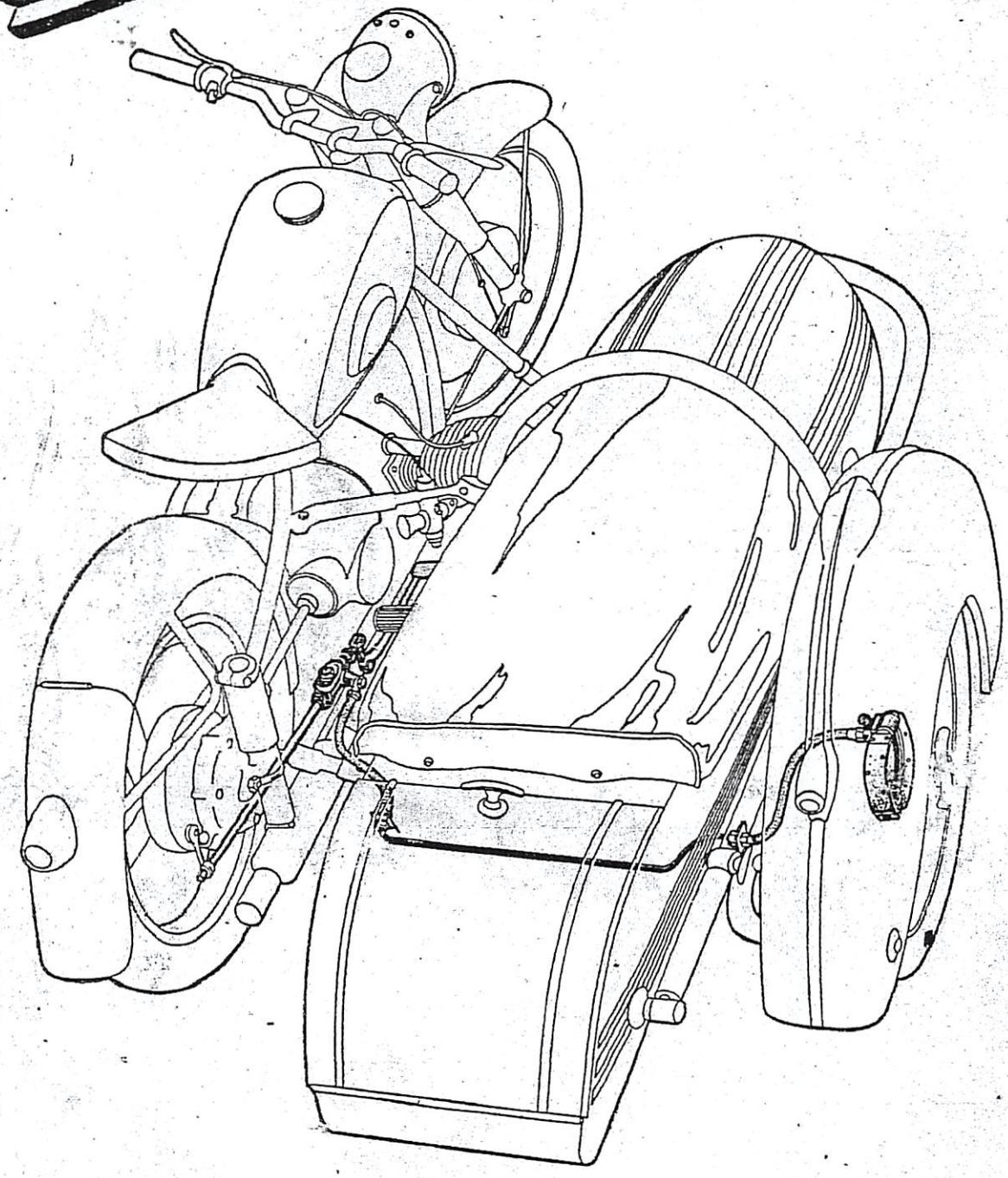
Steib



Service Instructions

for the Steib Hydraulic Side Car Brake

To-day, it is taken for granted that almost every motor car is fitted with a hydraulic brake. This wide use of the hydraulic brake, however, is due only to its unexcelled advantages, which are:

absolute and unchanging adjustment
high power with easy operation
highest efficiency, smooth action
not affected by dirt and aging
minimum maintenance and operational ease.

