Sept. 10, 1957 C. E. BRANICK 2,805,839

FLUID PRESSURE OPERATED JACK

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Fig. 3

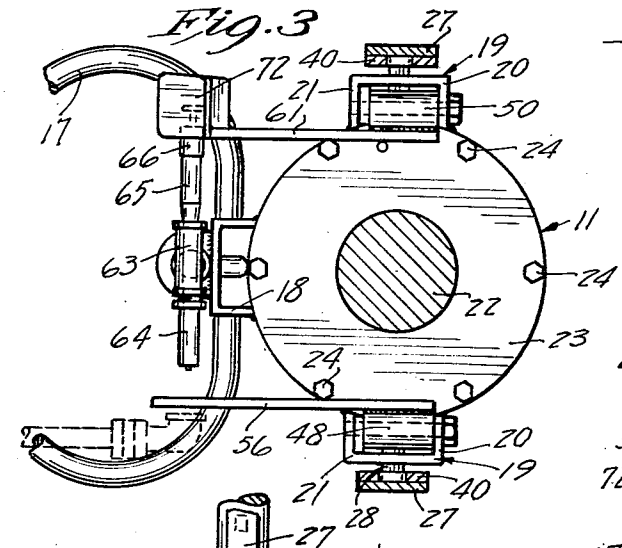


Fig. 1

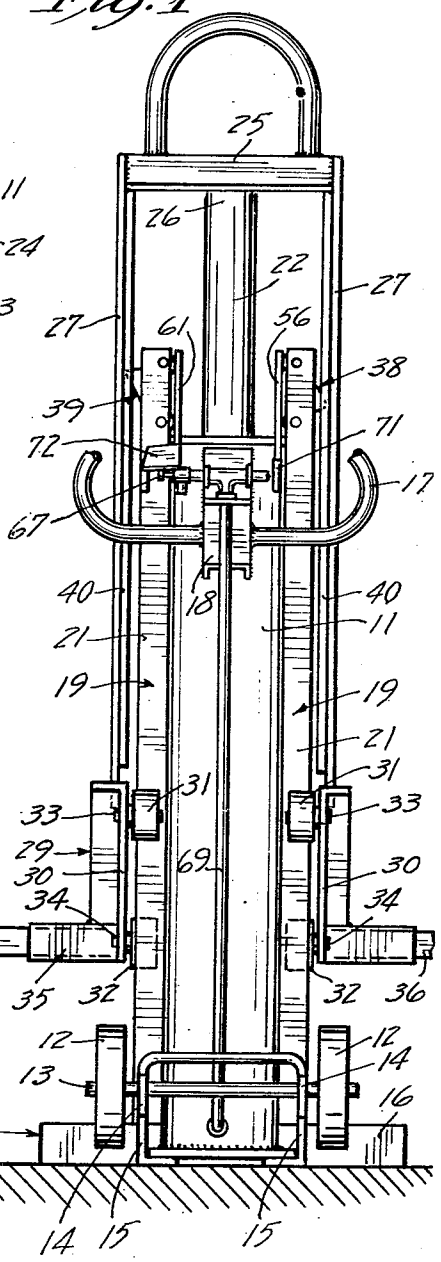
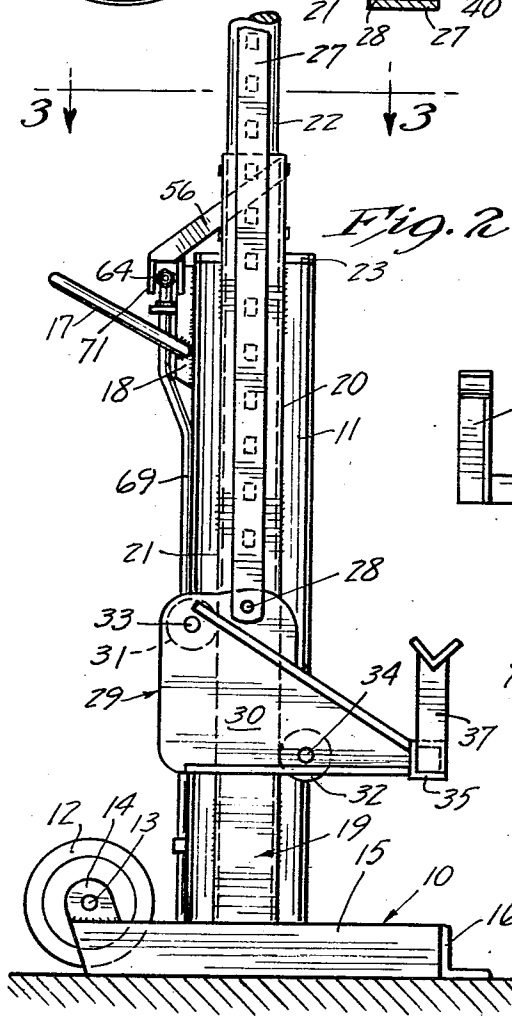


