

[54] **LIFTER FOR VEHICLES**

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[51] Int. Cl.**B66f 7/10**

[58] Field of Search.....**187/8.41, 8.49, 8.59, 8.67, 187/8.72, 8.75**

[56] **References Cited**

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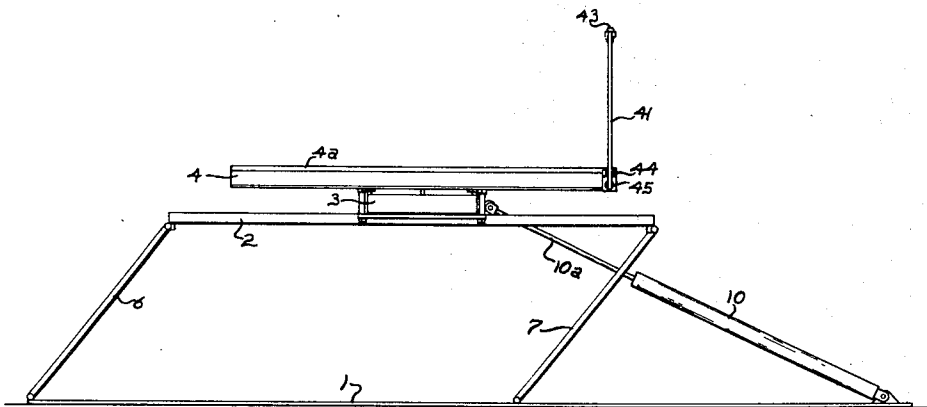
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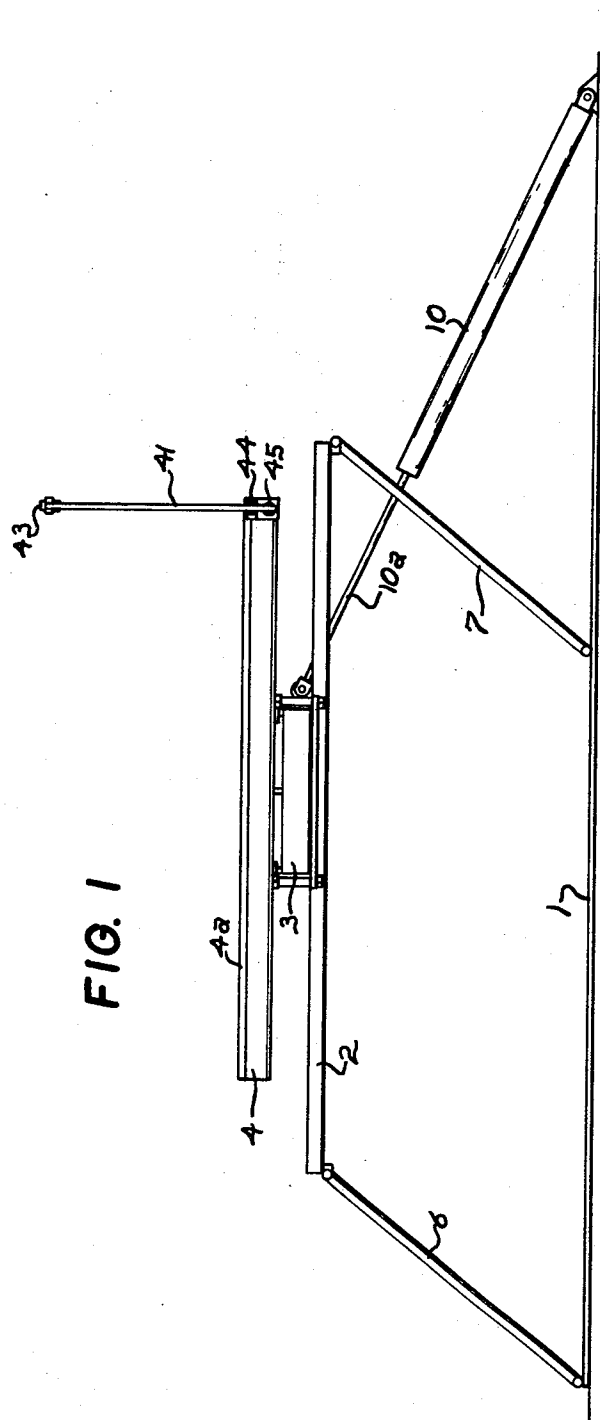
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[57] **ABSTRACT**

