaches a desired position adjacent the load by continuous manual rotation of the screw, and it is necessary to lower the arm from its lifted position also by continuous manual operation to collapse the device. This requires considerable time and trouble throughout the raising and lowering movement of the arm.

Therefore, it is a principal object of the present invention to overcome the above difficulties by providing improved jacking means of the above type which are simple in construction, economical to manufacture and efficient in operation.

According to this invention, briefly summarized, there are provided several recesses or detents on the support member or the jack base member and leg means on the link for engagement with any selected one of the recesses. Engagement of the leg means and a recess locates the lifting arm at or near its desired position without rotation of the screw shaft and disengagement thereof lowers the lifting arm readily and quickly.

Other objects will become apparent to those skilled in the art from the following description with reference to the accompanying drawings which depicts preferred embodiments of the invention for illustrative purposes only.

In the drawings:

FIG. 1 is a side elevation of a jack in its collapsed position embodying the invention;
FIG. 2 is a view similar to FIG. 1 in its elevated position;
FIG. 3 is a view in vertical section, taken along the line III—III of FIG. 2;
FIG. 4 is a plan view of the structure of FIG. 1;
FIG. 5 is a view similar to FIG. 1, but showing a modified form of this invention; and
FIG. 6 is a view corresponding to FIG. 4 of the structure of FIG. 5.

Referring first to the embodiment of FIGS. 1 to 4, the lifting device comprises generally a support or casing member 10 of upwardly open channel form, and a load lifting arm 12 which carries at one end a load lifting member 14 pivotally connected thereto by a pin 15. The lifting arm 12 which may be formed, for example, of relatively heavy gauge sheet metal is movable between the fully collapsed position (FIG. 1) in which the arm occupies a substantially horizontal position and the elevated position in which the arm may be substantially at right angle to the support member 10. An intermede portion of the lifting arm has an enlarged cross sectional area since it receives the maximum bending moment. A jack base 16 is securely attached by welding, for instance, to one end of the support member 10. The base consists of a bottom member 13 secured to the member and a pair of flanges 17 at opposite sides of the base which are substantially at right angle to the bottom member 13 and are formed integrally therewith. There are provided, symmetrical to the axis of the support member 10, several, three in this embodiment, recesses or detents 18 on the upper portion of each flange.

A screw shaft 20 is rotatably mounted within the support member 10. A rotary driving head 22 is fixed at one end of the shaft 20 and outside of the support 10, at which a suitable driving handle (not shown) may be engaged so as to rotate the driving screw 20. A traveler nut 24 is internally screw-threaded and carried on the screw shaft 20 at its other end. The nut 24 includes a pair of cylindrical projections 26 and 28 extending horizontally relative to the screw shaft 20, to act as pivots for a pair of rollers 30 and 32 which are rotatably mounted within the support member 10, respectively.

A pair of forks 31 and 35 are provided at the lower end of the lifting arm 12 and formed integrally therewith. The forked portions 31 and 35 are positioned on opposite sides of the driving nut 24 and between the rollers 30 and 32, and are also pivotally mounted on the cylindrical projections 26 and 28, respectively.

A thrust bearing 36 is attached on the screw shaft 20 between an end wall 37 of the support 10 and the rotary driving head 22. This bearing receives the leftward thrust on the screw when in use as shown in FIG. 2, A stopper ring 38 fixed to the screw 20 and in contact with the end wall 37, prevents the driving screw from being displaced axially relative to the support member 10. It will be apparent that when the screw is rotated the nut 24 is displaced along the length of the screw shaft 20 and is, smoothly guided along the inner wall of member 10 by the rollers 30 and 32. A link shaft in the form of a bifurcated member 40 is pivotally mounted at its central portion 42 in a recess 41 provided in the intermediate portion of the lifting arm 12 by supporting plates 44 and 46 secured thereto. A pair of leg portions 48 and 50 at the free ends of the link 40 project outwardly in mutually opposite directions relative to the member 10 and are engageable with any selected one of the notches 18. When the lifting device is in its fully collapsed position, the legs engage the outer recesses 52 as shown in FIG. 1 or 4. When an intermediate height is desired, the legs are located at second recesses 54 whereby the load lifting arm 12 is elevated about the projections 26 and 28 as shown in FIG. 2. In order to elevate a vehicle 56, for example, screw 20 may be rotated in a direction to cause traveler nut 24 to advance to the right in FIG. 2.

