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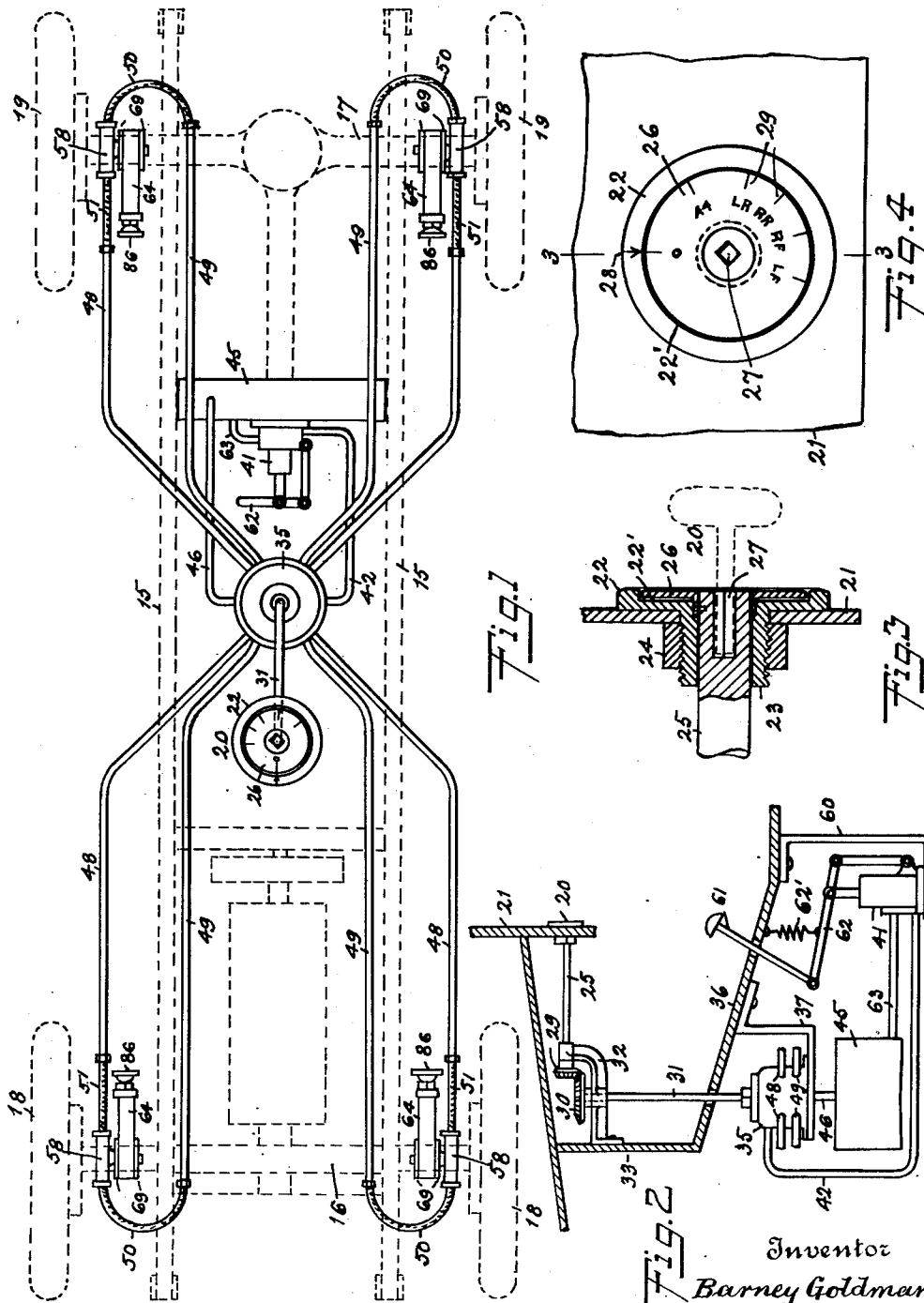
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HYDRAULIC JACK

