

*Service Manual*  
*for*

**JACKALL**

**BUILT-IN FOUR WHEEL JACKS**

*Confidential: Trade Only*

# Foreword

This book has been compiled to assist the garage trade in the servicing and maintenance of "Jackall" Built-in 4-Wheel Jacks.

In view of the adoption of "Jackall" by a large and ever increasing number of British Car Manufacturers, the information contained herein will be found invaluable for reference purposes.

It is only necessary to add that the experience of our technical department is always at the disposal of the trade and every assistance will gladly be given in dealing with any queries which are not fully covered by this handbook.



**S. SMITH & SONS** (Motor Accessories) **LTD**  
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# SMITH'S JACKALL

## Built-in 4-Wheel Hydraulic Jacks

Smith's "Jackall" Hydraulic Jacking System consists of tubular telescopic hydraulic jacks (1) attached to the vehicle axles at points convenient to the wheels, a simple two cylinder pump (2) in which is incorporated the distributing device (3), a fluid supply tank (4), special flexible hydraulic couplings (5), to convey the operating fluid from the sprung to the unsprung parts of the vehicle.

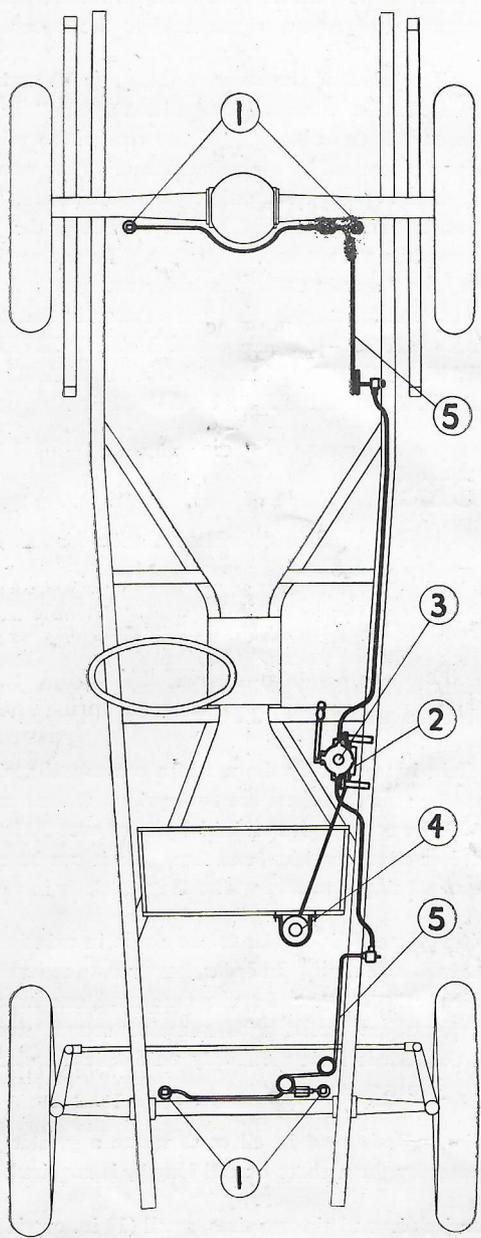
A special fluid, "Smith's Jackall Fluid," which is a lubricant, and at the same time is non-injurious to any of the components of the system, has been evolved, and under no circumstances must any other fluid be used. **THE USE OF ANY BUT THE GENUINE JACKALL FLUID CANCELS GUARANTEE.**

The Pump and Distributor Unit (see Page 5) is composed of a neat, light but exceptionally sturdy die-casting in a special alloy developed for this purpose. The double ended plunger (A) is ground to a close fit in the highly finished cylinders (A1), no packing being necessary. The ends of the cylinders are sealed with the plugs (B) and the joint between the plug and body is made with copper washer (B1). The plunger is oscillated by the rocking arm (C), actuated by means of a detachable handle fitted to the rocking arm lever (D), which is keyed to the shaft by a special chrome nickel steel cotter pin (D1). (Note.—The ordinary cycle cotter is useless for this purpose.)

Leakage through the bearing is prevented by means of the moulded composition gland (D2). The orthodox type of spring loaded inlet valve is dispensed with, as this is a feature of small high pressure pumps which is prone to give trouble; instead, the cylinders are ported (E), and the plunger itself used to seal the port on the return stroke. By this system, so long as fluid is available, the pump cannot fail to function. The delivery valves instead of being spring loaded, are governed by the square section gravity weights (F), which also serve the purpose of limiting the travel of the ball valve (F1) to  $\frac{1}{8}$  in., thus securing a high degree of efficiency and preventing damage to the valve seats by "pounding."