Fig. 2



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Fig. 4

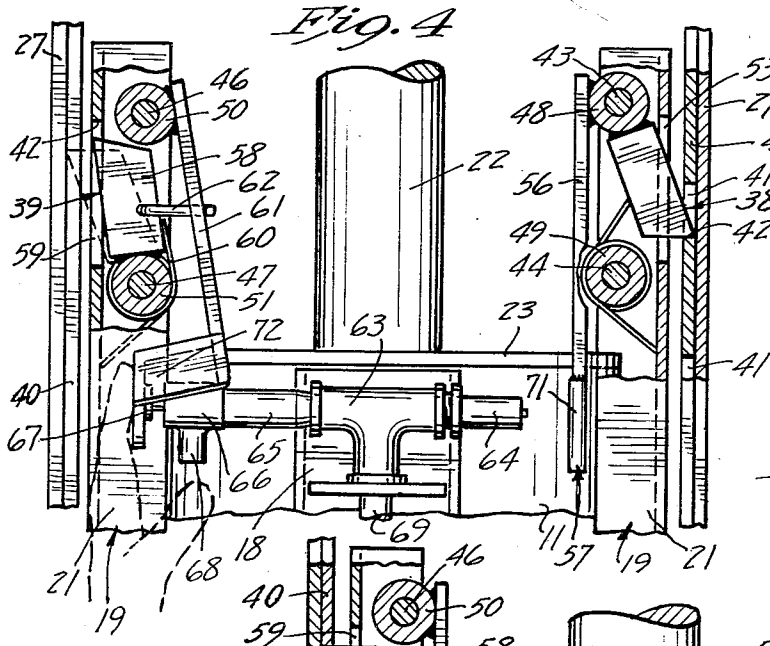


Fig. 5

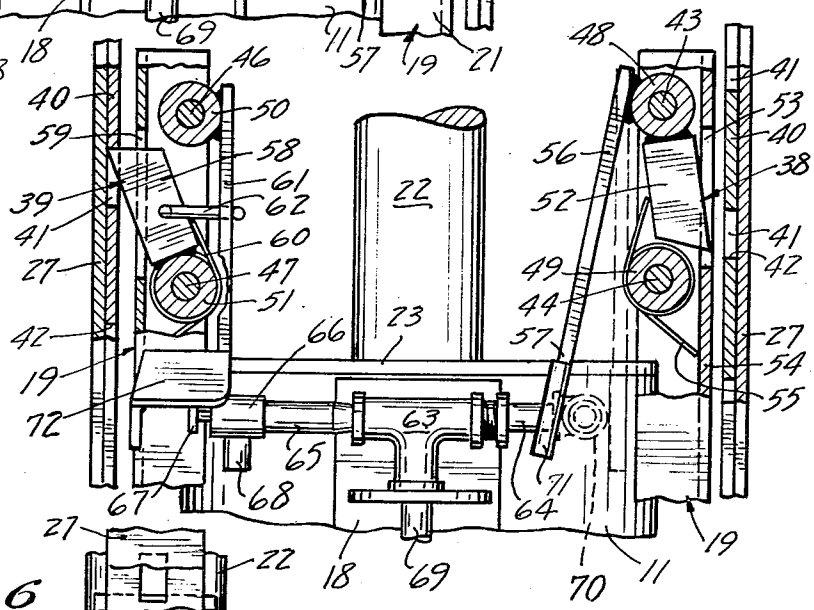
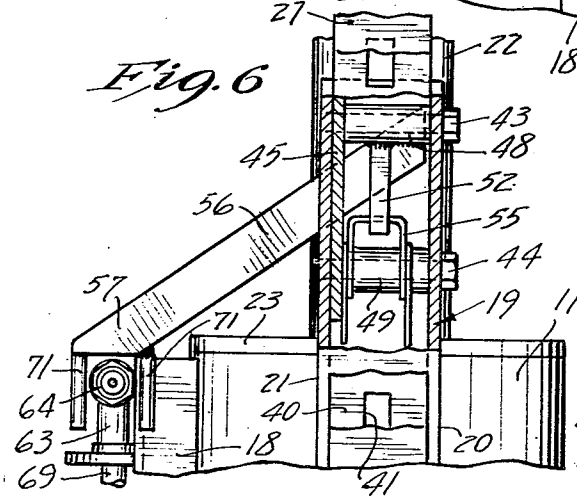


Fig. 6



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2,805,839

FLUID PRESSURE OPERATED JACK

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Application December 28, 1954, Serial No. 478,142

4 Claims. (Cl. 254—93)

My invention relates to fluid pressure operated lifting mechanisms; and more particularly, it relates to fluid pressure operated jacks for lifting automotive vehicles and the like.

An object of my invention is to provide a device of the class described which is capable of lifting great loads and is safe and simple to operate.

A further object of my invention is to provide a novel improved device of the class described which comprises a pair of safety latching mechanisms which prevent both uncontrolled lifting movements of the device and uncontrolled lowering movements of the device.

A still further object of my invention is to provide a device of the class described having the afore-mentioned latching mechanisms associated with valve means wherein one latching mechanism and one valve means are actuated together to permit lifting movements of the device, and the other latching mechanism and another valve means are actuated together to permit lowering movements of the device.

These and other objects and advantages of the invention will become apparent in the course of the following specification and claims, reference being had to the accompanying drawings wherein:

