

May 7, 1929.

M. J. HATFIELD ET AL

1,711,565

AUTOMOBILE JACK

Filed April 12, 1926

2 Sheets-Sheet 1

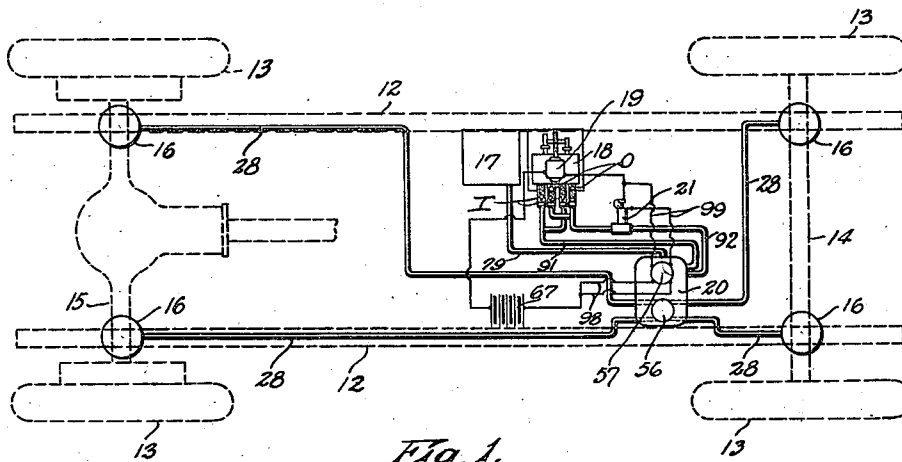


Fig. 1.

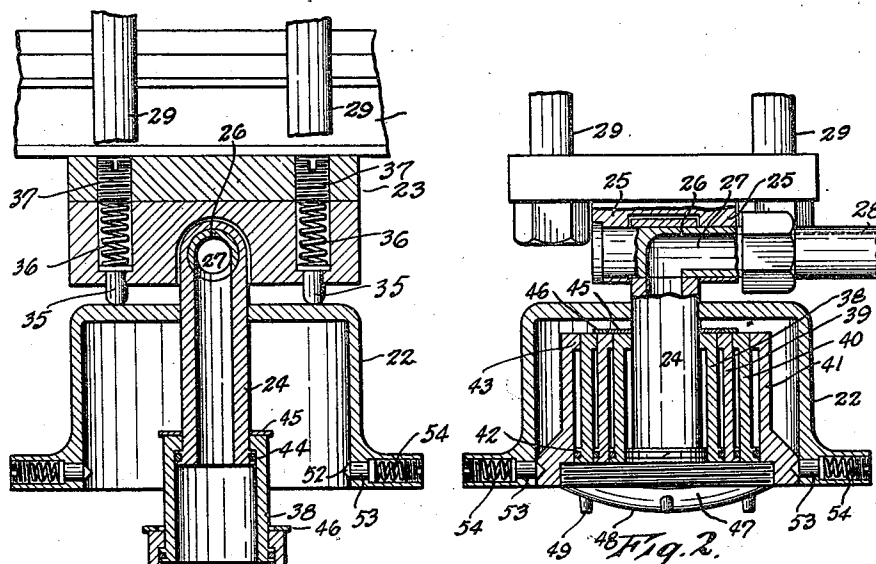


Fig. 2

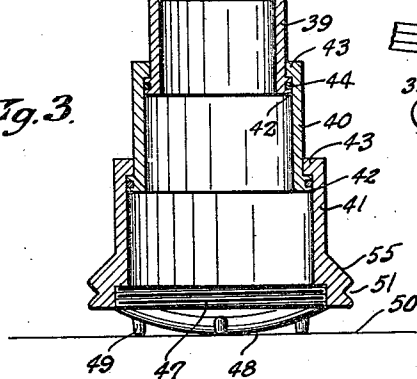
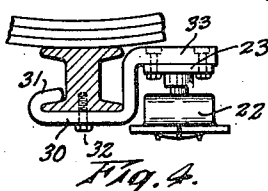


Fig. 4.