After passing the delivery valves the fluid enters the transverse passage (G) in communication with which is the pressure relief or safety valve (H) by means of which any excess pressure is avoided and surplus fluid allowed to return to the reservoir. The fluid under pressure enters the annual chamber (J) through the "master" check valve (J1), which effectually prevents any return of the fluid back to the pump, thus relieving the ordinary delivery valves and safety valve of any duty other than their normal function. The safety or pressure relief valve (K) consists of a  $\frac{3}{32}$  in. steel ball loaded with a laminated spring. No adjustment is necessary, as when the securing screw (K1) in the centre is screwed firmly home, the spring resistance obtained gives the correct pressure.

A filter is incorporated in back cover plate through which the fluid passes after each operation.



PLAN VIEW OF CHASSIS  
SHOWING TYPICAL  
"JACKALL" LAYOUT.

## THE DISTRIBUTOR

The distributor consists of an annular chamber (J) cast integral with the pump body. In the "floor" of this chamber three ports are positioned, the outer ports (L) each supplying fluid to the jacks to which they are connected, the centre port (M) forming a passage for the return of the fluid to the reservoir after use.

The valve "member" consists of three valves (N1) manufactured from a special alloy, securely vulcanised in a moulded composition "cup" or "bucket" (N), which has on its reverse side three sockets (N2) to receive the valve operating pins (N3). The outer pins are actuated by a distributor cam (O) by means of which front or rear jacks can be selected; or if the pointer is placed to the "ALL" position, all jacks will be operated simultaneously. Before operating, the "Release" valve knob (P) must be screwed home, but not too forcibly. To release the jacks, the knob is turned "anti-clockwise" gently at first to lower the car to the ground without shock, and then opened one full turn to ensure the return of the Rams to the closed or inoperative position. NOTE.—AFTER USING, THE POINTER (Q) SHOULD ALWAYS BE TURNED TO THE "ALL" POSITION AND THE RELEASE VALVE LEFT AT LEAST ONE FULL TURN OPEN.

## THE JACKS

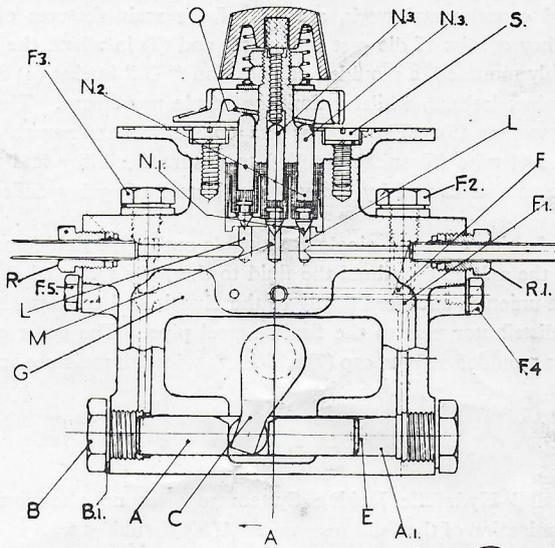
The jacks are of two types, single and double extension (see Page 7). The single extension jack (A) consists of two tubular steel members, the upper end (A3) of the outer tube (A2) being "domed" to form a "cap" or end, and the upper end (A4) of the inner tube (A1) being "bulged" to form a long guide or bearing which ensures stability when the jack is fully extended. The bottom cap (A5) contains the special moulded composition "gland" (A6) which is designed to prevent the escape of the fluid either under high pressure or whilst the jacks are in the normal out of use position.

The return of the fluid is secured by the use of a compound spring of the highest quality (A7). It will be seen that there are two springs, wound concentrically, with sturdy end hooks. These springs give an initial pull of over 30 lbs., when the jacks are in the inoperative or closed position, and from this it can be realised that there is no danger of the ram being extended whilst the vehicle is in motion.