A base supports a lifting frame by means of four parallel arms so the lifting frame may be raised and lowered. A hydraulic jack is connected between the base and the lifting frame to raise the frame. Cross rails on the frame support two lifting pads for movement toward and away from each other. Each pad has wheels rolling on the rails. Guides on the frame and the pads cooperate to keep the pads substantially parallel. Hydraulic jacks on the frame move the pads to and fro. At the end of each pad there is a stop extending above the pad to engage the side of a vehicle and twist the pad horizontally to interlock the guides and stop inward movement of the pad. The hydraulic jacks are combined with a pump and a pressure regulating valve to first cause the pads to move toward each other until stopped, then to lift the lifting frame.

1 Claim, 10 Drawing Figures





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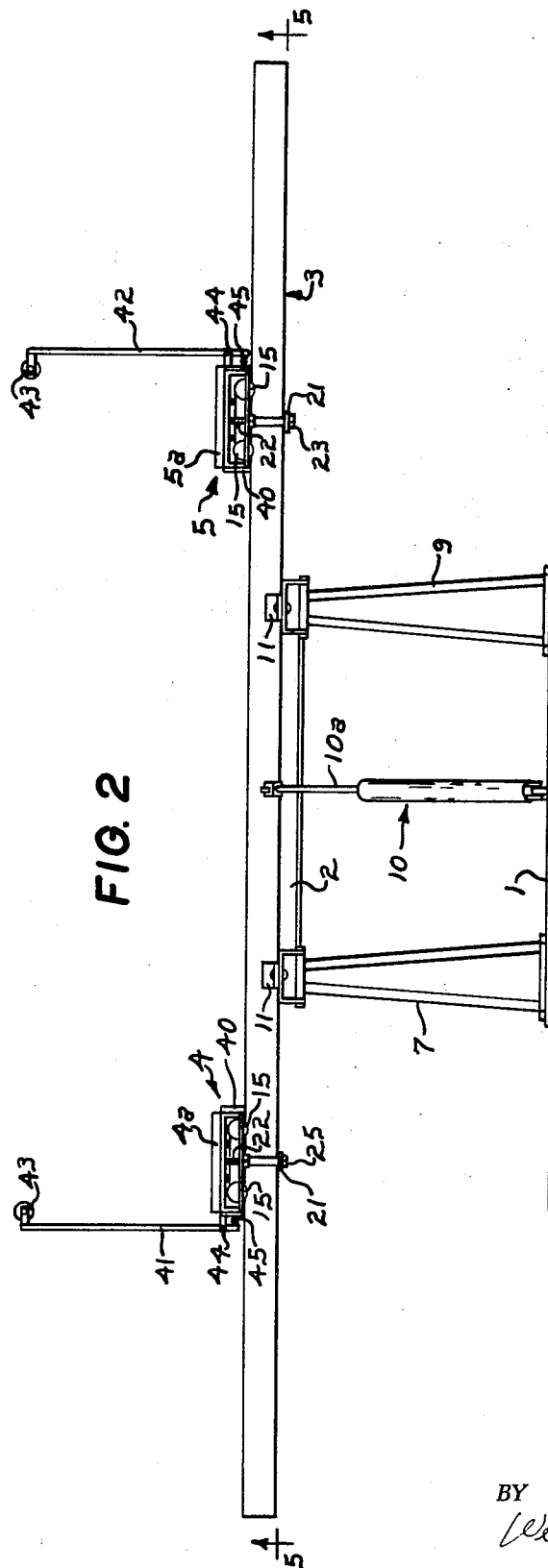
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FIG. 4