The same good properties will be found in the **hydraulic brake for motorcycles and side cars.**

The popularity of the motorcycle in Germany, which made motorcycle riding a favourite sport, makes it necessary that motorcycle and side car manufacturers give still more consideration to safety in operation.

This goes not only for the engine and the other components but also especially for the brake. There is a saying, which is very often cited and which should apply in this case, too, „The brake is the conscience of vehicle."

The brake system shown on the front page includes a hydraulic brake for the side car and a mechanical brake for the motorcycle. Therefore, we have here a **combined hydraulic side car wheel brake.**

The Main Operating Cylinder

The main cylinder shown in fig. 1 is a pull-type cylinder. It is incorporated in the pedal linkage rod system, and also serves as a connecting link for the rear-wheel brake of the motorcycle. The rear-wheel brake and the side car brake are operated by the normal brake pedal of the motorcycle.

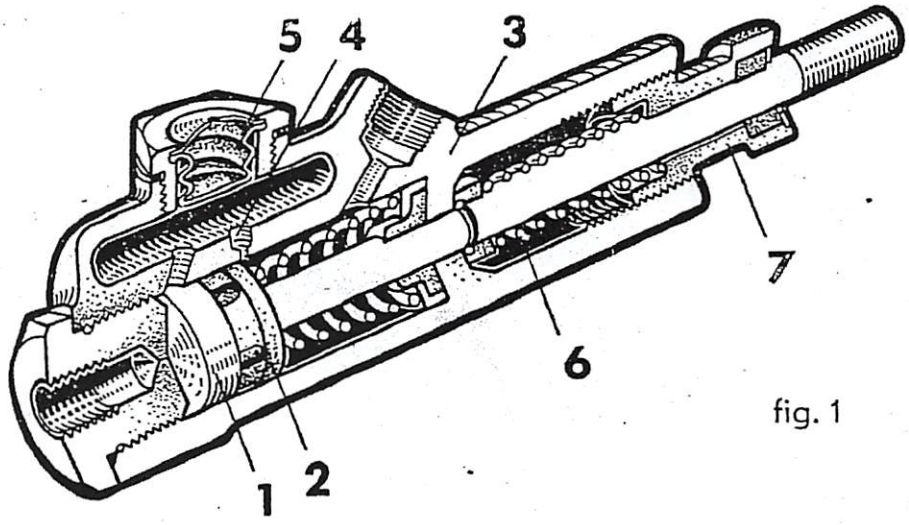


fig. 1

Method of Operation

When braking, plunger 1 of the operating cylinder (fig. 1) is pulled to the front. At the same time, sleeve 2 closes the connection to the refill space, the so-called equalisation bore 4, and a pressure is exerted on the brake fluid in front of the sleeve. This pressure is transferred to the wheel cylinder on the brake mask of the side car wheel through metal pipes and hose pipes. Simultaneously, pressure is also transferred to the wall of the main operating cylinder, thus mechanically operating the rear-wheel brake. The refill space is shut off from the outside air by a rubber bellows 5. This ensures that

(1) no dirt will enter the brake fluid, and

(2) no vacuum will form when braking.

In order to be able to adjust the side car brake to the side car load, provisions therefore are made at one end of the main cylinder. A compression spring 6 acts on the plunger 1, and can be pre-tensioned by a setscrew 7. The stronger the pre-tension, the less the braking effect on the side car. If the spring is fully compressed, so that it forms a solid block, the plunger cannot move and only the rear wheel is mechanically braked. This procedure should be used when there is trouble with the hydraulic system. When removing the side car, the spring should be blocked in the same manner.

The Wheel Brakes

In a hydraulic brake system, the wheel brakes are the „business end". Today, they are exclusively of the expanding type. They consist of a fixed brake mask or brake carrier, which supports the brake shoes.

The wheel cylinder is attached to the mask in such a way that its plungers and/or press pins will press the brake shoes against the brake drum when braking.

The brake shoes are equipped with linings which, on account of their friction, will generate the braking power. The rotating brake drum will try to rotate the shoes.

At the first shoe (in driving direction), also known as the primary shoe, where sense of rotation and direction of power are the same, the press load is increased automatically.

The second brake shoe is also known as the secondary shoe, where the sense of rotation is opposed to the direction of power. Consequently, the press load is decreased.

Simplex Brake

The simplest brake in design and operation is the Simplex brake. A wheel cylinder acts on the two brake shoes which are supported in a pivot, as shown in fig. 2. When the brake pedal is released, the two return springs will return the brake shoes to their normal position.