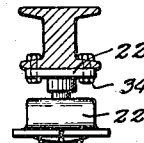


Fig. 5. Inventors.

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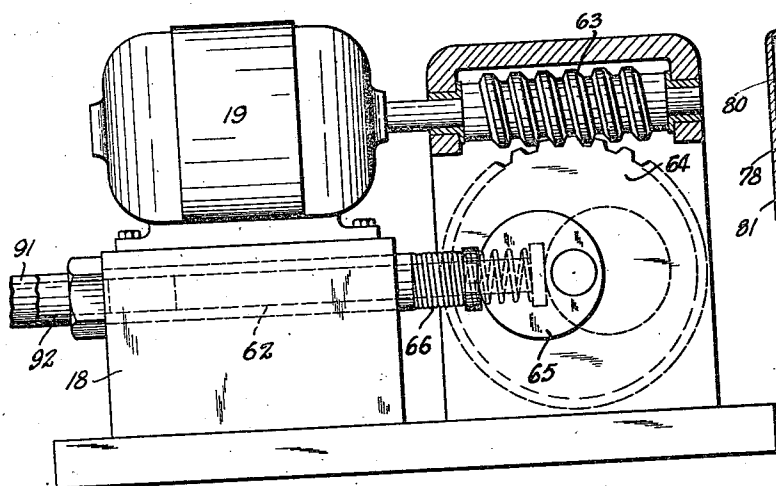


Fig. 6.

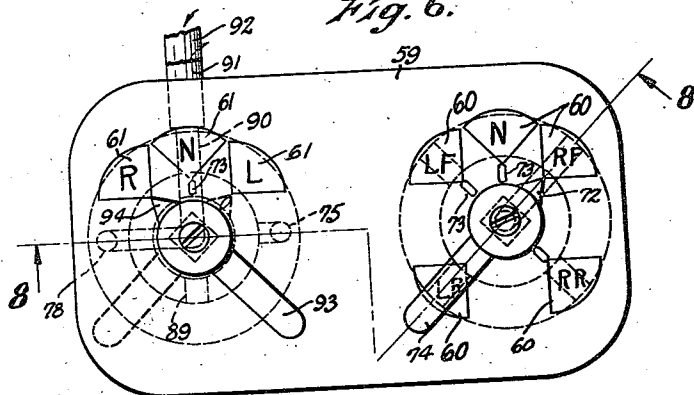
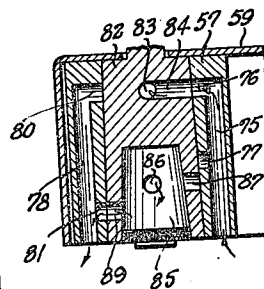


Fig. 9.

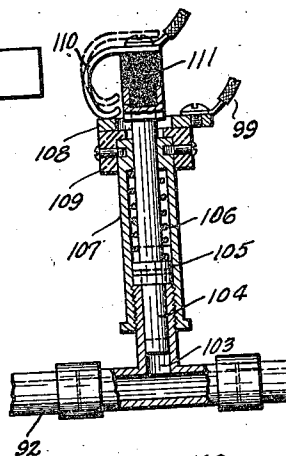


Fig. 10.

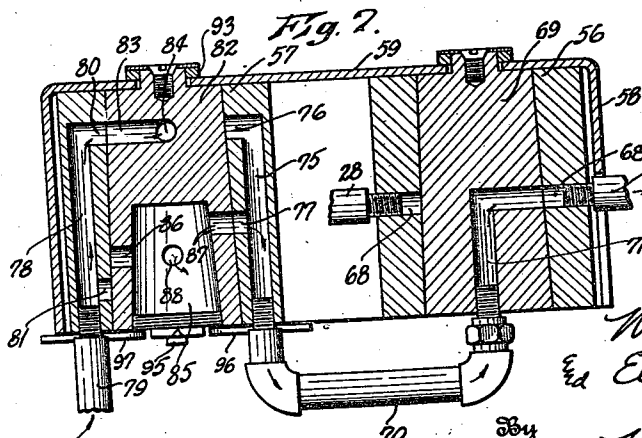


Fig. 8.

