

# SMITHS JACKALL SYSTEM

A System Which Enables the Front or Back of a Car to be Lifted by Moving a Lever



**T**HE Smiths Jackall System is a permanent installation on a car of four hydraulic jacks which enables either front or back or the whole car to be lifted by movement of a single lever. The lever is accessible sometimes from inside the car and sometimes from under the bonnet.

The system consists of three elements—the storage tank which holds the hydraulic fluid (oil); the distributor box which pressurises the oil and distributes it to the selected jacks—front, rear or all; and finally the jacks themselves.

### How to Use the Jacks

To operate the jacks the release valve is screwed down, i.e., clockwise, firmly and the selector knob rotated to point to the set or sets of jacks required to be operated. The operating handle is slipped over the stub projecting from the back of the box and moved back and forth. This pumping is continued until the jacks are extended sufficiently to lift the car from the ground. To lower the car, the release valve is opened gently, i.e., turned anti-clockwise as indicated on the knob, and finally left unscrewed a couple of turns, to avoid pressure building up in the system and a partial operation of the jacks. The operating handle is then removed and stowed away.

### How the System Works

Movement of the operating handle rocks the crank back and forth, so driving the pistons in and out of the cylinders. The box is full of oil and is kept filled from the storage tank under the bonnet of the car, the oil passing through the gauze filter on its way into the main body of the box. As each piston moves outwards in its cylinder it uncovers the rectangular port in the cylinder wall. Oil is sucked into the cylinder and the next stroke of the piston drives the oil up the appropriate way drilled in the body of box past the non-return ball valve. Once past the valve the oil is driven into a cross channel which unites the vertical oil ways from both cylinders. From this channel the oil has two routes—one through a pressure-relief valve back into the body of the box and the other route through a pressure-retaining valve into the pressure chamber. From the pressure chamber the oil has three routes; through the release valve outlet back to the main body of the box; or via the selector valve outlets to the front and/or rear jacks. If the release valve is closed the oil operates the selected jacks. If the release

valve is open, the oil simply flows back into the main body of the box via the filter.

The component parts of the system are:

### The Storage Tank

As the oil is pumped into the jacks, the distributor box is kept filled from the storage tank, located under the bonnet. This tank has a screw down cap with a small air hole in it, which should be kept clear. The collecting pipe to the distributor box projects about 1in. into the bottom of the tank to leave a space in which any solids may settle harmlessly. In the distributor box it also projects about 1in. above the entry into the filter chamber to provide a lodgment for solids.

### The Valves

There are three automatic valves—the

multi-leaf spring, itself clamped in place by a flatheaded screw and washer. To give extra pressure the distant end of the spring is forced upwards by a cross ridge moulded into the face of the spring platform. The leaves of the spring are .018in. thick and the number varies with the weight of the car. If pumping is continued after the jacks have lifted the car, any damage which might be caused by excessive pressure is

Fig. 1.—Exploded sketch of the distribution box.