Adjustment

As the brake linings of all friction brakes are subject to wear and tear, the brake shoes of such brakes have to be adjusted from time to time. In the ATE Lockheed hydraulic brake, the adjusting is done automatically as far as the volume of the main cylinder permits, but the path of the brake pedal is increased in consequence thereof.

The Simplex brake shown in figs. 2 and 3 is of the sliding shoe type. The brake shoes are supported in the slots of the press plungers of the wheel cylinders and of the supporting bearing so that the brake shoes can slide in them. This causes the brake shoes to center automatically, thus decreasing the danger of the brake locking.

The readjusting for wear and tear and the first adjusting of the brake shoes with the Steib brake mask is done in the following manner.

Two square screws can be seen at the outside of the back-plate; they are the adjusting eccentrics. When turned clockwise, they will press the primary brake shoe against the drum. Turning the screw in the opposite direction

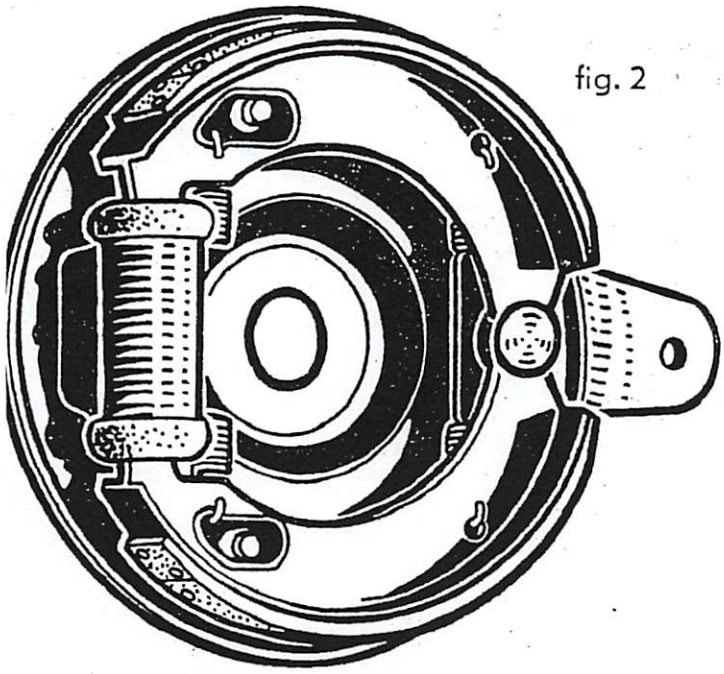


fig. 2

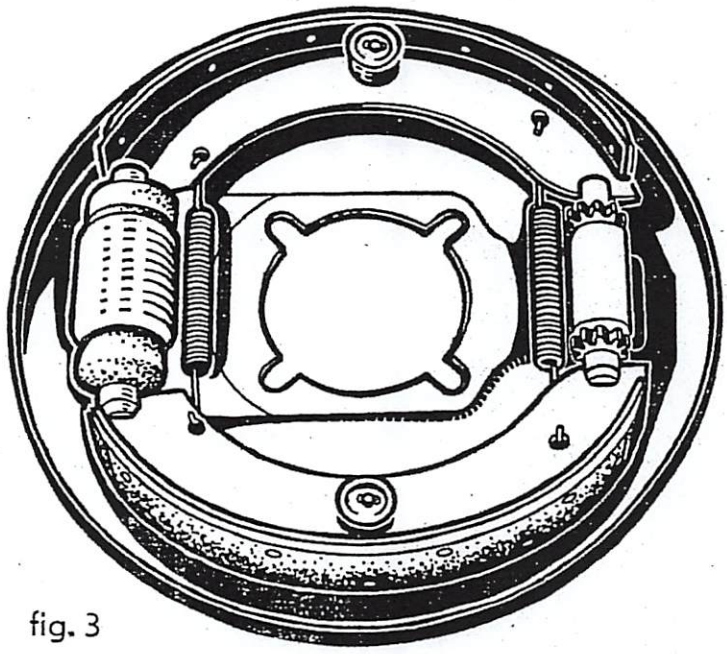
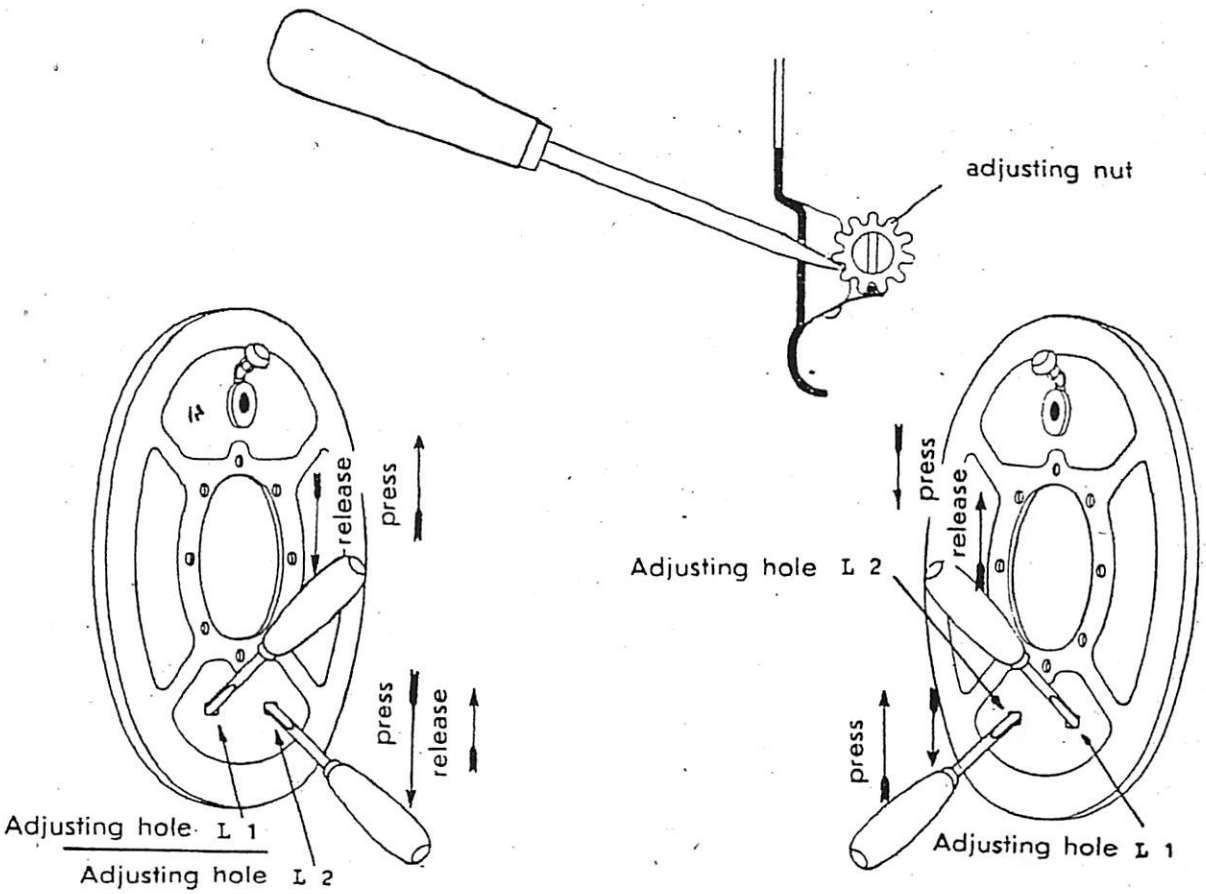


fig. 3

will release the shoe from drum until it is possible to rotate the drum without any noise caused by slipping. The same procedure is followed for the secondary shoe. For pressing on this shoe, however, the respective screw has to be turned counter-clockwise.

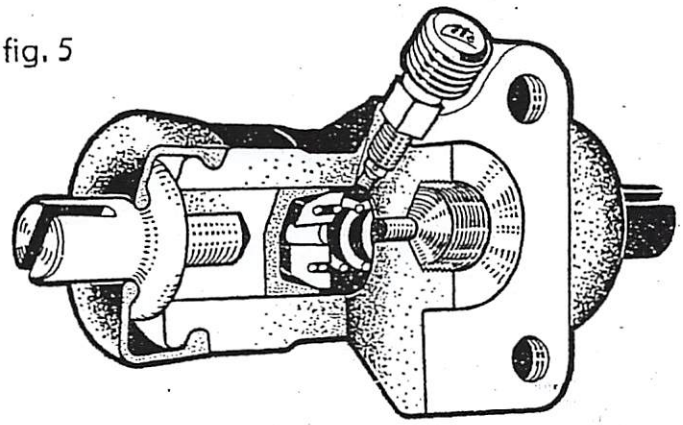
Adjusting the brake (fig. 3) is done as shown in fig. 4.