Filed Nov. 6, 1929

2 Sheets-Sheet 1



By his Attorney

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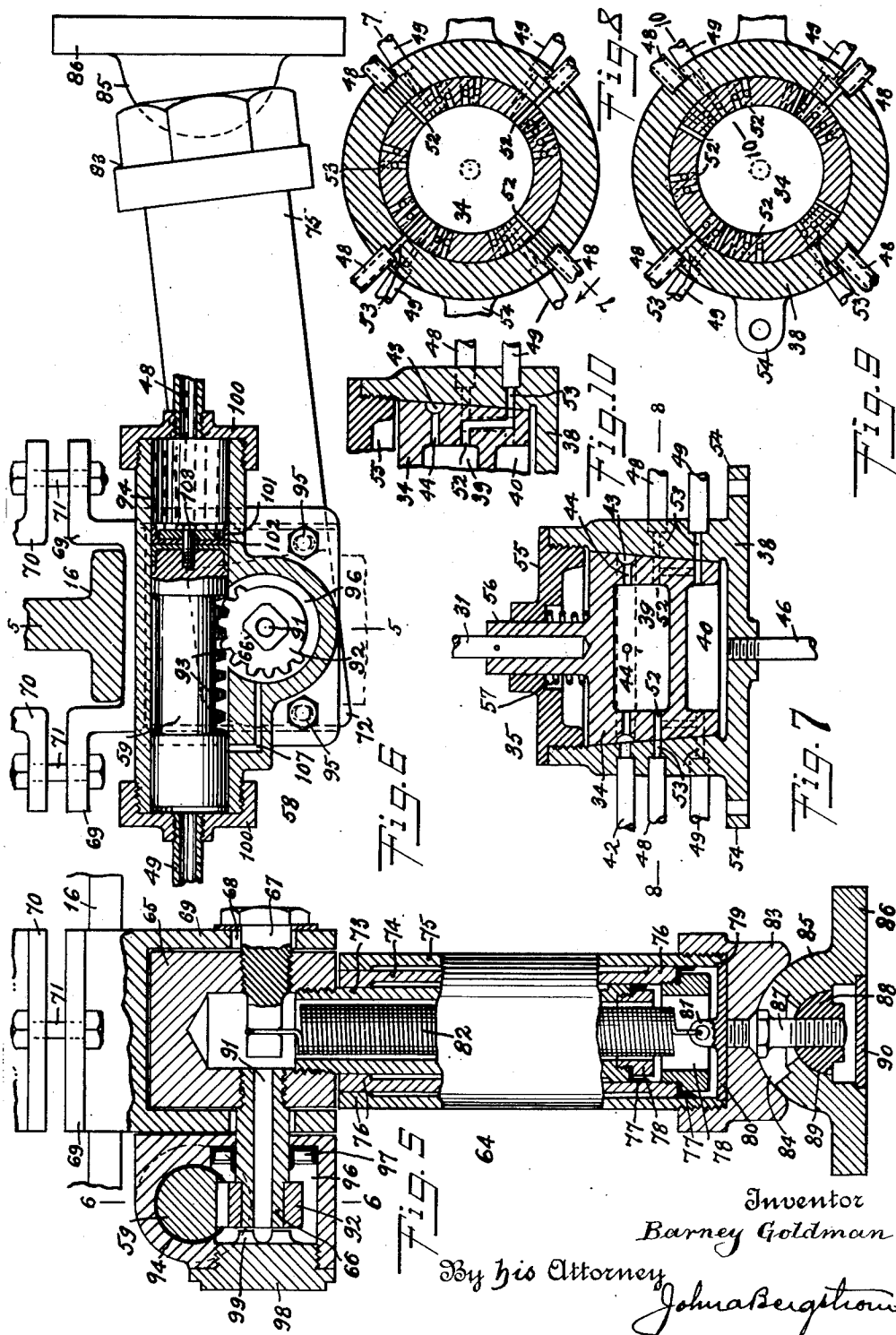
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UNITED STATES PATENT OFFICE

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HYDRAULIC JACK

Application filed November 6, 1929. Serial No. 405,099.

This invention relates to improvements in hydraulic jacks and more particularly to a jack shown in a patent application filed by me May 29, 1929, Ser. No. 366,912 Div. 9, and comprises a device secured to a vehicle and provides means, being in the form of jacks, whereby the whole vehicle or a portion thereof may be raised from the ground, and may be controlled by the operator, while seated behind the steering gear of the car or vehicle, by a single unit dial control.

An object of the invention is to provide a suitable hydraulic pump either operated manually or by means of connections with the engine of the car or vehicle, to force a liquid, stored in a tank, into any one or all the jacks, so as to first move them from a horizontal or locked, to a vertical or operative position and then expanding same, thereby lifting the whole car or any selected portion thereof clear off the ground.