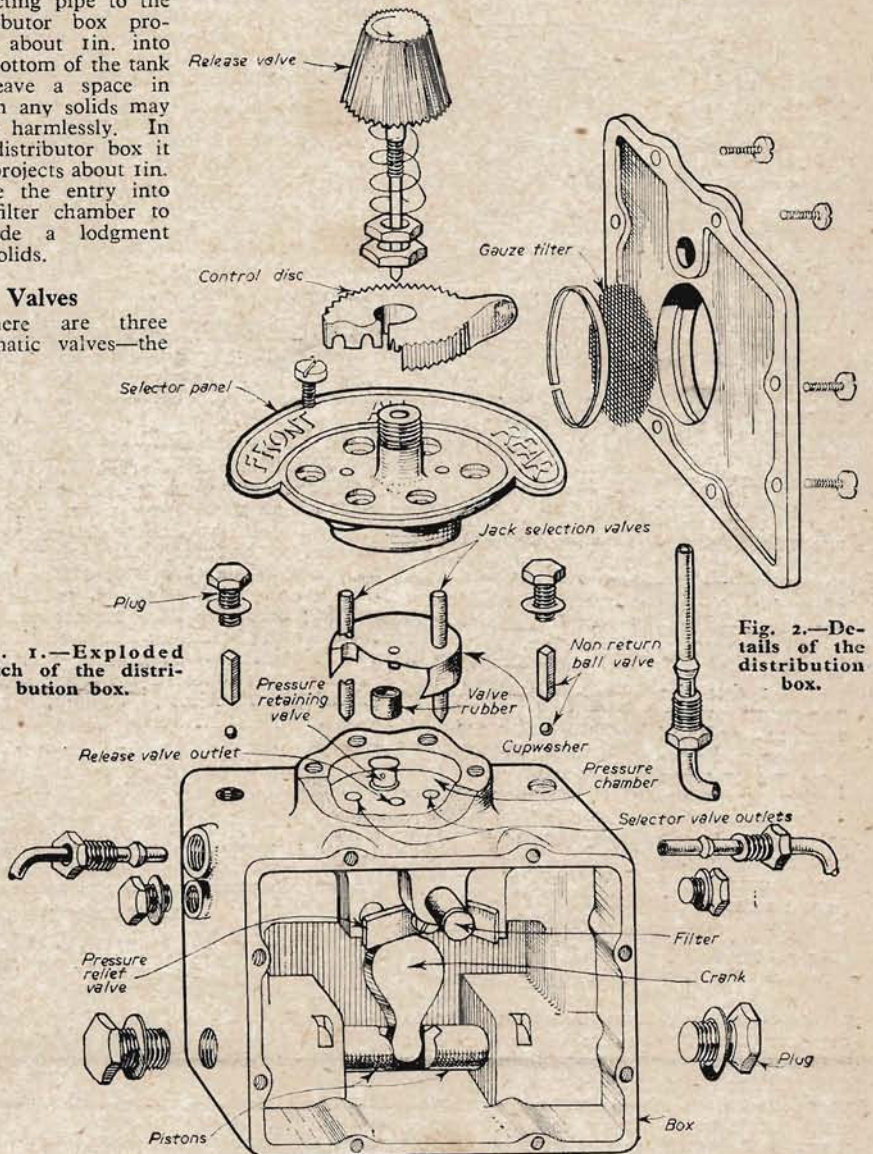


Fig. 2.—Details of the distribution box.

non-return valve in each way from the individual pistons; the pressure-relief valve and the pressure-retaining valve. The non-return valve is a simple phosphor-bronze ball, held on its seating by the weight of a piece of phosphor-bronze square bar. The pressure-relief valve is a hole joining the cross channel to the main body of the box. It is sealed at the box end by a phosphor-bronze ball held down by a

avoided by the opening of the valve at the pressure determined by the number of spring leaves; excess oil is then returned to the main body of the box.

The pressure-retaining valve is a short piece of rubber tubing slipped over the post. The length is fairly critical; one end fits into a groove in the floor of the pressure chamber and the other stops short under a lip at the top of the post. This

piece of rubber sustains the full pressure which holds the car off the ground.

In addition to the three automatic valves there are three manually operated valves—the release valve which is a needle valve and is screwed down to make the system operative or unscrewed to permit the jacks to retract, and the jack selection valves. The control disc has a face cam moulded in its underside. When the disc is rotated one or other of the needle valves is forced down on to its seating and the jacks served by that outlet are made inoperative. These three valves are all sealed by a combined cup washer, each hole being sleeved.

### The Jacks

These are each a simple tube closed at one end with a piston sliding into it through a packing gland at the open end. The oil forces the piston out against the pressure of a spring, external or coaxial. When the pressure is released the spring returns the jack to its closed position.



### Faults

The jacks will refuse to extend or, having extended refuse to lift or, having lifted not sustain the car off the ground or, having extended will refuse to retract fully.

Points to check are when all jacks refuse to extend that the release valve is screwed down, that the outlet pipe in the bottom of the storage tank is not uncovered. (This should never be allowed to happen even when the jacks are fully extended.)

Check that the non-return valve, pressure-relief valve and release valve are seating properly. A damaged seating or piece of grit holding any of them open will permit some or all

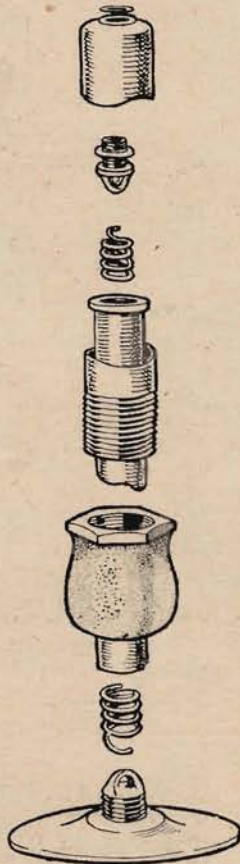


Fig. 3.—Exploded sketch of jack.

of the oil pumped from the cylinders to circulate uselessly in the distributor box.