Wheel Cylinder

The wheel cylinder serves to transfer the power produced in the main cylinder on to the brake shoes. The wheel cylinder is attached to the brake mask. It consists of the housing, the plungers (sleeve-sealed), the press pin as a connection between plunger and brake shoe, and the protective covers to keep out dirt and humidity. Between the two plungers, there is a spring pressing against the sleeve rim through spacers. The spacers have bores allowing the brake fluid to act on the bottom end of the sleeves. At the top position of the wheel cylinder, there is a vent valve located in the centre between the two plungers. This valve is opened when filling or venting the system and lets escape any air that may have entered the system.

fig. 5



Piping

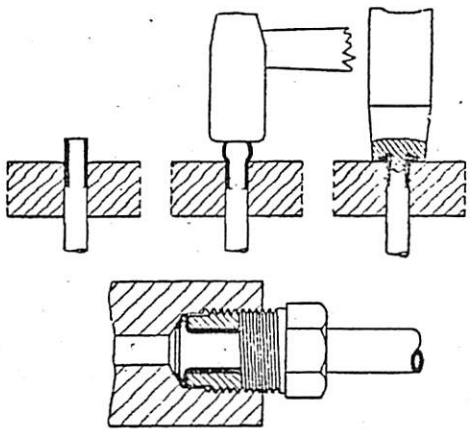


fig. 6

The piping used for the ATE Lockheed hydraulic brake consists of steel pipes. They must be protected throughout, and attached to the frame at short intervals in order to prevent vibrations. If the piping is well laid and connected to the frame, avoiding any abrasion caused by keen edges, they will stand up to any pressure occuring in the system. The pipe unions are of the tapered type, consisting of a screw union covering the funnel-shaped end of the pipe. The end of the pipe has to be upset as shown in fig 6.

Hose Pipes

In order to take up the spring movement, the ATE Lockheed hydraulic brakes are fitted with hose pipes. These have to be laid so that neither tension nor distortion of them can occur. Sharp bends have to be avoided. The hose pipe must be able to freely follow all movements. Rubbing against parts of the frame or of the body must be impossible. ATE brake hose must never be varnished and it must be protected from mineral oil as far as possible. The side car brake is connected to the main cylinder of the motorcycle by hose and steel pipes. In order to allow the side car to be removed from the motorcycle without any loss of brake fluid and without any air being allowed to

enter the brake system, a hose coupling (fig. 7) has been developed as a special equipment. The coupler part at the main cylinder end can be designed either to be of the screw type (fig. 8) or of the ring type (fig. 9). To prevent dust from entering the separated coupling, protective covers will be provided for the hose pipe (fig. 10) and for the coupler half at the main cylinder (fig. 11).

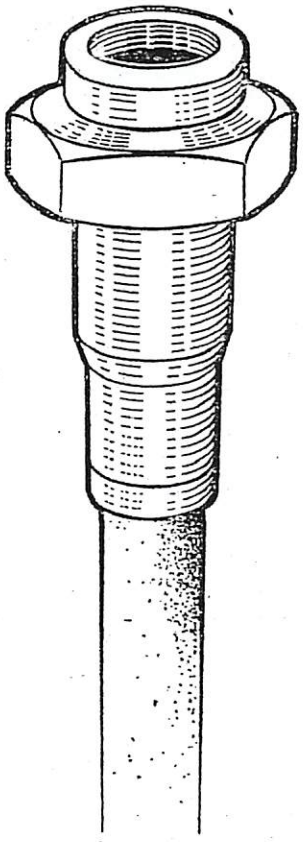


fig. 7

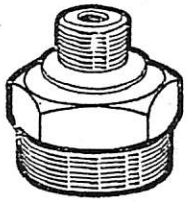


fig. 8

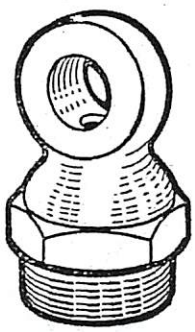


fig. 9

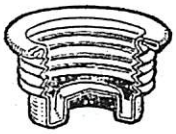


fig. 10

fig. 11

Filling and Venting of the Hydraulic Side Car Brake Using the ATE Filling and Venting Equipment

When the hydraulic side car brake system must be repaired, the otherwise closed system must be opened. In consequence thereof, air will enter the piping, apart from part of the brake fluid being lost. After finishing the repair work, it is therefore necessary to refill brake fluid and, which is most essential, the air must be removed from the system. The filling and venting gear shown in fig. 12 has been designed to do the work. Its operation is as follows:

After filling the container to 2/3 of its capacity with genuine ATE blue brake fluid, the remaining space in the container is compressed using waterfree air of a pressure of not more than 1.5 to 2 kgs./sq. cm (2—3 lbs/sq. inch.).