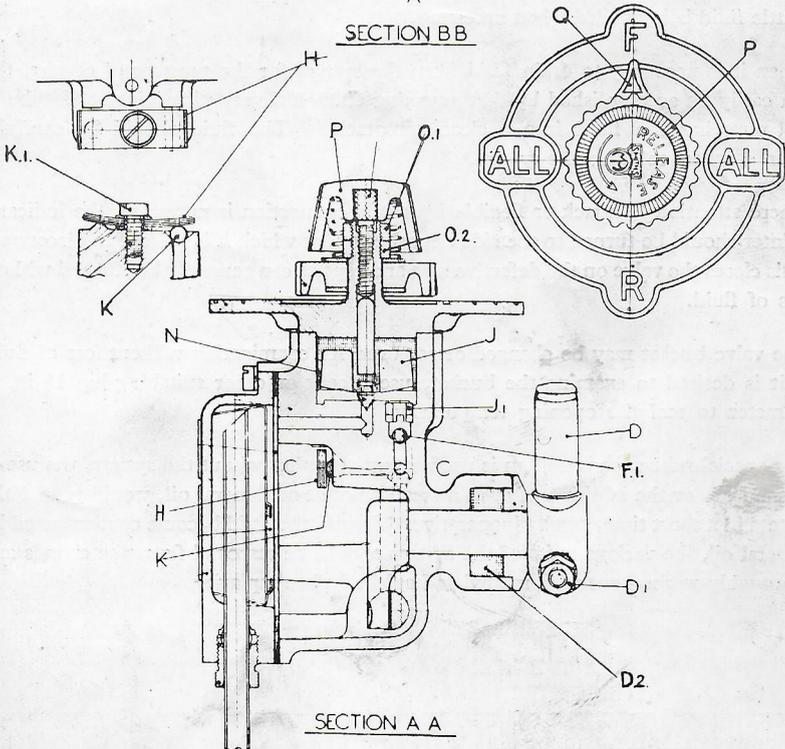
The double extension (Type B) is similar to the single in principle, similar packing glands being used at each extension. In order, however, to relieve the return springs from any excessive load, two compound springs are used, one interior (B1) and one exterior (B2). All joints are sealed with annealed copper washers (A.7—8—9, B.3—4—5—6) and the jack is a simple sturdy unit which, under all conditions of usage, is unlikely to give trouble.

The double extension type is used in all cases where a greater ground clearance, coupled with the necessity for a short overall length, is required.

The single extension jack is made in two sizes, small (1 $\frac{3}{8}$  in. outside diameter) which is used on cars up to 32 cwt. approx., and medium (1 $\frac{1}{2}$  in. outside diameter) which is suitable for cars up to 3 tons.



SECTION BB



SECTION A A

SECTIONED VIEWS OF  
PUMP AND DISTRIBUTOR  
UNIT.

# FLEXIBLE HYDRAULIC COUPLINGS

These flexible couplings, which have been designed after a considerable amount of research and experimental work, are one of the main features of the "Jackall" System. They consist of die cast unions (1) and (2) in which the pipe end bushes (3) are flexibly mounted, a moulded composition "U" bucket (4) effectually sealing the joint against leakage, whilst permitting ample movement. The thrust is taken by a loose washer (5). The unions are coupled together with a special silico-manganese steel tube (6) suitably coiled to ensure flexibility and to deal with the complex movements caused by the varying degrees of spring deflection.

Two types of union are used, single and double outlet, the double outlet union being attached on the axle to distribute the fluid to the jacks mounted thereon, whilst the single outlet union is anchored firmly to the chassis and conveys the fluid from the pump and distributor unit to the flexible steel pipe. The outer end of each joint is sealed by a moulded rubber cap (7) which excludes grit moisture and foreign matter.