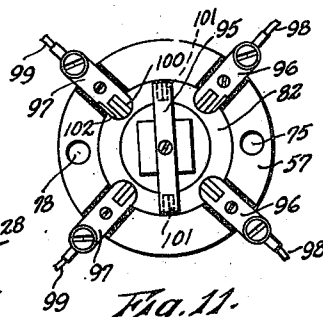


Fig. 11.

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UNITED STATES PATENT OFFICE.

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AUTOMOBILE JACK.

Application filed April 12, 1926. Serial No. 101,283.

This invention relates to a jacking system for vehicles, and has for an object to provide an improved jacking system which is permanently attached to the vehicle and which may be controlled by a person within the vehicle to raise any wheel, or all of them, off the ground, and may also be controlled from the vehicle for lowering it and retracting the jack mechanism to its normal inoperative position.

It is also an object of the invention to provide a device of this character which will be of simple construction and positive in operation, which will not be unsightly in use, is of sturdy construction and is not likely to be easily gotten out of order in use.

It is also an object to provide an improved control mechanism for this type of device which may be operated by the operator without leaving the vehicle, and in which the pressure mechanism for operating the lifting devices is also employed for retracting these devices to the normal ineffective position.

With the foregoing and other objects in view, we have devised a construction, one form of which is shown in the accompanying drawing forming a part of this specification, similar reference characters being employed throughout the various figures to indicate corresponding elements. In these drawings,

Fig. 1 is a top plan view in outline of a motor vehicle showing our improved jacking system applied thereto, the illustration being somewhat diagrammatical.

Fig. 2 is a transverse section through an individual jack in the raised or retracted position.

Fig. 3 is a vertical section through a jack taken on a plane substantially at right angles to Fig. 2 and showing the jack extended in the lifting position.

Figs. 4 and 5 are detail views on a smaller scale illustrating different ways which may be employed to mount the jacks in position.

Fig. 6 is a side elevation of the motor and pump with a portion of the drive housing broken away.

Fig. 7 is a front elevation of the control mechanism.

Fig. 8 is a section thereof substantially on line 8—8 of Fig. 7 showing its mechanism in

position to cause a jack to be extended to lifting position.

Fig. 9 is a similar view of the left hand portion of the mechanism of Fig. 8 showing the control valve in position to cause retraction of a jack to its inoperative position.

Fig. 10 is a detail sectional view of an automatic safety device to stop the motor when the pressure in a jack reaches a certain amount, and

Fig. 11 is an elevation of the switch mechanism controlling the operation of the motor.

In the drawings we have shown our device as applied to a motor vehicle, but it will be understood that it is not necessarily limited to a vehicle of this type. In Fig. 1 the chassis frame of the vehicle is indicated at 12, wheels 13, and front and rear axles at 14 and 15 respectively. In applying this system to a vehicle of this type it is preferred to mount a lifting jack, indicated at 16, on the axles adjacent each of the four wheels so that if desired each wheel may be lifted independently, as where it is desired to change a tire. The major portion of the system is preferably mounted under the body or the hood and comprises a reservoir or receptacle 17 for liquid such as oil, a pump 18 driven by any suitable means such as a small electric motor 19, a control mechanism indicated as a whole at 20 and preferably mounted on the dash or in any other position easily accessible to the operator, and a safety device 21 to render the mechanism practically fool proof.

