

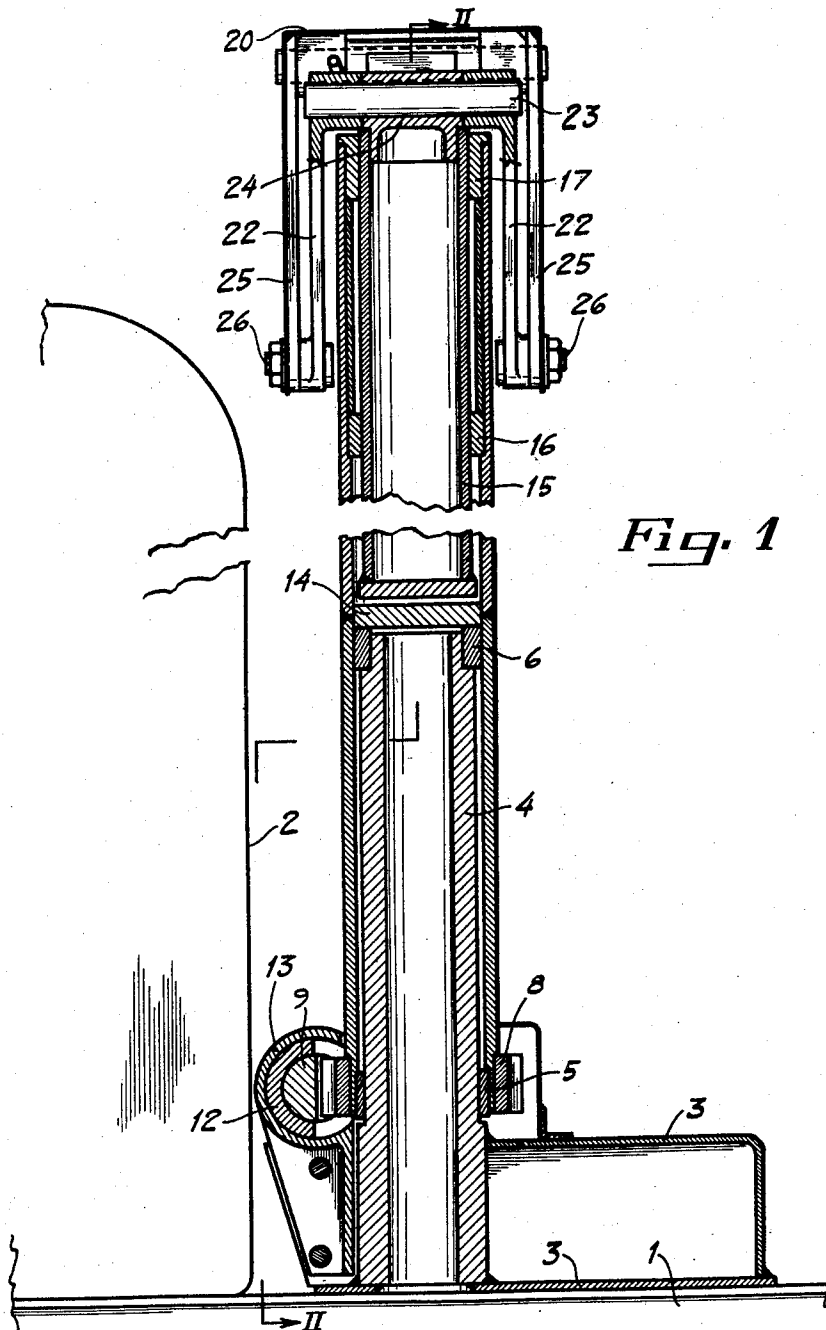
July 21, 1959

A. E. SUNDIN
HYDRAULIC JACK

2,895,622

Filed Dec. 8, 1955

4 Sheets-Sheet 1



Inventor:
Anders Eric Sundin

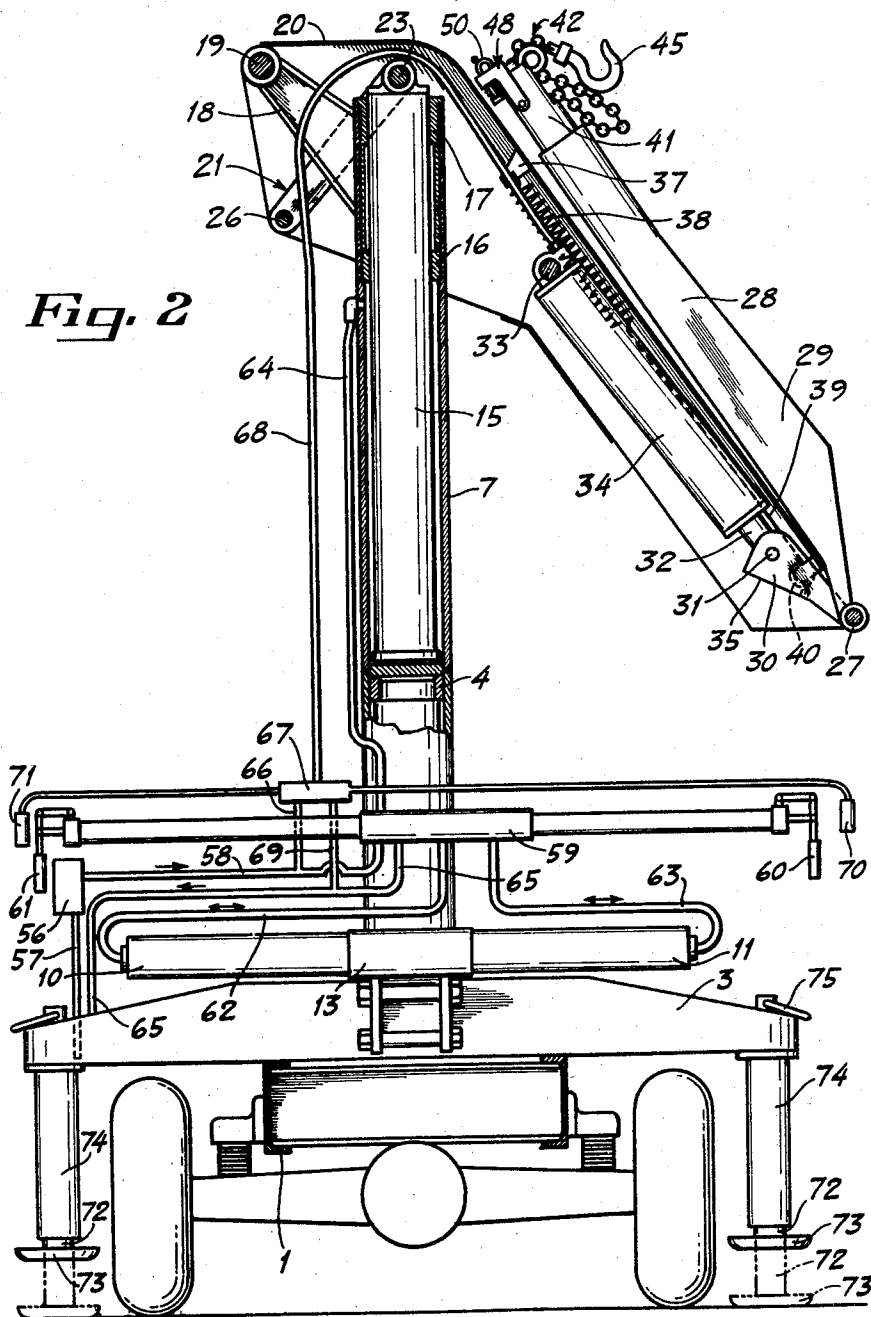
July 21, 1959

A. E. SUNDIN
HYDRAULIC JACK

2,895,622

Filed Dec. 8, 1955

4 Sheets-Sheet 2



Inventor:
Anders Eric Sundin