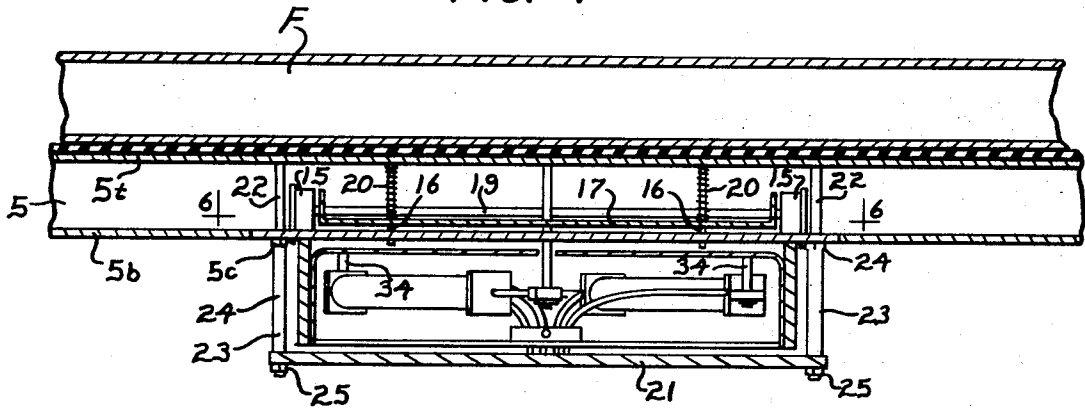
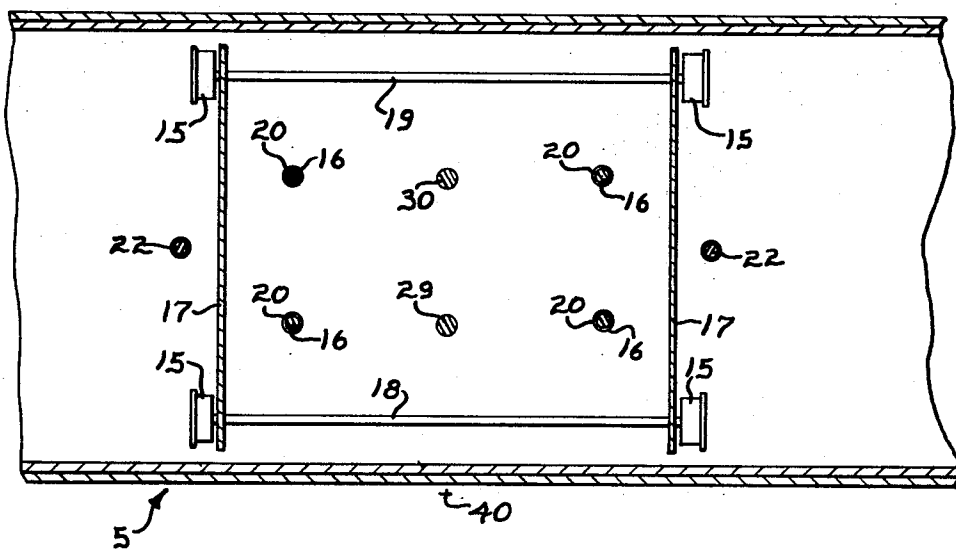
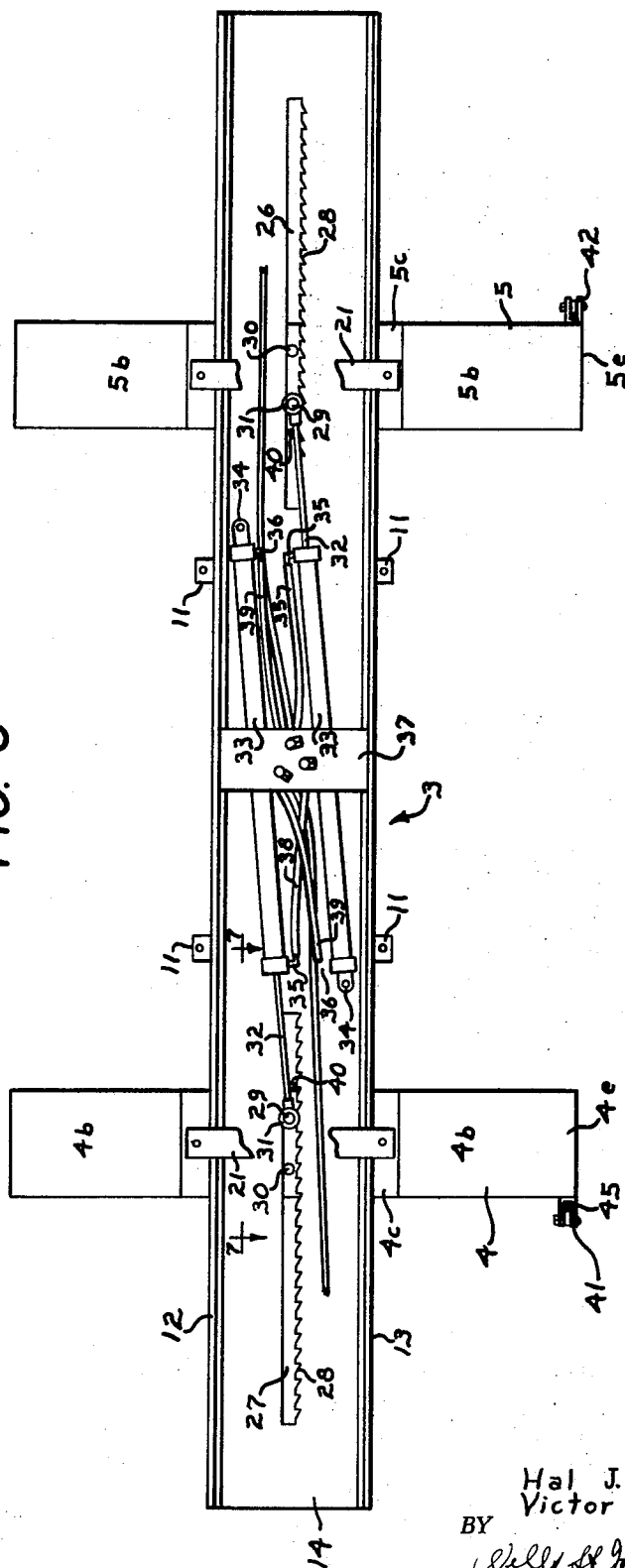