Fig. 1 is a view in rear elevation of my invention, with some parts broken off;

Fig. 2 is a view in side elevation, with some parts broken off, of the structure shown in Fig. 1;

Fig. 3 is an enlarged view partly in top plan and partly in section, with some parts broken off, taken on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary view in rear elevation, with some parts broken away, of a portion of the structure shown in Fig. 1;

Fig. 5 is a view similar to Fig. 4 showing different positions of some of the parts thereof; and

Fig. 6 is an enlarged fragmentary view in side elevation, with some parts broken away, of a portion of Fig. 2.

Referring more particularly to the drawings, wherein like parts will be indicated by the same numeral, the numeral **10** indicates a mounting base having secured to its central portion a generally vertically disposed cylinder **11**. A pair of wheels **12** are journaled to an axle **13** extending through oppositely disposed ears **14** on side flanges **15**, which form a part of the base **10**. As shown, wheels **12** are engageable with the ground X only when the forward end **16** of the base **10** is elevated by pressing downwardly and backwardly upon a handle **17** which is anchored to and projects rearwardly and upwardly from a mounting bracket **18**, anchored adjacent the upper end of cylinder **11**. The mounting of wheels **12**, herein provided, insures the stability of my invention when it is in use with the base **10** positioned firmly on the ground X, as particularly shown in Fig. 2, and yet provides my invention to be easily portable when it is desired to move it from one position to another.