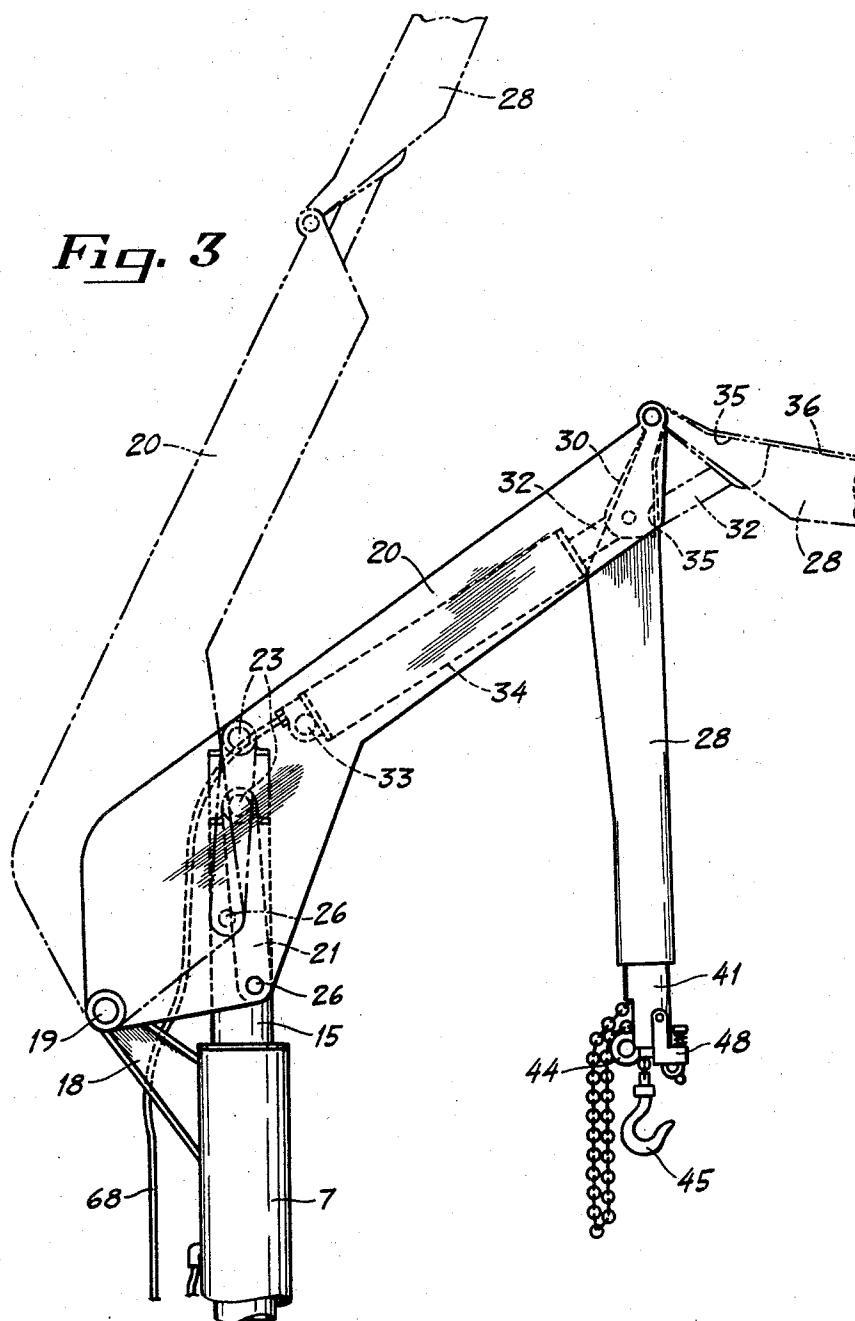
July 21, 1959

A. E. SUNDIN
HYDRAULIC JACK

2,895,622

Filed Dec. 8, 1955

4 Sheets-Sheet 3



Inventor:
Anders Eric Sundin

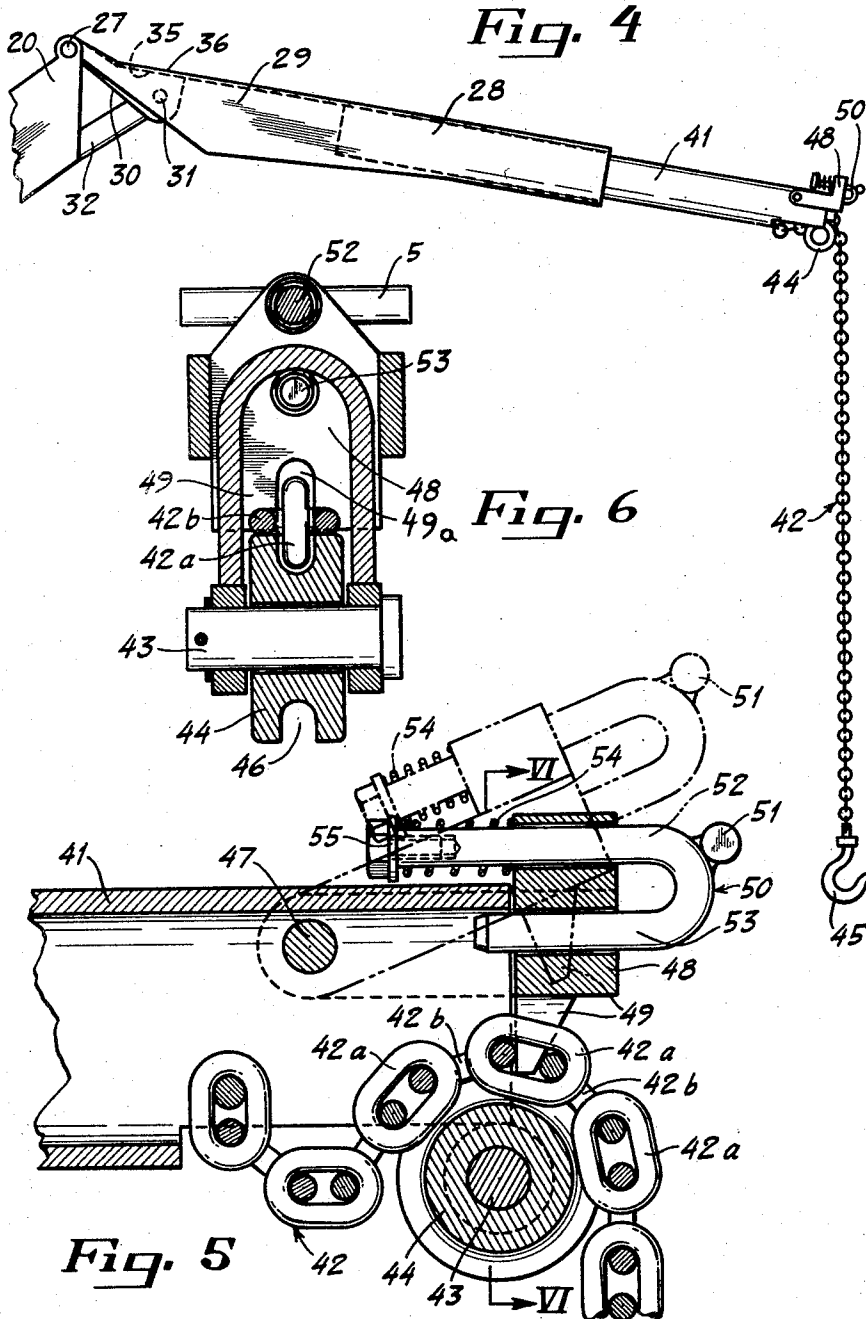
July 21, 1959

A. E. SUNDIN
HYDRAULIC JACK

2,895,622

Filed Dec. 8, 1955

4 Sheets-Sheet 4



Inventor:
Anders Eric Sundin

1

2,895,622

HYDRAULIC JACK

Anders Eric Sundin, Hudiksvall, Sweden, assignor to
Hydrauliska Industri Aktiebolaget, Hudiksvall, Sweden,
a corporation of Sweden

Application December 8, 1955, Serial No. 551,916

Claims priority, application Sweden December 9, 1954

3 Claims. (Cl. 212—35)

The present invention relates to a hydraulic jack especially adapted to be arranged behind the driving compartment of a lorry; by means of said hydraulic jack considerable loads can be lifted from the ground some distance beneath the lorry to the platform of the latter, and arranged on said platform as desired, either at the front or rear of the latter.