FIG. 6

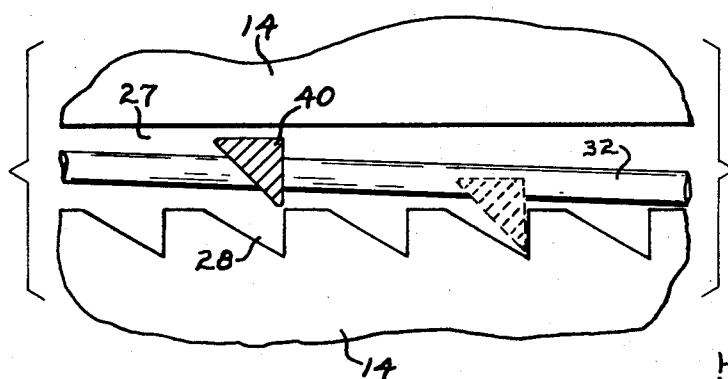
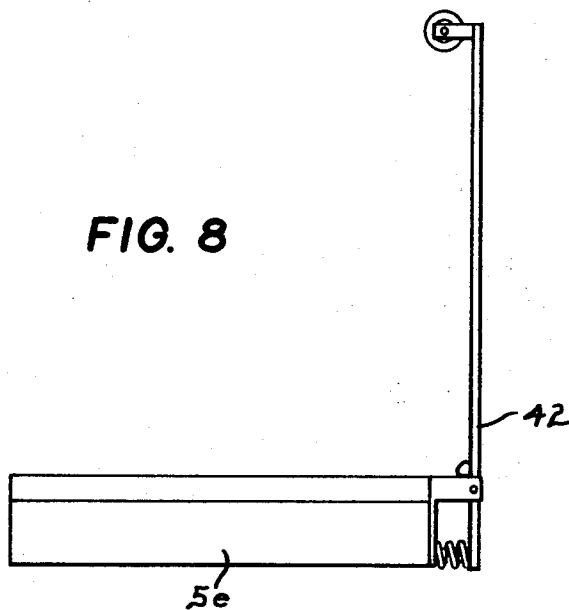
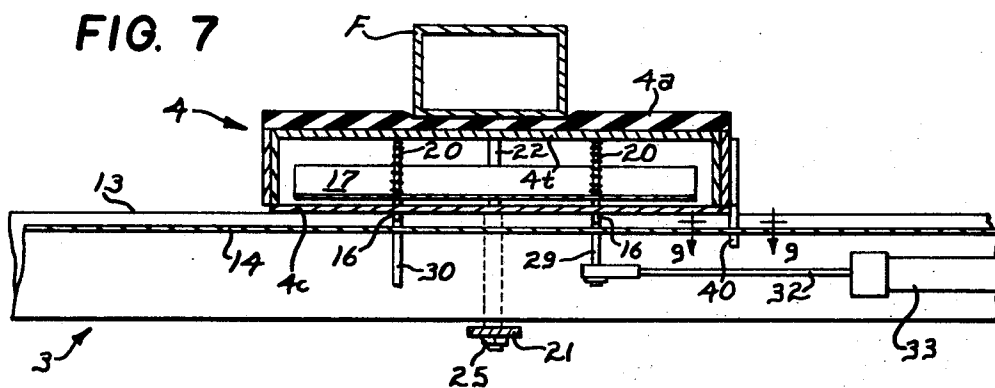