Another object of the invention is to provide a positive control valve, in which the plunger or piston of the valve is geared to the jack, so that when the plunger is moved in one direction by the pressure of the fluid, it will first swing the jack from a horizontal position down to a vertical or operative position, then expand same, thereby lifting the car or any selected portion thereof. When the pressure is released, the weight of the car will force the liquid back into the storage tank until the tires carry the weight of the car, then the jack will be contracted by means of a spring inside the telescopic jack. By introducing pressure into the opposite end of the control valve, it will swing the jack up into a horizontal position where it is held while travelling on the road, by the pressure against the piston while the car is travelling on the road.

And still another object of the invention is to provide a single unit selecting device being in the shape of a disc, located on the instrument board, which is operated by a key and is geared to a distributing valve, located under the footboard of the car. The valve is connected to the control valve by a series of pipes, and provides means whereby the flow of the liquid may be reversed in the pipes

to the control valve of the jack. The distributing device has a number of ports to control the direction of the fluid to and from the control valve, so that when the car is travelling on the road, one end of the control valve is subjected to pressure from the pump, thereby holding the jack in a horizontal position, while the other end of the valve is in communication with the storage tank.

With these and other objects in view, the invention consists in the details of construction and arrangement of parts to be hereinafter more fully described, claimed and illustrated in the accompanying drawings in which similar numerals of reference designate corresponding parts throughout the several views in which:—

Fig. 1 represents a plan view of an automobile, shown in dotted lines and the invention is shown diagrammatically in full lines.

Fig. 2 is a fragmentary vertical section of a portion of an automobile showing the location of some of the units.

Fig. 3 is a fragmentary vertical cross-section of the selecting device section being taken on line 3—3 of Fig. 4.

Fig. 4 is a face view of the selecting device, located on the instrument board of the automobile.

Fig. 5 is a vertical side elevation, partly in section, section being taken on line 5—5 of Fig. 6.

Fig. 6 is a vertical section on line 6—6 of Fig. 5 showing the jack held in a horizontal position.

Fig. 7 is a vertical cross-section of the distributing valve on line 7—7 of Fig. 8.

Fig. 8 is a horizontal cross-section on line 8—8 of Fig. 7.

Fig. 9 is a horizontal cross-section on line 8—8 of Fig. 7 showing the plug of the valve in position where all four jacks will operate and

Fig. 10 is a fragmentary vertical cross-section of the valve, showing the reversal of the ports.

In the drawings the numeral 15 designates the chassis of an automobile, shown in dotted lines in Fig. 1, having front and rear axles 16—17, provided with front and rear wheels

18—19. The selecting device 20 is fastened to the instrument board 21, within the reach of the operator when seated behind the steering gear of the car, and consists of housing 22, having a rearwardly extended threaded portion 23 which passes through the instrument board and is held in position with a nut 24. The face portion of the housing has an annular recess 22' into which rotates a disc 26 which is fastened to the end of a horizontal shaft 25. The extended portion of the housing forms a bearing for said shaft. On the face of the housing at the top thereof is an arrow 28. The disc 26 has predetermined graduations 29 on its face, which coincides with the ports or group of ports of the valve. The disc may be turned so that the graduations align with the arrow which indicates that a certain or all the jacks are in line, ready for operation, as for example: If the disc 26 is turned to the left until "RF" on the disc coincides with the arrow 28 on the housing 22, the apparatus is set so that when the pump is started, the right front wheel of the car will be raised. In the end of the horizontal shaft 25 is a keyway 27 through which the shaft is rotated by a small key shown in dotted lines. At the other end of the horizontal shaft 25 is fastened a bevel gear 29 which meshes into another bevel gear 30 which is fastened to one end of a vertical shaft 31. These shafts are mounted to rotate in a bracket 32 which is fastened to the vertical wall 33. The lower portion of shaft 31 is fastened to the plug 34 of the distributing valve 35. The valve is fastened to the under-part of the foot-board 36 by a bracket 37.

The distributing valve 35 consists of a housing 38 into which rotates a plug 34. The plug has a pressure chamber 39 and an exhaust chamber 40. The pressure from the pump enters the outer casing of the valve through a pipe line 42 into an annular recess 43 formed into the plug 34 and connects with the pressure chamber 39 through holes 44. The exhaust chamber 40 is connected to the storage tank 45 by a pipe 46.

The distributing valve 35 is connected to one end of the control valve 58 by a pipe line 48 and to the other end by a pipe line 49. Between the valve and the pipe lines are interposed short pieces of flexible tubing 50—51 for the purpose of taking up the vibrations between the chassis and the axles.