Check that pressure-retaining valve rubber is not damaged and that the pistons or cylinders are not so worn that the oil leaks past them. To do this remove the plugs and check by inspection or by moving the piston until the outlet port is covered and then filling the cylinder with methylated spirit or jack oil. It should only leak away, if at all, very slowly.

Check that the jack selection valves are free and not pressed or jammed down.

Ensure that there are no external leaks in the system—there are junction boxes in the system which may be tucked away out of sight.

Check that oil is arriving at the jacks by slackening each connection in turn.

### All Jacks Extend but Will Not Lift Car

When this occurs insufficient pressure has developed. Check for faults as above.

Make sure the system is thoroughly bled of air. Pressures developed are very high, depending on the weight of the car and contents and the diameter of the piston in the jack, e.g., for a car weighing 27 cwt., without passengers they can be between 1,500 and 2,000lb. to the square inch, and any air trapped makes the system most unsatisfactory in operation. To bleed the system loosen one of the plugs S and pump until the oil ceases frothing. The oil can be collected, strained, allowed to stand to de-aerate and then used again.

Check that the pressure retaining valve is not leaking. To do this lift the car clear of the ground with independent jacks, pump until the Jackall jacks reach the ground, then release the independent jacks until the car is resting on the Jackall jacks. If they will not sustain the weight of the car and there are no external leaks, the pressure-retaining valve is leaking. If jacks hold car, the fault lies elsewhere in the distribution box.

### Jacks Lift the Car but Will Not Hold It

If no external leaks are found, the pressure retaining valve is leaking (see previous paragraph). If the front or rear pair will not extend, there is insufficient fluid in system, the selector is in the wrong position, with blockage in the appropriate section.

## CATALOGUES RECEIVED

### Shell Films for 1958-1959

SHELL-MEX AND B.P. LTD., Shell-Mex House, Strand, London, W.C.2, have issued a catalogue covering the contents of their film lending library, available to clubs, societies, schools and other organised bodies. A brief outline of each film obtainable is provided, together with running time, and films are grouped under the following headings: Petroleum; Industry and Engineering; Agriculture; Aviation; Motor Sport; Motor Cycle Sport and other miscellaneous subjects.

### Reflex Reflectors

THE Department of Scientific and Industrial Research, Charles House, 5-11, Regent Street, London, S.W.1, has recently issued the Road Research Technical Paper No. 42, on Reflex Reflectors, at 2s. 6d.

Check the condition of the outlet pipe as previously described, that the selector valves are free, that there are no external leaks and that the oil is arriving at the jacks.

When the selector is set to "all" and only two jacks, whether front, rear or on one side of the car, will lift, insufficient pressure is being developed and it should be checked that the outlet pipe in the bottom of the storage tank is not uncovered, that the pressure retaining valve rubber is not damaged, that the pistons or cylinders are not worn, that the oil is actually arriving at the jacks, that the system is thoroughly bled of air and that the pressure retaining valve is not leaking.

If the jacks will not retract when the release valve is unscrewed, a broken return spring is indicated. If an internal spring, check by pulling the jack down manually. There should be strong resistance.

There may also be an obstruction in the system. Clear by draining off fluid, disconnecting pipes at jacks and flushing through with methylated spirit. Whilst the pipes are disconnected, the jacks should be pulled down by hand and released quickly to push out any dirt which may have collected in the jacks themselves. When the system has been refilled, bleed it as previously described.

The oil for these systems is of two kinds, a vegetable oil, green or clear, for use in pre-war jacking systems in which the rubber parts are made from natural rubber and a mineral oil, for use in post-war systems where synthetic rubber is used.

In it will be found the results obtained by the Road Research Laboratory from investigations on improving reflex reflectors for the benefit of road safety. The data given, which is augmented with diagrams, tables and photographs, assesses the reflecting properties which make such reflectors adequately visible, includes a summary of the theory of two types of reflex reflectors, and an analysis of quality. A method of distinguishing between good and poor reflectors and a description of a photometer by which their efficiency may be measured are also included.

### Vehicle Headlamp Testing

ALSO issued by the Department of Scientific and Industrial Research is No. 23 of the Road Research Road Notes, Vehicle Headlamp Testing, at 2s. This describes the various types of headlamp and auxiliary lamp currently in use and outlines a suitable procedure for finding and correcting faults. It also describes types of beam testing equipment now available.

Both these booklets are available from Her Majesty's Stationery Office, Kingsway, London, W.C.2.

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