## GENERAL INSTRUCTIONS

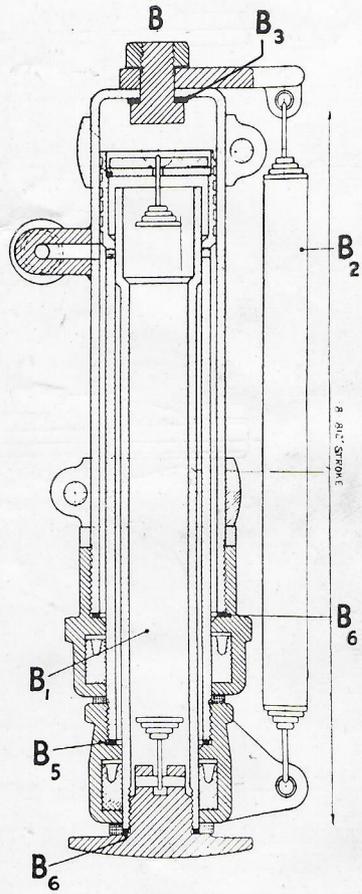
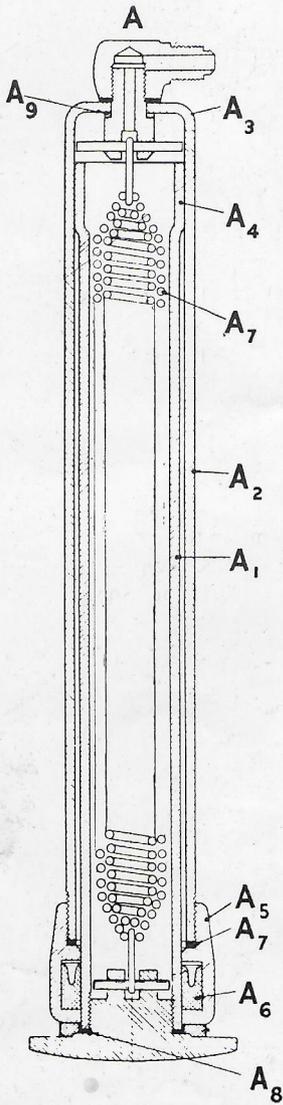
The "Jackall" Hydraulic Jacking System requires no attention other than the periodic examination of the fluid reservoir. This should be seen to every 2-3 months a little fluid being added when necessary.

When it is necessary to drain fluid from the system for the purpose of repairs, this can easily be accomplished by disconnecting either delivery pipe-joint at distributor and pumping the fluid into a clean receptacle. The fluid should be carefully filtered when refilling the system.

Where attention to a jack or flexible hydraulic connection is necessary, the indicator pointer should be turned to the side opposite to that which it is desired to disconnect. This closes the valve on the defective side and repairs can generally be effected without loss of fluid.

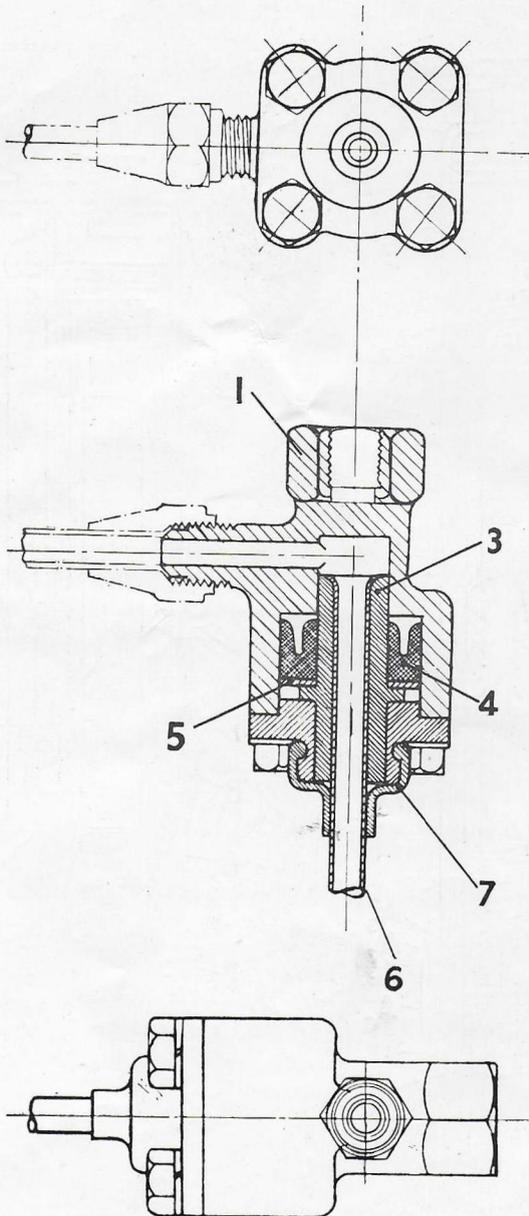
The valve bucket may be changed or removed for examination without loss of fluid. If it is desired to examine the bucket, use a cork or other suitable plug  $1\frac{1}{4}$  in. in diameter to seal the opening temporarily.

As a special rubber composition is used extensively throughout the system, the use of mineral oil, or the addition of even a small amount of mineral oil, would render the system in a short time, wholly inoperative. Should the fluid become contaminated by mineral oil, the various units of the system should be removed from the chassis and thoroughly washed out with methylated spirits before replacing.