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FIG. 5



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LIFTER FOR VEHICLES

BACKGROUND OF THE INVENTION

This invention relates to lifters for vehicles such as automobiles. These vehicles need to be lifted off their wheels frequently for various purposes. Most auto service stations employ some sort of lifting device which engages the frame of the vehicle. The most common devices use a center pedestal which is raised by hydraulic fluid pressure with a platform on the pedestal to carry the vehicle. Such devices must be built into the ground. Another development which avoids the necessity of putting any part of the lifting device underground uses a ramp resting on the ground or a service station floor onto which the vehicle can be driven and uses a parallelogram leverage means to elevate lifting pads or members under the frame. This device uses a sensing system by which the contact devices on the members generate signals when they engage the side of the vehicle. The generated signals control the elevating means for the members and the means for moving the members toward each other. A typical example of this type is illustrated by the U. S. Pat. No. 3,318,417 to Robert E. Royce.

The present invention utilizes a lifting parallelogram arrangement similar to that of the Royce patent but embodies a novel mechanism mounted on a parallelogram type lifting frame for first moving a pair of lifting pads, that are normally spaced far enough apart to receive the vehicle between them, toward each other and stopping and locking the pads in place beneath the vehicle frame, then lifting the frame and locking it in place.

It is a purpose of this invention to provide a lifter for vehicles and the like wherein lifting pads, adapted to engage the vehicle frame are supported on a cross beam arrangement for movement toward and away from each other, carry stops to engage the vehicle side and twist the pads to lock them in place under the vehicle frame.

It is also a purpose of the invention to provide a fluid supply system and jacks to move the lifting pads wherein the pressure is built up gradually in the jacks to first cause the lifting pads to move toward each other until they are under the vehicle frame and locked against movement and the pressure then further increases to a degree sufficient to lift the pads and the vehicle thereon to the desired raised position, therein being a jack for moving each pad toward the other and a third jack for lifting the pads.

The nature and advantages of the invention will appear more fully from the following description and the accompanying drawings of a preferred embodiment. The invention is defined by the claims.

GENERAL DESCRIPTION

In the drawings:

FIG. 1 is a simplified side view of a lifter for vehicles embodying our invention;

FIG. 2 is an end view of the lifter looking at FIG. 1 from the right;

FIG. 3 is a plan view of the lifter with the lifting pads in their lowermost position;

FIG. 4 is an enlarged sectional view taken substantially on the line 4—4 of FIG. 3 but with the lifting pad raised and supporting a vehicle frame;

FIG. 5 is a view looking upward from the line 5—5 of FIG. 2, with parts broken away;

FIG. 6 is a sectional view on the line 6—6 in FIG. 4;

FIG. 7 is an enlarged sectional view on the line 7—7 of FIG. 5 with a vehicle frame on the lifting pad;

FIG. 8 is an enlarged end view of one of the lifting pads and its vehicle engaging stop;

FIG. 9 is an enlarged fragmentary view on line 9—9 of FIG. 7 showing locking positions of the stop on the lifter pad in dotted lines;

FIG. 10 is a diagrammatic view showing of the hydraulic control circuit for moving the lifting pads toward and away from each other and lowering them.