The invention relates more particularly to such hydraulic jacks which are provided with a swingable lever beam that can be swung as well in a vertical as in a horizontal direction relative to the body of the hydraulic jack. The movement in vertical direction of the lever beam is caused at least partly by a hydraulic device consisting of a pressure cylinder with a pressure piston which brings the lever beam close to the supporting end adjacent the body.

Characteristic for the invention is that the lever beam is provided with a swinging arm actuated by a second pressure cylinder with a pressure piston so that the lever beam can swing a loading tool on the swinging arm not only in a vertical and horizontal direction but also can move this tool in a direction to or from the body besides which the lever beam with its swinging arm can be collapsed during driving the lorry.

By such a hydraulic jack a load may be placed at a considerable height as well at the front as at the rear part of the body platform if, for instance, bulk goods are in question; at the same time unloading can be performed quickly and comfortably by the jack.

An embodiment of the invention will be hereinafter described with reference to the accompanying drawings, in which:

Figure 1 shows a vertical longitudinal section through a hydraulic jack with its lever beam turned sidewise so that it will be in a position parallel to and behind the driving compartment of the lorry; this section being taken through the vertical longitudinal middle plane of the lorry.

Figure 2 shows on a somewhat reduced scale a vertical section through the upper part of the hydraulic jack on the line II—II in Figure 1, and a vertical cross section through the chassis of the vehicle with control devices for the hydraulic medium; said devices being shown diagrammatically.

Figure 3 is a side view, partly broken off, of the hydraulic jack showing the lever beam and the swinging arm of the jack in different positions.

Figure 4 is a side view of the swinging arm.

Figure 5 shows on an enlarged scale a longitudinal section through the outer end of the lever beam with means for blocking the lifting chain of the jack; and

Figure 6 shows a vertical cross section through the lever beam on the line VI—VI in Figure 5.

Referring more particularly to the drawings, a box-formed rail 3 is transversely arranged on the frame 1 of the chassis of a lorry closely behind the driving compartment 2 of the latter; said rail 3 forms a container

2

for the pressure medium, preferably oil, which medium drives the hydraulic jack.

A vertical cylinder 4 is with its lower end arranged at the rail 3, and around the upper end of said cylinder 4 is turnably carried a pressure cylinder 7 by means of two bearings 5 and 6; said cylinder 7 serves as a body for the jack.

A gear wheel 8 is arranged at the lower end of this cylinder; the teeth of said gear wheel 8 engage a rack-gear 9, said rack-gear connects two pistons (not shown); each one of said pistons is movable axially in pressure cylinders 10 and 11.

The rack-gear 9 is movable axially in a guide 12 in a piece 13, which connects the cylinders 10, 11 mutually.

The tubular body is provided with a bottom 14 fixed above the cylinder 4, this bottom forms a support for the lower end of a pressure piston 15, which is axially movable in the cylinder 7 when the pressure piston is in its lower position. The piston 15 is movably guided in two bearings 16 and 17 arranged at some distance from each other; the upper end of the cylinder 7 is provided with a bracket arm 18. A horizontal shaft 19 is turnably carried at the free end of the bracket arm 18, which shaft, with its ends, supports one end of the channel formed lever beam of the jack. One part 20 of this lever beam is by means of a U-shaped double-link 21 pivotally connected to the pressure piston 15. The U-shaped double-link 21 consists of two arms 22 mutually connected by a shaft 23 which is pivotally carried in a head 24 at the upper end of the piston 15; at their free ends of the arms 22 are pivotally connected to the side parts 25 of the lever beam by means of pins 26 situated below the shaft 19.