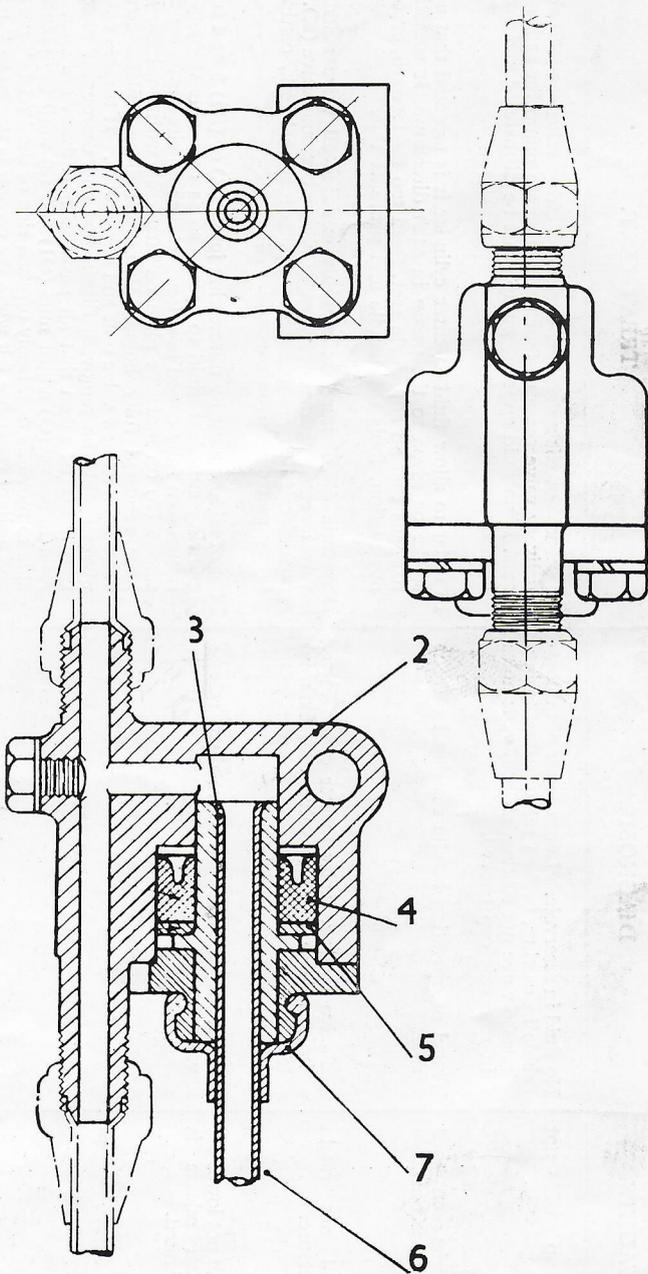


(A) SINGLE EXTENSION JACK.

(B) DOUBLE EXTENSION JACK.



**HYDRAULIC JOINT SINGLE  
OUTLET.**



**HYDRAULIC JOINT DOUBLE  
OUTLET.**

*We append herewith a list of possible faults, showing cause and suitable treatment*

# PUMP

FAULTS.	DIAGNOSIS.	TREATMENT.
<p>1. Pump will not operate.</p>	<p>No fluid in reservoir. Loose cotter pin, blow-hole in casting, broken safety valve spring, release valve not seating, airlock, vent holes in reservoir cap choked.</p>	<p>To ensure there is no airlock, slacken off either valve cap (F2) above delivery valve three or four turns, operate pump for at least 60 secs. If no fluid appears, pump must be dismantled and trouble located.</p>
<p>2. Works on one cylinder only.</p>	<p>Travel of operating handle restricted on one side.</p>	<p>In order to allow fluid to enter cylinder it is essential that a full stroke be given to the pump in each direction. It sometimes happens that an adjustable seat, fixed too far forward, or other obstruction, fouls the handle and prevents this.</p>
<p>3. Will not retain pressure.</p>	<p>Defective casting, faulty master check valve, faulty release valve or valve seat, external leakage in system.</p>	<p>Dismantle distributor box, carefully examine all valve seats and valves, removing master valve, retaining ring and valve (K). If no defect is apparent and there is no external leak, casting is faulty and should be replaced.</p>
<p>4. Will not lower car when release is operated.</p>	<p>Foreign matter in release valve duct, release valve faulty.</p>	<p>First of all lower car by unscrewing joints (R) or (R1) 3 or 4 turns, allowing sufficient fluid to escape so as to enable the jacks to return to a fully closed position. Under no circumstances must screws (S) on indicator plate be interfered with until the jacks have returned fully home. Remove indicator plate, remove valve unit, fit new valve unit and reassemble. If trouble persists pump should be removed, dismantled and thoroughly cleaned. Care must be taken that all passages and ducts are free. To reset indicator (O) adjust nuts (O1) and (2) until the pointer is able to move 20 deg. freely on each side of the "ALL" position and a slight resistance felt when the pointer is turned to "F" or "R." The indicator should be set so that little effort is required to move it to any desired position.</p>