The jacks are preferably constructed substantially as illustrated in Figs. 2 and 3 and are preferably mounted on the under sides of the axles. In the form shown they comprise an outer shell 2, preferably cylindrical, and it is open at its under side. This shell is also preferably mounted so as to have a limited tilting movement with respect to its support 23. Within the shell is a central comparatively small cylinder 24 extending at its upper end between lugs 25 on the support and to which it is pivoted by means of a pin 26. This pin 26 has a passage therethrough communicating with the passage within the cylinder 24 and is connected at its outer end by any suitable means with

a pipe 28 for the liquid under pressure for operating the jack. The support 23 may be mounted on the vehicle in various ways but is preferably clamped to the under side of the axle by the bolts 29 for clamping the springs to the axles.

In Figs. 4 and 5 we have shown slightly different ways of mounting the jack. In Fig. 4 a bracket 30 has an end 31 wrapped around one of the lower flanges of the axle and is secured to the under side of this axle by the screws 32. It has an upwardly and laterally extending portion 33 to which the jack is secured. In Fig. 5 the support is mounted directly on the under side of the axle by means of screws 34 passing through the flanges of the axle.

We provide means for preventing the jack rattling when not in use. For this purpose we provide a pair of spring pressed plungers 35 pressing on the top of the shell on opposite sides of its pivot with springs 36 holding them in this position. The pressure of the springs may be adjusted by the threaded plugs 37. The jack proper comprises a plurality of telescoping cylindrical sections 38, 39, 40 and 41. In the drawing we have four of these sections in addition to the central section 24 but, of course, the number may be varied if desired, and each section with the exception of the lower section, has an outwardly extending flange 42 fitting the inner walls of the next lower and larger section, and each section also has an inwardly extending flange 43 on its upper end fitting the outer wall of the next higher and smaller section. Each of the flanges 42 are provided with grooves holding a packing 44 to prevent leakage of the liquid during the movement of the section, but the engaging surfaces are ground to fit with grinding material so that when the sections are extended the inner surfaces of the flanges 42 and 43 are self sealing as well as forming limit stops to prevent separation of the sections. The two sections 38 and 39 are also preferably provided with plates 45 and 46 at their upper ends and projecting beyond the outer diameters of these sections to form shoulders to engage the upper end of the next lower section to prevent these sections passing by and separating when they are drawn into each other into the nested position. The lower section 41 is closed at its lower end by a plug 47, preferably threaded into the section, and the outer wall 48 of this plug is convex so that it may rock on the ground or floor to give a solid support. This surface may also be provided with calks or lugs 49 to give a rigid support when all four wheels are lifted from the floor. It is to be noted in the construction shown that the largest section is the lower section which engages the ground or floor 50, and therefore, it gives a larger supporting surface where it is required espe-

cially when used on the road where the road material is apt to be soft. This is also the proper arrangement from the mechanical standpoint. In ordinary use we believe that the suction of the oil will hold the sections in the elevated or nested position shown in Fig. 2, but in order to prevent any possibility of their shaking down, especially where a leak might develop in the system, we provide independent means for holding them in this position. For this purpose the lower section 41 is provided with a groove 51 in its outer wall which is adapted to receive the inclined ends 52 of spring pressed latch pins 53 mounted in the side walls of the shell 22. These pins are held in the inner position by springs 54 and effectively operate to hold the sections elevated. It will be obvious, however, that pressure within the cylinder sections when liquid is pumped into them will force the sections outwardly as the latch pins may yield laterally. The upper wall 55 of the flange on the lower section is inclined so that any dirt which might collect thereon will drop off.