Method of Venting

The vent valve of the wheel cylinder of the side car brake is connected to the express type nipple of the supply hose of the venting gear. Now depress brake pedal a few centimeters and open the container screw of the main cylinder. Now the vent valve of the wheel cylinder can be opened by turning it counter-clockwise. Next, open the shut-off cock of the supply hose pipe. The depressed brake pedal is now slowly returned to its original position as shown in fig. 1. The main cylinder is now filled with brake fluid through the supply pipe; at the same time the cylinder is vented. The brake fluid must now be permitted to run through the pipe lines until any air in front of the wheel cylinder is pressed out of the main cylinder through the pipework. It is best to place a clean cloth over the opening of the main cylinder and to collect the overflowing brake fluid in a container placed underneath the main cylinder.

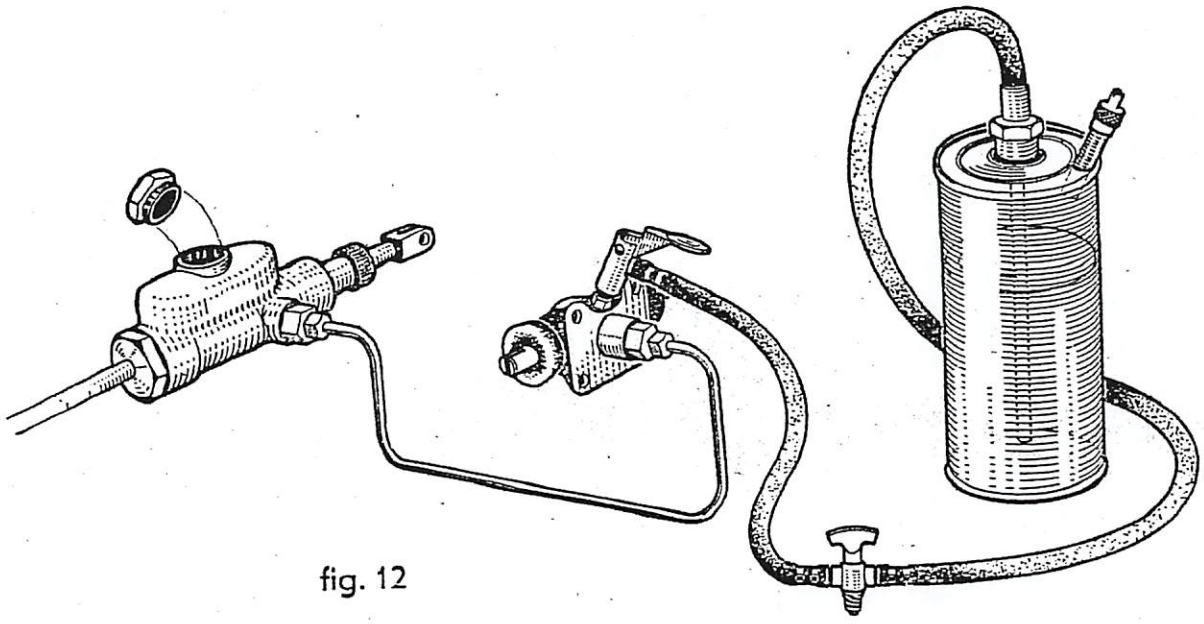


fig. 12

Brake Tests

No limits are imposed by law on the **acceleration** of a road vehicle. The **retardation,** however, is exactly laid down in the regulations. The following is an extract from the German Highway Code (Traffic Regulations and Regulations Road Vehicle Licencing), which says under section 41, para. 6: „All motorcycles, also those fitted with a sidecar, must be fitted with brakes, each of which must be able to produce a mean deceleration of at leat 2.5 m./s².“

Some examples are given for calculating the minimum permissible value for one's own vehicle to find out whether the brakes are up to the legal requirements. All brake tests must be made with a warm brake drum (260 deg. 6. are prescribed by law) and on a level, dry street. The power to operate the hand brake lever must not exceed 20 kgs., that for the foot brake pedal must not be more than 40 kgs.