At the end of the lever beam 20 and opposed to the shaft 19, a channel-formed or tubular arm 28 is pivotally carried on a horizontal shaft 27; the part 29 of the arm 28 situated closely to the shaft 27 is channel-formed. A swinging arm 30 is with one end swingably carried on the shaft 27. The free end of the arm 30 is swingably connected with the outer end of a piston 32 by means of a pin 31. The piston 32 is axially movable in a pressure cylinder 34 which is turnably carried on a pin 33 inside the part 20 of the lever beam. The part 35 (Figures 2 and 4) at the free end of the swinging arm 30 is formed so that it has a good bearing surface against the bottom 36 of the channel (Figure 4) when the lever beam is turned into a channel-formed part 29 of the outer arm 28 of the lever beam.

The swinging arm 30 is normally kept in the swung-in position shown in Figure 2 by means of a helical spring 38 having one of its ends fixed to an attachment 37 at the inside of the channel-formed inner arm 20 of the lever beam, said spring 38 has its other end connected to a wire 39. The latter has its end adjacent to the end connected to the spring 38 and first passed over a runner 40 in the interior of the inner arm 20 of the lever beam and then connected to the swinging arm 30.

A tubular bar 41 is axially movable in the outer arm 28 of the lever beam; said bar can be secured in different adjusted positions (not shown in the drawings). A chain 42 is attached at the outer end of the bar 41, which chain is passed over a roller 44 turnably carried on a transversal shaft 43 and at the outer end provided with a lifting hook 45.

The roller 44 is provided with a circumferential guiding notch 46 for obtaining the lower parts of the vertically situated links 42a of the chain. At the outer end of the bar 41 is arranged chain-shaped link 48 turnably carried on a transversal shaft 47, this link 48 serves as a blocking device for the chain 42.

The link 48 is provided with a downwardly directed

finger 49 which has a notch 49a embracing the upper part of the vertically situated links 42a of the chain, and which engages between two annexed links 42b of the chain on the roller 44, when the blocking device is in its downturned position (see position in Figure 5). The blocking device 48 is kept in this position by a clamped-shaped blocking pin 50 provided with a pull handle 51 and is movable in the blocking link 48 by means of two branches 52 and 53. By the action of a helical spring 54 situated between the blocking device and a washer 55 at the free end of the upper branch 52 of the clamp, the blocking pin 50 is kept in such position that the lower branch 53 of the clamp engages the outer end of the bar 41 so that the blocking link 48 cannot be swung upward when the chain 42 is loaded.

The blocking pin 50 can, however, be moved to the right when the handle 51 is pulled to the right, according to Figure 5, against the action of the spring 54 so that the member 53 is pulled out from the bar 41 whereupon the blocking link 48 can be swung upward, for instance to the position shown with dotted and dash lines in Figure 5; in this position the chain 42 can be drawn over the roller 44 either to the right so that the free end of the chain will be lengthened (Figure 4) or to the left so that the chain will be passed double to the left of the roller (Figure 3); all this depending on the shape and the weight of the load to be lifted by the jack. If the part of the chain on the left hand side of the roller 44 is not used at the lifting, it can be retracted into the tubular bar 41.

The devices for the control of the feeding of the pressure-medium are only shown diagrammatically in Figure 2. The hydraulic pump 56 (which is here supposed to consist of a pump) is preferably connected with the power take off (not shown) on the gear box of the lorry. The pump 56 is connected through a pipe 57 with the rail 3 serving as a container for the oil. The pressure side of the pump 56 is connected by a pipe 58 with a control valve 59 the valve body of which can be adjusted to different control positions by means of an operating handle 60, 61 from both sides of the lorry. The valve 59 is connected by means of a pipe 62 with the outer end of the pressure cylinder 10, and the valve 59, is connected by means of a pipe 63 with the pressure cylinder 11. The valve 59 is further connected with the interior of the cylinder 7 by means of a flexible pipe 64. The valve 59 is connected with the interior of the container 3 by means of a return pipe 65. A pipe 66 is branched from the pipe 58 and leading to a second control valve 67 which is connected with the pressure cylinder 34 at its end situated closely to the pin 33 by means of a flexible pipe 68. The control valve 67 is connected with the return pipe 65 by means of a pipe 69 and can also be operated by means of handles 70, 71 from both sides of the lorry.