A pair of U-shaped channel members **19** are secured to diametrically opposite side portions of cylinder **11** and each define a pair of generally vertically extending parallel guide rails **20** and **21**. A piston, not specifically shown in the drawings but disposed within cylinder **11** for movement therein, has a plunger rod **22** secured thereto for movement therewith. Plunger rod **22** projects outwardly, and specifically generally upwardly, through a head **23** anchored to cylinder **11** by bolts **24**. It is clear that the movement of the piston within cylinder **11** in one direction will extend plunger **22** with respect to the cylinder **11** and that the movement of the piston in the other direction will contract plunger **22** with respect to cylinder **11**. A crosshead **25** is secured to plunger **22** adjacent its outwardly projected end **26**, and specifically is secured at the extremity of the upper end thereof, and projects laterally outwardly therefrom in opposite directions to overlie the upper ends of channel members **19**. Rigidly secured to the opposite ends of crosshead **25** and depending generally vertically therefrom, adjacent channel members **19**, are a pair of longitudinally extending lifting links **27**. Lifting links **27** are disposed adjacent the cylinder **11** at diametrically opposed sides thereof in spaced parallel relation to its axis and are longitudinally movable with respect thereto by virtue of their connection to crosshead **25** and plunger **22**. Lifting links **27** have pivotal connections at their lower ends, as indicated at **28**, with carriage structure indicated in its entirety by the general reference numeral **29**. It will be noted that pivotal connections **28** are intermediate the guide rails **20** and **21** formed by the channel members **19**.

Carriage structure **29** comprises oppositely disposed side frame members **30**, each of which carry a pair of guide rail engaging roller elements **31** and **32**. Roller elements **31** are journaled on inwardly projecting stub axles **33** and are each engageable with a different one of the guide rails **21**. Roller elements **32** are generally downwardly spaced and laterally offset from roller elements **31** and are journaled on stub shafts **34**, each projecting inwardly from a different one of the side frame members **30** and each engage and ride upon a different one of the guide rails **20**. Carriage structure **29** further comprises a cross-sectionally rectangular generally horizontally disposed tubular lifting beam **35** which is anchored to and extends between the forward end portions of the side frames **30**. Each end of beam **35** projects laterally outwardly beyond the adjacent side frame member **30**. A pair of longitudinally extending beam sections **36** are adjustably and slidably mounted in beam **35** in side-by-side relationship and at their extreme outer ends are preferably provided with yoke-like load-receiving heads **37**.

I provide my invention with safety features comprising a one-way acting detent means releasably urged into latched relationship for preventing extending movements of plunger **22** and indicated generally by the reference numeral **38**, and a one-way acting detent means releasably urged into latched relationship and preventing contracting movements of plunger **22** and indicated generally by the reference numeral **39**. The purpose of detent means **38** and **39** will be subsequently brought out, and specifically they are comprised as follows: A pair of longitudinally extending ratchet bars **40** are each rigidly anchored to a different one of the links **27** and the bars have generally rectangular slots **41** cut therein to form pawl-engaging edges or teeth **42**.

Channel members **19** project upwardly beyond head **23** of cylinder **11**. At the upper end of one channel member **19** are disposed a pair of vertically spaced headed pins **43** and **44** which extend through guide rail **20** to be threaded through a spacer bar **45** into guide rail **21** of that channel member. Similarly disposed at the upper end of the other channel member **19** are a pair of vertically spaced headed pins **46** and **47** which extend through

the guide rail 20 to be threaded through the spacer bar 45 into guide rail 22 of that channel member. Sleeves 48 and 49 are journaled on pins 43 and 44, respectively, between the guide rail 20 and spacer bar 45 at the upper end of one channel member 19, and sleeves 50 and 51 are journaled on pins 46 and 47 between guide rail 20 and spacer bar 45 at the upper end of the other channel member 19.

