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(54) Title: VEHICLE ANTI-THEFT ARRANGEMENT (57) Abstract A vehicle anti-theft arrangement includes a multiplicity of valves (6), each valve being integral with the hydraulic breaking system of a respective wheel (5) and arranged when actuated to interrupt the supply (8) of hydraulic fluid to said system while the brakes are engaged.		

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VEHICLE ANTI THEFT ARRANGEMENT

This invention relates to a vehicle anti-theft arrangement.

Many conventional vehicle anti-theft devices immobilise the front or rear wheels of a vehicle, but not both and consequently do not prevent a determined thief using a towing truck or jack. Thus a valuable car or a trailer containing valuable merchandise may be stolen if left unattended for sufficient time.

According to the present invention a vehicle anti-theft arrangement includes a multiplicity of valves, each valve being integral with the hydraulic braking system of a respective wheel and arranged when actuated to interrupt a supply of hydraulic fluid to said system while the brakes are engaged.

The arrangement is preferably such that a user may depress the brake pedal and then actuate the anti-theft system, preventing a loss of pressure from the brake pistons or cylinders. All of the vehicle's wheels are then locked, preventing movement of the vehicle using towing apparatus.

Cutting of the brake pipes or otherwise depressurising the braking system does not release the wheels. This is important because the brake pipes, master cylinder or other parts of the system are commonly readily accessible. Locking arrangements located at the brake pedal or master cylinder are thus easily circumvented.

Each arrangement may comprise a solenoid actuated valve, located in the casing of hydraulic wheel cylinders or brake calipers of a respective wheel. The valves are preferably dead-locking that is the valves remain closed when the solenoids are de-energised, preventing rotation of brake drums or discs. Alternative valves such as hydraulic valves or air valves may be employed.

According to a first preferred aspect of the present

invention a vehicle anti-theft² arrangement includes first and second braking pistons, each first piston being connected directly to the brake actuator and each second piston being connected to the brake actuator by a said valve.

The brake actuator may comprise the brake pedal and master cylinder, hand lever or other conventional arrangement.

The first piston may have greater area than the second piston so that most of the braking force is applied through the first piston. The second piston preferably provides sufficient force to immobilise the vehicle when the valve is closed. Provision of first and second pistons in accordance with the preferred aspect of this invention has the advantage of the vehicle braking system is not inactivated in the event that the valve fails to function.

The first and second pistons may be arranged to act directly upon the brake disc, calipers or other conventional braking means. The first and second braking pistons may be incorporated in a single caliper. Alternatively separate calipers may be provided. The latter arrangement is not preferred because of the complexity of manufacture.

According to a second preferred aspect of the present invention each valve includes a latch arranged when actuated to immobilise the valve. A sensor may be arranged to provide a display, for example on the vehicle dashboard, to confirm to a user that the locking system is safely deactivated and that accidental application of the locking system is prevented. The display may also serve to alert a user to any malfunction in the locking arrangement, for example if one of the valves becomes seized. The latch may comprise a pin or other member arranged to engage and secure the valve member when the latter is in the open condition.

The anti-theft arrangement may further comprise one or

more security systems, one of which may be a keyboard which prevents unlocking of the braking wheel system, and could be used linked to solenoids which would be mounted to all doors, locks, boots and bonnets, thus preventing the vehicle from being removed by any unauthorised persons without the private code or codes or private identification number or words of the owner. Removal of the vehicle is prevented as the number or code must be correctly entered, preferably within a specified time to activate the release of the anti-theft device. Alternative arrangements for example using a magnetically coded card or a key may be employed.

The invention is further described by means of example, but not in any limitation sense, with references to the accompanying drawings, of which:

Figure 1 is a cross sectional view of a vehicle disc brake in accordance with this invention.

Figure 2 is a cross sectional view of a rear wheel brake cylinder in accordance with the invention,

Figures 3 and 4 show a system for use with heavy goods vehicles, and

Figure 5 is a cross sectional view of a preferred braking arrangement.

Figure 1 shows a cross section through a front disc brake caliper of a vehicle fitted with an anti-theft device in accordance with the present invention. A piston 1, located within the cylinder body 5 is arranged to be driven by brake fluid 4 supplied through a brake pipe 8 in a conventional manner. Piston seals 2 and sealing boot 3 serve conventional functions. A solenoid 6 is arranged to actuate a piston 9 which is received into a valve seat 10 to close the connection between the brake pipe and piston. Piston seals 7 prevent leakage from the valve maintaining the fluid pressure.