It should be recognized that such construction causes less movement of the driving nut than would be the case if there were provided no recesses on the jack base member for receiving the leg members of the link shaft. In lowering the jack, a reverse action of course takes place. That is to say, after revolution of the screw 20 in the opposite direction until there is no load on the load engaging head 14, the leg members 48 and 50 are moved to the outer recesses 52 to cause the lifting arm
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12 to be substantially collapsed and parallel with the screw shaft 20 without any further rotation of the screw 20.

Referring to FIGS. 5 and 6, there is shown a modification with the same parts as shown in the previous embodiment being designated with the same reference numerals with primes (') affixed thereto.

The present invention relates also to a modified lifting jack which comprises a support member 10' and the jack base 16'. The support 10' is pivotally mounted at one end on the base 16' by a pivot pin 56 preferably with collars 58 and 60 so that when the load engaging member 14' is inclined to the horizontal because of inclination of the vehicle (not shown) the support member 10' is pivoted about the pin 56. The pin 56 extends across and is supported by the flanges 17' of the base 16'. It is to be noted that unless the support member 10' is pivoted according to the inclination of the vehicle, the support with the jack base will slide along the ground in the horizontal direction.

The screw shaft 20' is rotatably mounted within the support 10'. The rotating driving head 22' of the screw shaft 20' is mounted at the other end of the casing 10' with the thrust bearing 36'. A bearing member 62 for the driving screw 20' is mounted within one end portion of the support 10' by rivets 64 and 66. The forked ends 31' and 35' of the load lifting arm 12' are pivotally connected to the projections 26' and 28' of the internally threaded nut 24', which is located on the screw 20' at the opposite end relative to the bearing member 62. A ground engaging member 68 may be fixed, by welding for example, to the underside surface of support 10' substantially at the middle portion thereof so as to raise the head 22' a small amount. From the foregoing, it will be readily apparent that a driving crank handle may be attached to the rotary head 22' more easily in this embodiment than in the first embodiment wherein the head 22 occupies a substantially horizontal position.

A link shaft 40' consists of a pair of U-shaped pins 70 and 72 which are symmetrically disposed relative to the lifting arm 12' as shown in BEST FIG. 6. Opposed ends of each pin are securely fitted in tubular members 74 and 76, respectively. More particularly, legs 48' and 50' extend inwardly in mutually opposite directions and are rigidly fitted in the tubular member 74, while the stems 42' and 42' of each pin are rigidly mounted in the tubular member 76 and are pivotally connected to the lifting arm 12' at its intermediate portion. It will be recognized that the above structure of the link shaft 40' ensures its rigidity and the engagement of the legs 48' and 50' and the recesses 18' on the base member 16' in comparison with that of the previous embodiment wherein the leg 48 or 50 may be disengaged in the inward direction.

The description of operation of the modified form will be omitted since it is substantially similar to that of the first embodiment.

It will be apparent to those skilled in the art that the detents or recesses may be provided at one end portion of the support member in place of providing them on the flanges of jack base.

It is to be understood that the novel structure disclosed herein is not limited in application to a vehicle but is also useful in any application wherein the load is required to be lifted by manual operation.

The use and operation of the advantages of the load lifting mechanism of the present invention will be fully apparent from the above detailed description of a single embodiment, operation and use. It will be further apparent that many changes may be made in the construction thereof without departing from the spirit of the invention defined in the following claims.

I claim:

1. A load lifting jack having a support member, a jack base attached thereto, a screw shaft rotatably mounted within said support member, a load lifting arm having a load engaging member at one end thereof and a threaded nut pivotally mounted on the other end thereof, said nut being mounted on said screw shaft, a link shaft pivotally connected to said load lifting arm and displaceably mounted at the other end to the support member, whereby when said screw shaft is rotated said threaded nut will be displaced along said screw shaft thus causing said load engaging member to be raised or lowered, the improvement wherein the other end of said link shaft includes legs means and wherein said jack base is provided with a plurality of recesses spaced along the length thereof for selectively receiving said leg means so that said load engaging member may be raised to a desired position adjacent the load to be raised before the screw shaft is rotated.

2. A load lifting jack as claimed in claim 1, wherein said jack base is pivotally mounted on said support member.

3. A load lifting jack as claimed in claim 2, and further comprising a driving head secured to one end of said screw shaft and extending outside said support member for rotation thereof.

4. A load lifting jack as claimed in claim 3, and further comprising a ground engaging member disposed substantially at the middle of said support member.

5. A load lifting jack as claimed in claim 1 and further comprising a stop ring secured to said screw shaft for abutment against the inside of one end of said support member so that axial displacement of said screw shaft relative to said support member when said screw shaft is rotated will be substantially eliminated.

6. A load lifting jack as claimed in claim 1, wherein said link shaft comprises a pair of U-shaped members symmetrically arranged in abutment to each other.

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