The lifter is shown generally in FIGS. 1, 2 and 3. It embodies a lower rectangular base frame 1, an upper H-shaped frame 2, a cross frame 3 and a pair of lifting pads 4 and 5.

The H-shaped frame 2 is connected to the base frame 1 by four parallel links 6, 7, 8 and 9, each pivoted to both frames so that, in lifting the H-shaped frame 2, these supporting links will maintain the frame 2 parallel with the frame 1. A hydraulic jack 10 is pivotally connected to the frames 1 and 2. By expanding the jack 10 the H-shaped frame 2 can be raised from a position where the links 6—9 are substantially down flat to the position shown in FIG. 1. It will be noted that the pivotal connection of the piston 10a of the jack 10 to the frame 2 is above the level of the frame 2 so that the jack 10 in its lowermost position will exert enough lifting component of force on the frame 2 when expanded, to start the frame 2 upward. The cross frame 3 is secured on the frame 2 by four brackets 11.

The cross frame 3 is made up of a pair of side rails 12 and 13 and an inverted channel 14 welded together so that the rails extend above the channel 14. Each of the lifting pads 4 and 5 is movably mounted on the cross bar 3 by a series of four wheels 15 (see FIGS. 4 and 6) that roll on the rails 12 and 13. Both lifting pads 4 and 5 have like mountings to the cross bar 3. Each lifting pad has four guide pins 16 fixed to the top wall 4t or 5t thereof and extending down through the bottom wall 4b or 5b thereof. These pins pass through a channel-shaped frame 17 that carries axles 18 and 19 for the wheels 15. They also pass through the bottom wall of the hollow pad. The pads 4 and 5 are shown as having soft padding 4a and 5a on the top to engage a frame member F of the vehicle being lifted. Each of the pins 16 has a spring 20 around it between the top wall 4t or 5t, of the pad and the frame 17. These springs are heavy enough to carry the weight of the pad but when the weight of the vehicle is on the pad the springs will allow the central section 4c or 5c of the pad bottom wall to rest on the side rails 12 and 13 as shown in FIG. 4.

The pads are limited against too much upward movement with respect to the frame 17 by a cross bar 21 which is suspended by a pair of rods 22 that are fixed to the top wall of each pad and extend down through the bottom wall section 4b or 5b of the pad. A spacer tube 23 surrounds each rod 22 between a nut 24 on threaded on the rod 22 and the cross cross bar 21. Nuts 25 on the rods 22 beneath the bar 21 complete the securement of the cross bar 21 in a fixed position with respect to the pad. It will be noted from FIGS. 4 and 5 that the sections 4c and 5c of the pad bottom wall

through which the rods 22 and the guide pins 16 extend are separate from the remainder of the pad bottom wall and can be removed by removing the cross bar 21 and the parts 23, 24 and 25 from the rods 22 and lifting the pad 4 or 5 off the cross bar 3. These sections have openings cut therein so that wheels 15 can ride on the rails 12 and 13 of the cross frame 3.

The mechanism employed for moving the lifting pads 4 and 5 toward and away from each other along the cross frame 3 is shown best in FIGS. 3, 4, 5 and 7. The cross frame channel 14 has an elongated slot 26 beneath the path of travel of the lifting pad 4 and a like slot 27 beneath the path of travel of the lifting pad 5. The slots 26 and 27 have serrations 28 along one side for a purpose which will presently appear. A pair of guide pins 29 and 30 are secured to each of the lifting pads 4 and 5. These pins extend through the slots 26 and 27. The guide pins 29 have a pivot block 31 mounted on their lower ends. The pivot blocks are attached to the piston shafts 32 of hydraulic push-pull jacks 33. The jacks 33 are suspended from the channel 14 by anchor pins 34 secured to the channel 14. These pins 34 are located close to the opposite side flanges of the channel so that there is ample room for the hydraulic fluid connections 35 and 36 for each jack 33. A plate 37 beneath the jacks 33 supports the fluid hoses 38 and 39 for the connection 35 and 36.