Referring particularly to detent means 38, a pawl 52 is rigidly secured to sleeve 48 by welding or the like in depending relationship for pivotal movement therewith on the horizontal axis defined by pin 43. Pawl 52 is pivotally swingable into and out of latching engagement with the adjacent ratchet bar 40 through a vertically extending slot 53 formed in one of the crosspieces 54 which form that part of channel members 19 extending between the guide rails 20 and 21. A torsion spring 55 carried by sleeve 49 has one end in engagement with the adjacent crosspiece 54 and its opposite end in engagement with pawl 52 to yieldingly urge pawl 52 into its latched relationship with the adjacent ratchet bar 40. An actuating arm 56 is rigidly anchored at one end by welding or the like to sleeve 48 and extends generally diagonally downward therefrom so that the free end 57 thereof is disposed adjacent bracket 18.

Referring particularly to detent means 39, a pawl 58 is rigidly secured to sleeve 51 by welding or the like and extends generally upwardly therefrom for pivotal movement with sleeve 51 on the horizontal axis defined by pin 47 into and out of latching engagement with the adjacent ratchet bar 40 through a vertically extending slot 59 formed in the crosspiece 54 of the channel member 19 with which detent 39 is associated.

A torsion spring 60 similar to torsion spring 55, see particularly Fig. 6, is mounted on sleeve 51 and has one end in engagement with the adjacent crosspiece 54 and its opposite end in engagement with pawl 58 to yieldingly urge pawl 58 into its latched relationship with the ratchet bar 40 which is associated with detent means 39. An actuating arm 61 is rigidly anchored at one end by welding or the like to sleeve 50 for pivotal movements on the horizontal axis defined by pin 46 and extends generally diagonally downward therefrom.

Actuating arm 61 is connected intermediate its ends to a linking member 62 which at its opposite end is connected to pawl 58 so that the pivotal movement of actuating arm 61 from its position shown in Fig. 5 to its position shown in Fig. 4 moves pawl 58 from its latched relationship with ratchet bar 40, Fig. 5, to its unlatched position, Fig. 4.

Connected to bracket 18 generally upwardly from the connection to handle 17 thereto is a tee fitting 63. Connected to one end of the tee 63 is a valve casing and valve, indicated by the numeral 64, the valve being of the type generally used with pneumatic tires. Connected to an oppositely disposed end of tee 63 by nipple 65 is a second valve casing and valve, indicated by the numeral 66, which is actuated by push button 67 from a normally closed position to its open position. A downwardly extending conduit section 68 is connected to the casing of valve 66 to form an outlet spout and is in communication with nipple 65 through valve 66 when the latter is open. Valves 64 and 66 represent inlet and outlet valves, respectively, and are both normally biased to a closed position. Connected to the third central end of tee 63 and in communication with inlet valve 64 and outlet valve 66 through tee 63 is inlet and outlet conduit means 69 which extends generally vertically downwardly from tee 63 to the lower end of cylinder 11 to be in communication therewith beneath the piston disposed therein.