Stopping distance

With a pressure of 88 lbs. of the driver's foot, the stopping distance is depending on:

the weight of the vehicle,
the speed of the vehicle at the beginning of braking,
the quality of the tyres and
the conditions of the road surface.

Explanation of the abbreviations contained in the following forms:

s	= stopping distance	ft
b	= retardation	ft/s²
V	= speed	mph
v	= speed	ft/s
t	= stopping time	s

Stopping distance $s = \frac{V^2}{2 \cdot b} =$ **ft**

Example 1:

Known: Speed V = 43.49 mph = V = 63.84 ft/s
Average retardation b = 8.2 ft/s²
Asked: Stopping distance s = ?

$$s = \frac{V^2}{2 \cdot b} = \frac{4076.09}{2 \cdot 8.2} = \mathbf{248\ ft}$$

Example 2:

Known: Speed V = 37.28 mph = V = 54.72 ft/s
Stopping distance s = 129.92 ft
Asked: Average retardation b = ?

$$b = \frac{V^2}{2 \cdot s} = \frac{2994.68}{2 \cdot 129.92} = \mathbf{115.2\ ft/s^2}$$

Example 3:

Known: Speed V = 31.06 mph = V = 45.60 ft/s
Stopping time t = 4 s
Asked: Average retardation b = ?

$$b = \frac{V}{t} = \frac{45.60}{4} = \mathbf{114\ ft/s^2}$$

Fitting of Steib Hydraulic Side Car Brake to Vehicles Not Fitted With Same

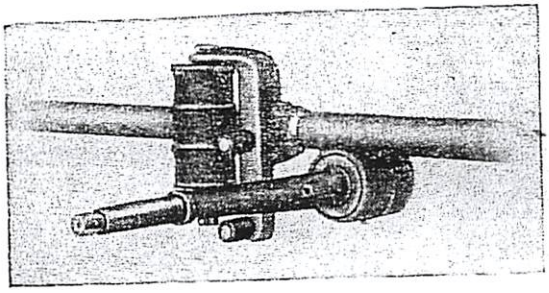
All required parts are designed to suit the respective motorcycle model and they are ready for putting together and fitting.

Main Cylinder

The assembled main cylinder with the Steib brake rods must be substituted for the brake rod previously fitted to the motorcycle.

Brake Mask

The brake mask can be correctly attached only of the bearing bracket with swing crank and spring bracket of the latest type is welded to the frame as shown in the illustration, so that only the brake mask has to be pushed on the axle and bolted to the brake support with the hex. bolt. For side cars of the latest design, this is included in the standard equipment and the floating axle need not be purchased when fitting the brake at a later date. If not, the old floating axle must be replaced by the new equipment. For floating axles with rubber pads of the old type, i. e., with a spring bracket of flattened mild steel tube, the old spring bracket must be replaced by one with two end stops and the rocker arm must be arranged as shown in the illustration. At the centering bore of the rocker arm, an eye must be arc-welded, which has an outer dia. of 18 mm., an inside thread of the M 8 type with a height of thread of 11 mm., to take up the brake support. Otherwise, the rocker arm must be replaced by a new one. The ring on the axle for sealing the old hub must be removed to make way for the brake hub.



Brake Hose Pipe

When laying the brake hose pipe, take care to avoid sharp bends and see that the hose pipe is not in tension or distortion. The hose pipe must be laid so as to avoid rubbing, which can be done by suitably arranging the pipe clips.

Piping

The piping is connected to the hose pipe by means of a screw union. It is laid from the wheel side of the side car over the rear end of the frame member to the engine side. It must be fixed to the tubular side car frame by means of pipe clips, so that all rubbing is avoided.

After the wheel has been put on the axle and after the winged nut has been tightened slightly, the whole brake system can be filled and vented as shown in the operating instructions. After that has been done, it is suggested to operate the foot brake with slightly tightened side car wheel, so that the brake mask can center itself on the axle in relation to the wheel. Then the winged nut must be fully tightened. Now the brake shoes have to be adjusted as described in the operating instructions. Afterwards, the brake system is ready for operation and only the serrated screw at the main cylinder has to be adjusted to regulate the brake power of the side car wheel corresponding to the rear wheel of the motorcycle.