Each of the lifting pads 4 and 5 has a locking pin 40 fixed thereon. This pin is on the edge of the pad toward the opposite pad and extends down through the slot 26 or 27 so it will engage one of the serrations 28 if the lifting pad is held back at the end 4e or 5e (FIG. 5). The engagement of the locking pin 40 in the serration 28 prevents further movement of the lifting pad 4 or 5 toward the other pad. The lifting pads 4 and 5 have upstanding stops 41 and 42 respectively at the outside corners thereof adjacent to the ends 4e and 5e. These stops engage the sides of the vehicle and twist the respective pads enough to bring the locking pins 40 on the pads into the serrations 28. Each of the stops 41 and 42 has a roller 43 made of yielding material at its top end so it may engage the side of an automobile without marring the finish thereon. Each stop also is pivoted at 44 to the pad and spring-pressed by a spring 45 into upright position. The spring 45 will allow enough pad travel to assure engagement of the locking pin 40 in a serration 28.

The operation sequence for lifting an automobile and lowering it begins with locating the vehicle over the H-shaped frame 2 when that frame is in its lowermost position as shown in FIG. 3. The lifting pads 4 and 5 are located far enough apart to receive the vehicle between them. The front vehicle wheels pass over the rails 12 and 13 and the channel far enough to substantially center the cross frame 3 under the vehicle between the front and rear wheels of the vehicle. The next step is to supply fluid under pressure to the jacks 33 through their connections 35 to draw the lifting pads toward each other and under the vehicle. When the stops 41 and 42 engage the sides of the vehicle they force the locking pins into the serrations 28. At this position the lifting pads 4 and 5 are under the vehicle frame F and ready to receive the vehicle weight. The final operation is the activation of the jack 10 to lift the H-shaped frame 2, the cross frame 3 and the lifting pads 4 and 5

up enough to engage the pads with the vehicle frame and then continue lifting these parts until the vehicle is at the desired height. The operations are reversed to return the vehicle to the ground.

The operations just described are effected by means of hydraulic fluid supplied from a reservoir 45 through a pump 46 and a flow directing valve 47. The pump 46 is a low volume output pump. The valve 47 is capable of directing the pump output to a pressure regulating valve 48 which is adapted to close when a preset pressure is reached in the fluid outlet of the valve but is otherwise open. A conduit 49 leading from the valve 47 to the valve 48 also has a branch 50 leading to an over center valve unit 51 which includes a check valve 52 through which fluid normally passes to the lifting jack 10 but cannot return. Since the U.S. Patent Office rules do not include a symbol for an over center valve the over center valve unit 51 is shown in the drawings by the A.S.A. symbol used by the maker of the valve which is Fluid Controls, Inc. of Mentor, Ohio. This over center valve 51 can be opened to permit fluid around the check valve 52 out of the cylinder of jack 10 by applying pressure through a pilot port 53 of the valve 51 from the pump 46 through the valve 47 over a conduit 54 by turning the valve 47 to connect the outlet of the pump 46 to the conduit 54. The conduit 54 leads from the valve 47 to conduits 39 and they lead to connections 36 of the jacks 33. A conduit 55 leads from the conduit 54 to the pilot port 53 of the over center valve 51.