When my invention is wheeled or otherwise placed in an operative position, wherein the yoke-like heads 37 underlie the bumper or other horizontally disposed bar-like portion of an automotive vehicle, fluid under pressure, which is preferably air, is introduced into the cylinder 11 by means of an air hose, not specifically shown but which extends from a source of fluid pressure and which terminates in a conduit head 70 to be applied to the valve or valve casing 64. The free end 57 of actuating arm 56 is formed with a pair of depending finger-like members 71 which are positioned so that when the operator positions air conduit head 70 in engagement with valve 64, fingers 71 are first engaged by head 70 and moved therewith to be disposed on either side of the valve casing of valve 64, as particularly shown in Fig. 5. Movement of fingers 71 by head 70 and therewith actuating arm 56 moves pawl 52 from its engaged relationship shown in Fig. 4 to its released unlatched relationship shown in Fig. 5. Pawl 52 is maintained in its unlatched relationship so long as head 70 is in engagement with valve 64 because fingers 71 are prevented by head 70 from returning to the position shown in Fig. 4. As soon as head 70 is removed from valve 64, torsion spring 55 biases pawl 52 into its latched relationship with the adjacent ratchet bar 40 and engaging arm 56 and fingers 71 are returned to their normal positions shown in Fig. 4. The engagement of head 70 with valve 64 opens valve 64 and air passes through tee 63 and conduit 69 to enter the bottom of cylinder 11 below the piston disposed therein, which causes the extending or upward movements of plunger rod 22 and the parts carried thereby. Under such an arrangement, pawl 58 is maintained in latched relationship during the extending movements of plunger 22 and acts as a safety mechanism to maintain the extended movement of plunger 22 and the parts carried thereby and acts to prevent any uncontrolled lowering movements of my invention. Thus, the operator is perfectly safe from any unexpected lowering movements of my invention when it is being used to lift an automotive vehicle should any sudden dissipation of the fluid pressure occur. As soon as the vehicle or other body being lifted has reached the desired raised position, head 70 is removed from inlet valve 64 to cease the inflow of fluid pressure to the cylinder 11. As previously explained, this causes pawl 52 to return to its latched position which acts to prevent further extending movements of plunger 22. This is an important safety feature which acts to prevent any danger to the operator should the automotive vehicle slip off of the yoke-like heads 37 by preventing the uncontrolled upward movement of plunger 22 which would occur when the load is removed therefrom.

Lowering movements of the plunger 22 and the parts carried thereby is effected by moving an L-shaped flange 72 fixed to the free end of actuating arm 61 into engagement with push button 67 and moving push button 67 generally inwardly to open outlet valve 66. This causes the fluid under pressure in cylinder 11 to be released through conduit 69, tee 63, nipple 65, valve 66 and conduit section 68. The movement of actuating arm 61 to actuate push button 67 moves pawl 58 from its latched relationship with the adjacent ratchet bar 40, Fig. 5, to its released or unlatched relationship, Fig. 4, to permit contracting movements of plunger 22 and permit the lowering of the parts carried thereby. It is clear that as soon as plunger 22 has been contracted the desired amount, the release of flange 72 permits torsion spring 60 to again move pawl 58 into latched relationship and also releases push button 67 to permit valve 66 to return to its normally closed position and prevent further release of fluid pressure from cylinder 11.

By providing pawl 52 to be actuated together with valve 64 and pawl 58 to be actuated together with valve 66, detent means 38 and 39 are maintained in latched relationship at all times except during those periods when they must be released to permit either extending or contracting movements of the plunger, which arrangement insures utmost safety to the operator of my invention. Further, my invention insures against any improper or inopportune release of the detent means 38 or 39.

My invention has been built and tested and found to accomplish all of the afore-mentioned objectives and

advantages. It will be obvious to those skilled in the art that my invention may be modified by many substitutions and equivalents and that this disclosure is intended to be illustrative only; therefore, I intend to be limited solely by the scope of the appended claims.

What I claim is:

1. In a fluid pressure operated lifting mechanism, a cylinder, a piston disposed within said cylinder for movement therein, a plunger secured to said piston for movement therewith and projecting outwardly through a head on said cylinder, movement of said piston in one direction extending said plunger with respect to said cylinder and movement of said piston in the opposite direction contracting said plunger with respect to said cylinder, a crosshead secured to said plunger adjacent the outwardly projecting end thereof and extending laterally outwardly therefrom in opposite directions, a pair of longitudinally extending lifting links connected one each to opposite ends of said crosshead for movement therewith and disposed adjacent said cylinder at diametrically opposed sides thereof in spaced parallel relation to the axis thereof, a pair of longitudinally extending ratchet bars each connected to a different one of said links, a pair of pawls each anchored to said cylinder for pivotal movement into and out of latching engagement with a different one of said ratchet bars, the latched relationship of one pawl and ratchet bar preventing extending movements of said plunger and the latched relationship of the other pawl and ratchet bar preventing contracting movements of said plunger, means urging said pawls into their latched relationship with said ratchet bars, and a pair of actuating arms each connected to a different one of said pawls and movable to release their latched relationship with said ratchet bars.