The control valves 59 and 67 may be combined in one single valve but because of the fact that the pipe system shown has been provided with two valves it is easier to explain the action of the jack. If the outer arm 28 of the lever beam is in the position shown in Figure 3, and if by changing of the adjustment of the control valve 67 a certain quantity of the pressure-medium is pressed through the pipe 68 into the cylinder 34, the piston 32 will return the swinging arm 30 in a counter clockwise direction according to Figure 3, whereby the swinging arm 30 with its part 35 pressing against the bottom 36, swings the outer arm 28 of the lever beam in a counter clockwise direction, for instance to the lower position shown with dotted and dash lines in Figure 3. If the bar 41 further is elongated, for instance to the position shown in Figure 4, it is evident that the load will be situated at a considerable distance from the vertical, turning axis when the load is arranged on the hook 45, i.e., the axis around which the cylinder 7 is turning. When the control valve 67 then is adjusted to a position in which no more

pressure-medium is pressed into the cylinder 34 and the pressure-medium cannot return from this cylinder, the outer arm 28 of the lever beam will evidently remain in the position at the side of the lorry. If the load has to be lifted still higher, the control valve 59 is adjusted with the handles 60, 61 so that the pressure-medium will be pressed through the pipe 64 into the cylinder 7. The pressure piston 15 will then be moved upward whereby due to the double link 21, the inner part 20 of the lever beam is turned in a counter clock-wise direction according to Figures 2 and 3, for instance to the upper position shown with dotted and dash lines. In this position is also indicated that the outer arm 28 of the lever beam by means of the piston 32 can be swung so far upward that it will be situated approximately in the elongation of the inner arm 20 of the lever beam. If the lever beam 20, 28 then is swung in a horizontal plane around the pressure cylinder 7, and the control valve 59 for instance is adjusted so that the pressure-medium is forced through the pipe 62 into the cylinder 10, the piston in the cylinder is pressed to the right according to Figure 2 bringing with it the rack-gear 9 and the piston in the cylinder 11 is pressed through the pipe 63 via the control valve 59 and the return pipe 65 to the container 3. Due to the co-operation between the gear wheel 8 and the rack-gear 9 the cylinder 7 is turned by the movement of the rack-gear 9, and by turning of the cylinder 7 the lever beam 20, 28 is swung so that it will pass rearwards over the platform (not shown in the drawings) from the position shown in Figure 2. When the load then has to be lowered on the rear end of the platform, the control valve 59 is adjusted so that the piston 15 moving in the cylinder, due to its weight, the weight of the lever beam 20, 28 and the weight of the load, will force the pressure-medium out of the cylinder through the pipe 64, the control valve 59 and the return pipe 65, to the container 3. This lowering can however be interrupted any time by closing the valve 59. If on the other hand the load is to be lowered from the upper position shown by dotted and dash lines in Figure 3 so that it will be situated at the front end of the platform close by to the driving compartment 2, the control valve 67 is adjusted by the handles 70, 71 so that the pressure-medium can pass from the cylinder 34 through the pipe 68 via the valve 67 and through the return pipes 69 and 65 to the container 3. Due to the weight of the outer arm 28 of the lever beam the swinging arm 30 is swung clock-wise according to Figure 3 and thereby forces the piston 32 into the cylinder 34 while the piston forces the pressure-medium out of this cylinder through the pipe 68. When traveling, and when the hydraulic jack is not used the outer arm 28 of the lever beam is swung up on the inner arm 20 of the lever beam (Figure 2) where it takes a relatively small space. By the action of the spring 38 and by pulling in the wire 39, the swinging arm 30 is further swung clock-wise into the outer end of the inner arm 20 of the lever beam. In this position (Figure 2) the outer end of the lever beam does not extend outside the body of the platform. The opposite end of the inner arm 20 of the lever beam is projecting only slightly above the roof of the driving compartment 2.