The control mechanism is shown in Figs. 7 to 11 and comprises two valves 56 and 57 preferably mounted on the dash. These valves are mounted in a casing 58 which has a front plate 59 fitted in the dash and has suitable indications 60 and 61 mounted thereon to indicate in what positions the valves are placed. The pressure for operating the jacks is furnished from any suitable force pump such as a hand pump, a motor operated pump, or a pump driven from the transmission, but we prefer to use a pump 62 having a pair of reciprocating plungers 63 which are driven from a small electric motor 19 having any suitable driving connection with these plungers, such as a worm 63 meshing with a gear 64 driving two cams 65 bearing on the ends of the plungers with springs 66 to hold the ends of the plungers against these cams. The plungers will also have suitable stuffing boxes which are not shown as this is the ordinary construction. As these plungers may be relatively small and not much larger than the conduits leading from the pump, a high pressure may be secured with a small expenditure of power, and thus a relatively small motor which may be easily operated by the usual storage battery 67 of the car may be used.

It will, of course, be understood that there is a supply pipe 38 leading to each jack and the selective valve 56 is provided with four outlet passages 68, preferably spaced about ninety degrees from each other, and connected to the respective conduits 28. The rotatable element 69 of this valve is connected with a supply pipe 70 and has a passage 71 from this pipe leading through the lateral wall of the rotary element in the plane of the passages 68, so that, by rotating

the member 69, this passage may be brought to alignment with any one of the outlet passages 68 desired, depending on the jack which is to be operated. On the front of the plate 59 is an indication 60 for each jack, and when the pointer 72 is opposite any one of these indications it indicates the passage 71 is in communication with the proper outlet for the jack indicated. There may be a detent finger used or the pointer may comprise this finger coacting with depressions 73 in the front of the plate to hold the valve in proper position to bring the passages in alignment. A suitable handle 74 may be provided for operating the valve and when the point is opposite the indication (N) it indicates the valve is in neutral position.

The supply pipe 70 leads to a passage 75 in the casing of the control valve 57, there being two lateral outlets 76 and 77 from this passage. This casing also has a passage 78 connected by a pipe 79 to the reservoir or receptacle 17. This passage 78 has two spaced outlets 80 and 81. The valve 57 also has a rotary plug 82 which has a passage comprising connected angularly disposed sections 83 and 84 opening through the lateral walls of the plug. The plug also has a chamber 85 which communicates with lateral openings 86, 87, 88 and 89 passing through the lateral walls of the plug. The casing 57 of this valve is also provided with an outlet opening 90 in the plane of the passage 83—84 connected by means of a pipe 91 with the inlet or suction side of the pump 18 and another passage in the plane of the openings 86 and 88 connected to the outlet pipe 92 of the pump. It will be noted from Fig. 8 that the passage 83—84 is in the plane of the openings 80 and 76, the opening 87 is in the plane of the opening 77, the openings 86 and 88 are in the plane of the passage connected to the discharge pipe 92, and the opening 89 is in the plane of the opening 81. The plug 82 is operated by a lever 93 and has a pointer 94 to cooperate with the indications 61 to indicate the position of the valve, (R) indicating that the valve is in position to pump oil to the jacks to raise the car, (L) indicating that the valve is in position to retract the jack to lower the car and (N) being the neutral position.

Connected to the rear end of the valve plug 82 so as to be operated simultaneously therewith, is a movable switch element 95 adapted to engage and bridge electrical contacts 96 and 97 connected by suitable leads 98 to the source of current and by leads 99 to the motor. The contacts 96 are preferably provided with V-shaped recesses 100 adapted to receive similarly shaped spring contacts 101 carried by the switch element 95 to assist in indicating and retaining the valve in various positions with

the passages properly in alignment. These contacts are also preferably provided with lugs 102 on one side thereof to form stops to limit the movements of the member 95 and also the valve member.