2. The structure defined in claim 1 in further combination with a pair of normally closed valves, one being an inlet valve and the other being an outlet valve, fluid pressure inlet and outlet conduit means extending between said valves and said cylinder, said inlet valve being adapted to removably receive a head of a conduit leading from a source of fluid pressure, engagement of said head with said inlet valve opening said inlet valve to admit piston-actuating fluid pressure into said cylinder and the removal of said head permitting said inlet valve to close, and means for opening said outlet valve, said arms being disposed adjacent said valves and adapted to be actuated so that the arm connected to the pawl preventing contracting movements of the plunger and said last mentioned means are actuated together to permit contracting movements of said plunger and the engagement of said head with said inlet valve and the actuation of the other arm are accomplished together to permit extending movements of said plunger.

3. In a portable fluid pressure operated lifting mechanism, a mounting base, a generally vertically disposed pressure cylinder secured to said base, a piston disposed within said cylinder for movement therein, a plunger secured to said piston and projecting generally upwardly through a head on said cylinder, the movement of said piston in one direction extending said plunger with respect to said cylinder and movement of said piston in the opposite direction contracting said plunger with respect to said cylinder, a crosshead mounted on the upper end of said plunger and projecting laterally outwardly therefrom in opposite directions, two pairs of generally vertically extending parallel guide rails, each pair being anchored to said cylinder in diametrically opposed relationship, a pair of vertical lifting links each connected to a different end of said crosshead and depending therefrom adjacent a different pair of said guide rails, carriage structure including a pair of side frame members each pivotally secured to the lower end portion of a different one of said lifting links at points intermediate the guide rails of the adjacent pair, vertically spaced guide-rail engaging roller elements carried by each of said side frame members, transverse load-engaging means connecting said side frame members, a pair of longitudinally extending ratchet bars each connected to a different one of said links, a pair of pawls each disposed between a different pair of guide rails adjacent the upper ends thereof and anchored thereto for pivotal movement into and out of latching engagement with a different one of said ratchet bars, the latched relationship of one pawl and ratchet bar preventing extending movements of said plunger and the latched relationship of the other pawl and ratchet bar preventing contracting movements of said plunger, means urging said pawls into their latched relationship with said ratchet bars, and a pair of actuating arms each connected to a different one of said pawls and movable to release their latched relationship with said ratchet bars.

4. The structure defined in claim 1 in further combination with a pair of normally closed valves rigidly fixed in position adjacent the upper end of said cylinder, one being an inlet valve and the other being an outlet valve, fluid pressure inlet and outlet conduit means extending between said valves and said cylinder, said inlet valve being adapted to removably receive a head of a conduit leading from a source of fluid pressure, engagement of said head with said inlet valve opening said inlet valve to admit piston-actuating fluid pressure into said cylinder and the removal of said head permitting said inlet valve to close, and means for opening said outlet valve, said actuating arms each having a free end disposed adjacent a different one of said valves, the movement of the free end of the arm connected to the pawl preventing contracting movements of the plunger, moves said last mentioned pawl from its latched relationship and engages said last mentioned means to said outlet valve and thereby permits contracting movements of said plunger, said head being moved to be received on said inlet valve, engages the other arm to move the pawl preventing extending movements of the plunger from its latched relationship and when engaging said inlet valve, said head maintains the last mentioned pawl in its unlatched position to permit extending movements of said plunger.

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