The plug 34 has a number of ports 52 which communicate with ports 53 in the housing 38. The plug may be turned by the selecting device so that a predetermined port or ports will register with a port or ports in the housing. In other words, if a certain jack has to be brought into play, the plug of the distributing valve is turned from the selecting device until the port in the plug registers with the port in the housing, which leads to this particular jack, that is, the disc 26, is

turned until the legend or identification mark of this particular jack is opposite the arrow 28 of the housing 22. The housing 38 has at its lower portions lugs 54 for the purpose of fastening.

The upper end of the housing 35 is threaded to receive the cap 55 through which the portion 56 of the plug is extended and serves as a guide, for same. Interposed between the cap 55 and the plug 34 is a spring 57 which prevents the plug from moving upward when the vehicle is moving over rough roads.

By referring to Fig. 8, it will be seen that the plug of the distributing valve is shown in a neutral position as indicated in Fig. 4. Four ports from the pressure chamber in the plug register with four ports in the housing and the liquid under pressure will flow through these ports into the pipe line 48 into the control valve 58 thereby restoring and holding the jacks in a horizontal position, while pipe line 49 connects with the exhaust chamber 40 and tank 45.

By referring to Fig. 10, it will be seen that if the plug 34 is placed in a certain position, the port 52 will communicate with port 53 and pipe line 49 instead of with pipe line 48 as in Fig. 7. This will reverse the flow of the liquid and move the piston 59 of the control valve 58 in the opposite direction as before.

By referring to Fig. 9, it will be seen that all four ports of the plug register with pipe line 49, consequently if pressure is admitted into the pressure chamber, it will pass down through into pipe line 49 and move the piston 59 of the control valve 58 towards the right, thereby swinging the jacks down into a vertical position and then lift the whole car. When it is desired to lower the car, the disc 26 is turned back to neutral, as indicated in Fig. 4, when the ports in the plug will register with the ports in the housing and pipe line 48. When the pressure is again admitted, the liquid will flow through pipe line 48, thereby moving the plunger towards the left and swing all the jacks up into a horizontal position as shown in Fig. 6.

It is now evident that the plug may be rotated in either direction, by the operator, to a predetermined position according to the location of the selected jack or jacks, as indicated by the disc 26, when the ports in the housing and the ports in the plug, for this particular jack, will register, thereby establishing a communication between the jack and the pressure chamber, and when the pressure is applied, it will operate the selected jack and lift that portion of the car when it is desired to let the car down, the disc 26 is turned to neutral. This operation resets the ports of the distributing valve and reverses flow of the liquid in the pipe lines 48—49. Line 48 becomes a pressure pipe and line 49 exhaust, that is to say, that the pressure which is used to raise the jack forces

the liquid in the exhaust line back through the distributing valve into the storage tank. After the jacks have been raised up to a horizontal position the pressure remains in the pipe line 48, thereby keeping the jacks in this position while travelling on the road.

The pump 41 is fastened underneath the footboard 36 by a bracket 60 and is operated by a treadle 61 which extends above the footboard and its lower end is connected to the pump lever 62. Interposed between the footboard and the pump lever is a spring 62' which returns the pump lever to its normal position. A suction pipe 63 connects the pump with the storage tank and a pressure pipe 42 connects the pump with the pressure chamber of the distributing valve 35.

By referring to Figs. 5—6, it will be seen that the jack 64 comprises a head 65 which is swingingly mounted on trunnions 66—67, screwed into the head and passes through vertically slotted holes 68 in the clamp 69 which is fastened to the axle 16 by a clamp 70 and bolts 71. The head 65 has a stop 72 which limits the vertical movement of the jack. Into the head 65 is screwed a tubular member 73 which is surmounted by two tubular telescopic plungers 74—75. At the upper and lower ends of these plungers are annular flanges 76 which serve as guides as well as stops when the jack is expanded. To the lower portion of plungers 73—74 is attached a hydraulic packing 77, held in position by a nut 78. At the lower end of the tubular plunger 75 is a recess 79 into which fits a washer 80 having an eye 81 in the centre thereof. Interposed between this eye and the inwardly projecting end of trunnion 67 is a coil spring 82 for the purpose of contracting the jack after the pressure of the liquid is exhausted.

To the lower end of the tubular member 75 is screwed a head 83 having a spherical cavity 84 into which fits the spherical portion 85 of the base plate 86. This plate is held in position by a bolt 87 screwed into the head 83 and having a spherical nut 88 which fits into a spherical recess 89 of the base plate 86. The opening in the base plate is closed by a washer 90. The object of this construction is so that the base plate may accommodate itself to any unevenness of the ground.