In operation, member 69 is first shifted to bring the passage 71 in alignment with the proper outlet passage 68 to the jack which it is desired to operate, this position being indicated by the pointer 72. The valve 82 is then swung to the position shown in Figs. 7 and 8. This movement will close the circuit through one of the set of contacts 96—97 to the motor 19 and will pump oil from the reservoir 17 through the valve 82, pipe 70 to valve 56, and to the jack selected, which will extend the same to the position shown in Fig. 3 and raise that portion of the vehicle. When the pressure in the jack reaches a certain amount the safety device shown in Fig. 10 will operate to break the circuit to the motor and stop the motor so that the pressure cannot become high enough in the system to do any damage. This safety device is preferably connected to the outlet pipe 92 from the pump and comprises a cylinder 103 in which is a plunger 104, the cylinder being in communication with the pipe 82. This plunger has an enlarged portion or flange 105 with a spring 106 tending to hold the plunger in its lowest position. Mounted at the upper end of the casing 107 is an electrical contact 108 carried on an insulating support 109, and this contact is connected in the leads 99 from the hand controlled switch to the motor. The plunger 104 also carries a contact 110 mounted on an insulating block 111 which is in the other side of the lead from the hand controlled switch to the motor. It will, therefore, be apparent that when the pressure reaches a certain amount the plunger 104 will move upwardly to separate the contacts 108 and 110 to break the circuit and stop the motor. After the circuit is once broken by this device the motor cannot be started again to pump more oil until the valves have either been changed to lower the jack or to pump oil to some other jack. This will render the system practically fool proof.

If now it is desired to lower the jack all that is necessary is to shift the control valve 82 to bring the handle 93 into the dotted line position of Fig. 7. This will bring the movable plug 82 of the valve to the position shown in Fig. 9, and will bring the switch member 95 in engagement with the other set of contacts 96—97 to start the motor as before. The valve 82, however, when in the position shown in Fig. 9 reverses the direction of flow of the liquid through the valve 56 and pumps it from the jack back into the reservoir 17. This is because the inlet passage 83 in the valve 82 is now in communication with the opening

90 connected to the inlet pipe 91 of the pump and the passage 84 is in communication with the passage 75 through the opening 76. Thus the suction side of the pump is
 5 connected to the pipe 70 and pipe 28 leading to the jack, the other opening 77 to the passage 75 being closed. The oil is pumped back through the pipe 92 the same as when
 10 extending the jack, but the opening 86 in the valve 82 is now in communication with the pipe 92, and the opening 89 is in alignment with the opening 81 leading to the
 15 passage 78 connected to the pipe 79 leading to the reservoir. The opening 80 from the passage 78 is closed, and therefore, the passage 78 is now in communication with the
 20 outlet from the pump. When the valve 82 is in the neutral position intermediate the two positions shown in Fig. 7 the device will not operate as the various passages through
 the valve are closed and the circuit to the motor is open, the switch member 95 being in the position shown in Fig. 11. It
 25 will, of course, be apparent that the inlet and outlet connections to the pump will be provided with the usual non-return valves such as the spring pressed ball valves (I) and (O) in the suction and discharge pipes respectively.

30 It will be apparent from the foregoing description that the device is simple in construction and will occupy a very small amount of space on the vehicle. With the control mechanism shown the operator can
 35 raise any or all four wheels of the vehicle from the ground and again retract the jacks without leaving his seat, and there is no danger of breaking any part of the system if the motor is run too long. As the jacks
 40 are retracted by the action of the pump this gives a positive operation of the jacks, and therefore, no reliance is laid on springs and such devices for retracting the jacks. As such devices are always unreliable the ap-
 45 plicants' device is a material improvement in this respect over the old devices. Furthermore, the cylinder sections of the jack are securely locked in the raised position by the latch pins 53. With this device, during
 50 bad weather the driver does not need to leave the car to jack up or lower the car, nor is it necessary to crawl under the car to place a jack in position. Also, as any part of this system which is exposed is relatively small and is placed in a position
 55 which is not prominent on the car, it presents no unsightly appearance.

Having thus set forth the nature of our invention, what we claim is:

60 1. In combination, a jack, means for securing the jack to a vehicle for raising the vehicle, a liquid receptacle mountable on the vehicle, a pump connected with said receptacle, a power means for operating the pump,
 65 a control valve arranged when in one po-

sition to connect the suction side of the pump with the receptacle and the discharge side with the jack and when in another position to reverse these connections, and a control device for the power means connected with
 70 said valve for simultaneous operation therewith.