Initially the operator starts the pump 46 and positions the valve 47 to direct the pump output to the pressure regulating valve 48 through the conduit 49 and to the over center valve 51 through the conduit 50. The valve 48 remains open to direct the fluid from it through the conduit 38 to the connections 35 of the jacks 33. The jack shafts 32 are thus moved into the cylinders to bring the lifting pads 4 and 5 toward each other. The fluid also travels over branch conduit 50 through the check valve 52 of the over center valve unit 51, and into the cylinder of the lifting jack 10. The valve 48 is set to close at a pressure, (300 p.s.i.) which is sufficient to move the lifting pads inward until the stops 41 and 42 cause the pins 40 to engage the serrations 28 and stop further movement of the pads inward. The pressure then builds up in the valve 48 to close it and continues to flow through conduit 50 and valve 51 to lifting jack 10 to cause this jack to lift the H-shaped frame 2, bringing the lifting pads 4 and 5 up against the frame F of the vehicle, and then lifting the frame F. Normally, a pressure of 500 p.s.i. in the jack 10 is adequate. The vehicle is stopped at the desired height by stopping the pump and returning the valve 47 to the position shown in FIG. 10. In this position of the valve 47 there can be no further flow of fluid to or from the conduits 49 and 50. The pressure in the conduit 50 remains at the high level needed to support the load on the jack 10. The check valve 52 prevents reverse flow from the jack 10 in any event until the valve 51 is actuated by actuation of fluid pressure at port 53 or manual operation of the valve 51. The valve 51 is preferably mounted directly to the jack 10 so as to minimize possibility of any break in the hydraulic connection from valve 51 to the jack 10.

When the vehicle is to be lowered the pump 46 is started and is connected by the valve 47 to the conduit 54. The valve 47 also connects conduit 49 to a conduit 45a leading to the reservoir 45. The pump supplies fluid through conduit 54 to the pilot port 53 through the conduit 55. This opens the valve 51 so the fluid in the jack 10 can return via the conduit 50 to the conduit 49 and from there it can pass through the valve 47 and conduit 45a to the reservoir 45. The frame 2 is thus lowered until the vehicle is supported on its wheels and the lifting pads 4 and 5 are lowered away from the vehicle frame. Fluid from the pump 46 flows through the conduit 54 to the connections 36 of the jacks 33. As soon as the pressure on the valve 48 drops below the closing pressure for this valve it will open and fluid from the connections 35 of the jacks 33 will flow out to the reservoir through conduits 38, valve 48, conduit 49, valve 47 and conduit 45a. This enables fluid entering the jacks 33 at connections 36 to push the shafts 32 out and thus move the pads 4 and 5 out of the path of the vehicle. The pump is then stopped and the valve 47 returned to neutral position as shown in FIG. 10.

It is believed to be evident from the foregoing description that the vehicle lifter provided is characterized by a simple direct lock to stop the inward movement of the pads when a stop thereof engages the vehicle over the pad and gives the pad a second horizontal movement on the support beam. The inner guide pins 29 and outer guide pins 30 are smaller than the slots 26 and 27 to allow enough of the second movement of the pads 4 and 5 to enable the locking pins 40 to engage in the serrations 28. The serrations 28 in the channel 14 provide a ratchet bar to receive the locking pin 40.

The embodiment of the invention, in which an exclusive property is claimed, is defined as follows:

1. In a lifter for vehicles having a base, a vehicle lift-

ing frame mounted for movement up and down on said base and first power means for effecting said movement, the improvement comprising:

a pair of vehicle lifting pads mounted on said lifting frame for horizontal movement toward and away from each other and for a limited second horizontal movement while moving toward and away from each other;

a second power means connected to the lifting frame and to said pads to move said pads toward and away from each other;

a vehicle engaging stop on and projecting above each pad, effective when moved against the adjacent side of a vehicle positioned over said lifting frame by movement of a pad toward the other pad, to give the first named pad its second horizontal movement; and

cooperating means on the lifting frame and on each pad engaged by said second horizontal movement of the pad to stop further movement of that pad toward the other pad;

said first power means comprising a hydraulic jack connected between the base and the lifting frame and said second power means comprising a hydraulic jack for each pad connecting that pad to the lifting frame;

a pump supplying fluid under pressure to said hydraulic jacks; and

a pressure responsive valve interposed between the pump and the jacks connecting the pads to the lifting frame operable to cut off fluid flow to said last named jacks when the fluid pressure to the valve reaches a predetermined level below the pressure necessary to cause the first power means to raise the lifting frame.

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