When the lever beam 20, 28 is swung completely to the side outside the platform of the lorry and when a considerable load is arranged at the outer end of the fully elongated bar 41, the chassis of the lorry is exposed to considerable stresses. In order to reduce these stresses on the chassis the hydraulic jack according to the present invention has been provided with supports. Each of these supports 72 is provided with a supporting plate 73 and are each vertically movable in a cylinder 74 arranged at the outer end of the rail 3. When needed the supports 72 can be lowered to the ground (Figure 2) and the supports 72 may in this position be secured by a handle 75 or the like. It will appear from Figure 2 that the frame of the vehicle is almost completely un-

5

loaded by the supports. When the loading operation is finished, the supports are lifted up again to the position shown with unbroken lines in Figure 2.

The illustrated and described embodiment of the invention is to be considered only as an example and the different details of the hydraulic jack may be constructively altered in many ways within the scope of the invention. The pressure cylinder 34 and the piston 32 have been shown as single-acting but they may instead be double-acting, and the piston 32 can be pivotally connected directly at the outer arm 28 of the lever beam. In such a case the outer end of the outer arm 28 of the lever beam may preferably be connected with a dredger ladle, swinging in a vertical plane, so that the hydraulic jack also can be used as a digging machine. With the hydraulic jack, according to the invention, timber and other heavy objects can be dragged towards the lorry. Different embodiments of the control valves 59 and 67 or of a combined valve are possible within the scope of the invention. The double-link 21 which is adapted to unload the lifting piston in such a way that it will not be exposed to any detrimental stresses from the side can, if desired, be shaped and arranged so that it, when loaded, is exposed to pressure-stresses instead of tension-stresses. Even the device for the swinging of the cylinder 7 can be varied in many ways within the scope of the invention.

What I claim is:

1. An hydraulic jack especially adapted to be arranged on a lorry, a lever beam swingable in a vertical and horizontal direction relative to the body of said jack, said lever beam comprising an outer and an inner lever arm, a bracket arm swingable in a vertical plane and hinged at the joint between said outer and inner lever arm, a cylinder having a pressure piston pivotally connected to said bracket arm at its end and arranged opposite the end hinged at said joint, said bracket arm being arranged to abut against said outer lever arm near its joint with said inner lever arm when said lever beam

6

is in a loading position, whereby said outer lever arm is capable of being swung up onto said inner lever arm.

2. An hydraulic jack as set forth in claim 1, characterized by the fact that said cylinder on the inner lever arm of said lever beam at the end opposite said pressure piston is swingably carried in said inner lever arm of said lever beam.

3. An hydraulic jack especially adapted to be arranged on a lorry, a lever beam swingable in a vertical and horizontal direction relative to the body of said jack, said lever beam comprising an outer and an inner lever arm, a bracket arm swingable in a vertical plane and hinged at the joint between said outer and inner lever arm, a cylinder having a pressure piston pivotally connected to said bracket arm at its end and situated opposite the end hinged at said joint, said bracket arm being arranged to abut against said outer lever arm near its joint with said inner lever arm when said lever beam is in a loading position, whereby said outer lever arm is capable of being swung up onto said inner lever arm, a spring member adapted to keep said bracket arm swung into said inner lever arm, said spring member tending to draw the free end of said bracket arm connected to said pressure piston, towards the cylinder of the latter, said cylinder being arranged on the inner lever arm of said lever beam, the cylinder being pivotally connected to said bracket arm when the latter is not exposed to hydraulic pressure.

References Cited in the file of this patent

UNITED STATES PATENTS

2,406,620	Lockett	Aug. 27, 1946
2,598,517	Drott	May 27, 1952
2,621,803	Taylor	Dec. 16, 1952
2,639,826	Welden	May 26, 1953
2,676,837	Wagner et al.	Apr. 27, 1954
2,682,957	Holmes	July 6, 1954
2,689,656	Przybylski	Sept. 21, 1954
2,712,878	Sutton et al.	July 12, 1955