Trunnion 66 is made hollow having a hole 21 through its centre. The outer end is made square, onto which fits a gear wheel 92 which meshes into a rack 93 formed into the lower and central portion of the plunger 59. The plunger fits into the bore 94 of the control valve 58. The valve has a small vertical movement on bolts 95 which attaches same to clamp 69. The object of this is so as to relieve the trunnions of any undue pressure while the jack is in operation or in other words to allow the head 65 to come in con-

tact with the lower portion of the clamp 69 without exerting any pressure on the trunnions.

Behind the gear 92 in the gear chamber 96 is a hydraulic packing 97 which keeps the oil from leaking around the trunnion. A cap 98 closes the front of the gear chamber and having lugs 99 which keeps the gear in position. The control valve 59 is closed at each end by a cap 100 into which are screwed pipe lines 48—49. The piston 59 of the control valve has at one end a double hydraulic packing 101 held in position by a plate 102 and a screw 103.

The operation of the control valve is as follows: When it is desired to operate the jack, the liquid under pressure enters the valve through pipe line 49, thereby pushing the piston 59 to the right and at the same time swings the jack down into a vertical position. At this time, the piston has uncovered port 107 which connects the bore 94 with the gear-chamber. The liquid will pass through this port into the gear chamber, thence through the hollow trunnion into the tubular sections of the jack, thereby expanding same, and raising a portion of the car clear off the ground. When it is desired to lower the car, the plug 34 of the distributing valve 35 is turned to the zero position as shown in Fig. 4, this will reverse the ports in the valve 36 and the liquid will flow in the reverse direction as before, through the pipe line 49 back to the storage tank 45 by reason of the weight of the car and the contraction of the spring 82, this leaves the jack standing in a contracted vertical position. When liquid under pressure is introduced into the pipe line 48, it will move the piston 59 towards the left, thereby forcing out the liquid in the pipe line 49 and at the same time swing the jack up to a horizontal position. Now, if the plug 34 is turned slightly, thereby closing the outlet ports, the pressure in the pipe line 48 will remain and keep the jack in a horizontal position while the car is travelling on the road.

I claim:—

1. In a hydraulic jack the combination with a storage tank, a pump connected to the tank, a plurality of heads adapted to fasten to an object, a series of tubular telescopic plungers swingingly connected to the head, a piston slidingly arranged in each head to vibrate the plungers, a distributing valve comprising a casing having a fluid pressure chamber communicating with the pump and one end of the piston, an exhaust chamber connected to the storage tank and the other end of the piston, a rotary plug arranged in the casing with a series of ports leading into the casing each port at predetermined times made to communicate with a port in the casing, and a plurality of pairs of fluid pipes leading from the casing, each

pair being connected to one of the heads to convey the fluid to the end of each piston.

2. In a hydraulic jack the combination with a storage tank, a pump connected to the tank, a plurality of heads adapted to fasten to an object, a series of tubular telescopic plungers swingingly connected to each head, a piston slidingly arranged in each head to vibrate the plungers, a distributing valve comprising a casing having a fluid pressure chamber communicating with the pump and one end of the piston, an exhaust chamber connected to the storage tank and the other end of the piston, a rotary plug arranged in the casing with a series of ports leading into the casing each port at predetermined times made to communicate with a port in the casing, a plurality of pairs of fluid pipes leading from the casing each pair being connected to one of the heads to convey the fluid to the end of each piston, and a selective device controlled by the operator for rotating the plug to register with any port in the casing.

3. In a hydraulic jack the combination with a storage tank, a pump connected to the tank, a plurality of heads adapted to fasten to an object, a series of tubular telescopic plungers swingingly connected to each head, a piston slidingly arranged in each head to vibrate the plungers, a distributing valve comprising a casing having a fluid pressure chamber communicating with the pump and one end of the piston, an exhaust chamber connected to the storage tank and the other end of the piston, a rotary plug arranged in the casing with a series of ports leading into the casing each port at predetermined times made to communicate with a port in the casing, a plurality of pairs of fluid pipes leading from the casing each pair being connected to one of the heads to convey the fluid to the end of each piston, and a selective device geared to the plug actuated by the operator for rotating the plug to register with any port in the casing.

Signed at New York in the county of New York and State of New York this 2nd day of Nov., A. D. 1929.

BARNEY GOLDMAN.