2. In combination, a jack, means for securing the jack to a vehicle for raising the vehicle, a liquid receptacle mountable on
 75 the vehicle, a pump connected with said receptacle, an electric motor for operating said pump, a control valve arranged when in one position to connect the suction side of the pump with the receptacle and the discharge
 80 side with the jack and when in another position to reverse these connections, and pressure operated means to break the circuit to said motor when the pressure in the jack reaches a predetermined limit.

3. In combination, a plurality of jacks, means for securing the jacks to a vehicle for raising the vehicle, a liquid receptacle mountable on the vehicle, a pump connected
 90 with the receptacle, a power means for operating the pump, a selective valve for controlling the flow of liquid to the respective jacks, a control valve arranged when in one position to connect the suction side of the pump with the receptacle and the discharge
 95 side with said selective valve and when in another position to reverse these connections, and a control means for the power means connected with the control valve for simultaneous operation therewith.

4. In combination, a jack for raising a vehicle comprising a shell, means for securing the shell to the vehicle, said shell being open on its under side, a plurality of telescoping cylinders of progressively increasing
 100 diameter adapted to be nested in said shell and extended downwardly therefrom with the outer cylinder resting on a support, and means for pumping liquid into said cylinders to extend the same and for withdrawing the liquid from said cylinders to raise
 110 them by suction into nested relation.

5. In combination, a jack for raising a vehicle, means for securing the jack thereto and comprising a plurality of telescoping
 115 cylinders progressively increasing in diameter with the larger one at the free end when extended and the inner and smaller one stationary, the larger cylinder having its free end closed by a head adapted to rest on a
 120 support, a liquid receptacle mountable on the vehicle, a pump connected with said receptacle, a connection from the pump to the smaller cylinder, and a control valve arranged when in one position to connect the
 125 suction side of the pump with the receptacle and the outlet with the jack to force liquid into it to extend the cylinders and in another position to reverse these connections so that the pump will withdraw liquid from
 130

the jack and draw the cylinders into nested relation by suction.

6. In combination, a jack for raising a vehicle comprising a bracket, means for securing the bracket to the vehicle, a shell pivoted to the bracket and open at its under side, spring pressed means engaging the shell on opposite sides of its pivot tending to maintain it in a central upright position, a plurality of telescoping cylinders of progressively increasing diameter normally nested within the shell and arranged so that the larger cylinder is at the free end when the cylinders are extended, said larger cylinder being closed at its lower end with a rounded head having lugs adapted to rest on a support, and means for forcing liquid into the cylinders to extend the same and for withdrawing the liquid from the cylinders to retract them into nested relation by suction.

7. In combination, a jack for lifting a vehicle comprising a shell, means for securing the shell to the vehicle and open at its under side, a plurality of telescoping cylinders of progressively increasing diameter normally mounted in nested relation within the shell and arranged so that when extended the larger cylinder is at the lower free

end and adapted to rest on a support, said larger cylinder being provided with a groove in its outer side walls, spring pressed plugs carried by the shell to seat in said groove to yieldably hold the cylinders within the shell, and means for forcing liquid into the cylinders to extend the same and for withdrawing the liquid from the cylinders to retract them into nested relation by suction.

8. In combination, a jack, means for securing the jack to a vehicle for raising it, said jack comprising a plurality of telescoping cylinders adapted to be extending downwardly with the end cylinder resting on a support, a pump, a reservoir, connections between the pump, the reservoir and the interior of the jack cylinders, and controlling means for connecting the pump to the jack to force liquid from the reservoir to the jack to extend it or to withdraw liquid from the jack to the reservoir and raise the jack cylinders to nested relation by suction.

In testimony whereof we affix our signatures.

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