<p>5. Jacks return very slowly when release is fully open.</p> <p>6. Works on one side of indicator, but not on other, or "ALL" position.</p> <p>7. Leaks at indicator plate.</p>	<p>Operating pins (N3) too tight in cap . . . .</p> <p>Defective casting or one faulty valve . . . .</p> <p>Defective casting or faulty valve bucket . . . .</p>	<p>Usually caused by corrosion. Remove indicator plate, remove pins, clean and oil thoroughly with castor oil and replace.</p> <p>Remove valve bucket (N), and examine valve seats and valves carefully. Replace bucket if necessary. If fault persists, casting is faulty.</p> <p>Remove valve bucket (N), examine for puncture, replace bucket if necessary, if fault persists casting is faulty.</p>
<p>8. Leaks under pressure.</p> <p>9. Leaks slow drip.</p>	<p>Cylinder end cap (B) or other caps loose. (F2, F3, F4, F5.)</p> <p>Cover plate screws loose, or faulty gasket . . . .</p>	<p>Without removing unit from chassis, go over all plugs with spanner to ensure tightness, wipe box thoroughly. If leak persists a new copper washer will probably effect a cure, wipe thoroughly, then operate all four jacks, pumping 10 or 12 strokes against safety valve, then examine the various plugs.</p> <p>Remove unit from chassis and tighten screws thoroughly, do not disturb cover plate unless absolutely necessary. If cover plate is removed a new washer must be used, all faces thoroughly cleaned and Seccotine, Croid or similar adhesive used on both sides of washer.</p>

## JACKS

FAULTS.	DIAGNOSIS.	TREATMENT.
<p>1. Failing to return after use.</p>	<p>If either pair or all jacks fail to return, fault is due to defective valve in distributor box or choked pipe. If one jack fails to return, broken spring, bent or distorted ram.</p>	<p>Remove jack, first turning indicator on distributor box to opposite side, grip in vice (using shaped hardwood blocks), remove elbow on I type A or nut on I type B. Remove bottom cap. Ram can then be withdrawn, remove spring anchor pin, grip ram in vice (again using shaped blocks), remove foot to which spring is attached. Check ram for straightness or distortion, check spring. When reassembling new copper washers should be used.</p>

2. Leak at foot ..	Faulty copper washer or foot loose ..	Remove jack. Without dismantling, ram can be pulled out and gripped in shaped blocks for retightening.
3. Leaks at screwed part of bottom cap ..	Faulty copper washer or cap loose ..	Remove jack, grip in blocks, re-tighten; if leak persists jack should be dismantled and new copper washer fitted. Great care must be taken to prevent cap being distorted by undue force when reassembling.
4. Leak at elbow ..	Elbow loose or faulty copper washer ..	Without removing jack from bracket, remove union nut, remove elbow and examine copper washer and replace if necessary, ease off bracket to enable elbow to be turned into line with pipe and retighten.
5. Leak past gland.	Faulty rubber bucket. Bottom cap damaged or distorted, "Swarf" or other foreign matter lodged between bucket and ram.	Dismantle jack, prize out bucket with blunt tool, examine for faults, examine inside of annular groove for dents or distortion. Bucket housing or bucket to be changed if distorted or faulty in any way.

## FLEXIBLE HYDRAULIC COUPLING

FAULTS.	DIAGNOSIS.	TREATMENT.
1. Leak at hydraulic joints.	Plug on double outlet loose, or faulty copper washer, fault in casting, faulty rubber bucket, faulty brazing.	Tighten plug, fit new copper washer if necessary, examine rubber bucket. If leak appears through rubber dust cap, brazing is faulty.
2. Leaky pipe ..	Split, or damaged externally ..	Must be replaced by pipe, complete with end bushes, cover plate and rubber dust cap.