In use of the locking arrangement the brake pedal is depressed, pressurising the brake fluid 4 and engaging the

brake. The solenoids are then actuated while the hydraulic pressure is maintained locking the brake in the engaged mode.

Figure 2 illustrates an alternative arrangement applicable to a conventional wheel cylinder wherein the wheel cylinder lodged within a cylinder body 27 is arranged to actuate pistons 23 and respective brake calipers (not shown). Hydraulic brake fluid 25 is supplied to the pistons via the brake pipe 20. The pistons are provided with seals 26 and sealing boots 24 in conventional manner. A solenoid 22 is arranged to actuate a piston 28 within a valve seat 29 in the supply line from the brake pipe 20 to the piston. Seals 21 prevent leakage from the valve.

In use of either of the arrangements shown in Figures 1 and 2 a user depresses the brake pedal of the vehicle and actuates the solenoids, locking the brakes. The actuating arrangement for the solenoids may include a security system, such as a keyboard into which a personal identification number must be entered, magnetic card operated system or other arrangement.

The invention finds particular application in immobilisation of heavy goods vehicles trailers. An electronically operated keyboard or similar arrangement may be located in the tractor unit and used to immobilise the wheels of the trailer, preventing movement of the latter even if the tractor unit is disconnected. Thus a trailer with a valuable cargo may not be removed using an unauthorised tractor unit. Solenoid operated locks may also be provided at the container doors so that the latter may not be opened when the brakes are locked.

Figures 3 and 4 illustrate an arrangement for use with heavy goods vehicles. The plan view shown in Figure 3 shows an air valve 20 connected by means of a push rod 21 to a brake camshaft linkage 22. The brake camshaft 25 is connected to the brake shoes 27 via a linkage 26 which acts as an anti theft adjuster. The solenoid 28 located upon

the spring leaf seat 24 acts to drive a piston 30. Extension of the piston causes engagement with the anti theft adjuster 26 preventing release of the brake shoes 1.

The locking arrangements may be actuated when the brake pedal is depressed and the brakes are engaged. The solenoids are actuated while the brake pressure is maintained on the camshaft 25 locking the brakes in the engaged mode.

Figure 5 illustrates a preferred arrangement wherein hydraulic brake fluid from the master cylinder acting through a brake pipe 1 applies force to the braking disc 10 by means of first and second pistons 8 and 7 respectively. The first piston 8 is connected directly to the hydraulic supply 1 in conventional manner. The force applied to the first piston is released when the driver removes pressure from the brake pedal or otherwise ceases to apply the brakes. The second cylinder 7 is connected to the hydraulic supply 1 by a valve 2 operated by a solenoid 14. Actuation of the solenoid 14 may close the valve 2 preventing release of the piston 7 from the disc 10. The valve 2 may be opened by correct use of a security switch mounted on the vehicle facia. The electrical connection to the solenoid is made secure by means of an armoured conduit 6. A bleed valve 3, provided for normal maintenance purposes is located upstream of the valve 2 so as not to impede prevention of theft of the vehicle by actuation of the latter.

A twin cylinder arrangement, as shown in Figure 2, may be provided with first and second pistons as shown in Figure 5. This arrangement allows the safety features of the two pistons arranged to be incorporated in the Figure 2 embodiment of the invention.

The arrangements shown in Figures 1 to 5 may include latches arranged upon actuation to secure the valves in the open condition, ensuring safety when driving the vehicle. The latch may comprise a pin or other member arranged to be

arranged to be engaged by the valve pistons or solenoid, preventing movement of the latter. A sensor may be arranged to provide a display indicative of the valves being locked open, so that the driver is aware of any accidental or unintended activation of the anti-theft arrangement.

CLAIMS

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1. A vehicle anti-theft arrangement including a multiplicity of valves, each valve being integral with the hydraulic breaking system on a respective wheel and arranged when actuated to interrupt a supply of hydraulic fluid to said system while the brakes are engaged.

2. A vehicle anti-theft arrangement as claimed in Claim 1, comprising solenoid actuated valves located in the casing of a hydraulic wheel cylinder or brake caliper of a respective wheel.

3. A vehicle anti-theft arrangement as claimed in Claim 1 or 2, including first and second breaking pistons, each first piston being connected directly to the brake actuator and each second piston being connected to said actuator through a said valve.

4. A vehicle anti-theft arrangement as claimed in Claim 3, wherein first piston has a greater area than the second piston.

5. A vehicle anti-theft arrangement as claimed in any proceeding claim, including one or more security systems.

6. A vehicle anti-theft arrangement as claimed in any preceding claim, wherein each valve includes a latch arranged to secure the valve in the open condition.

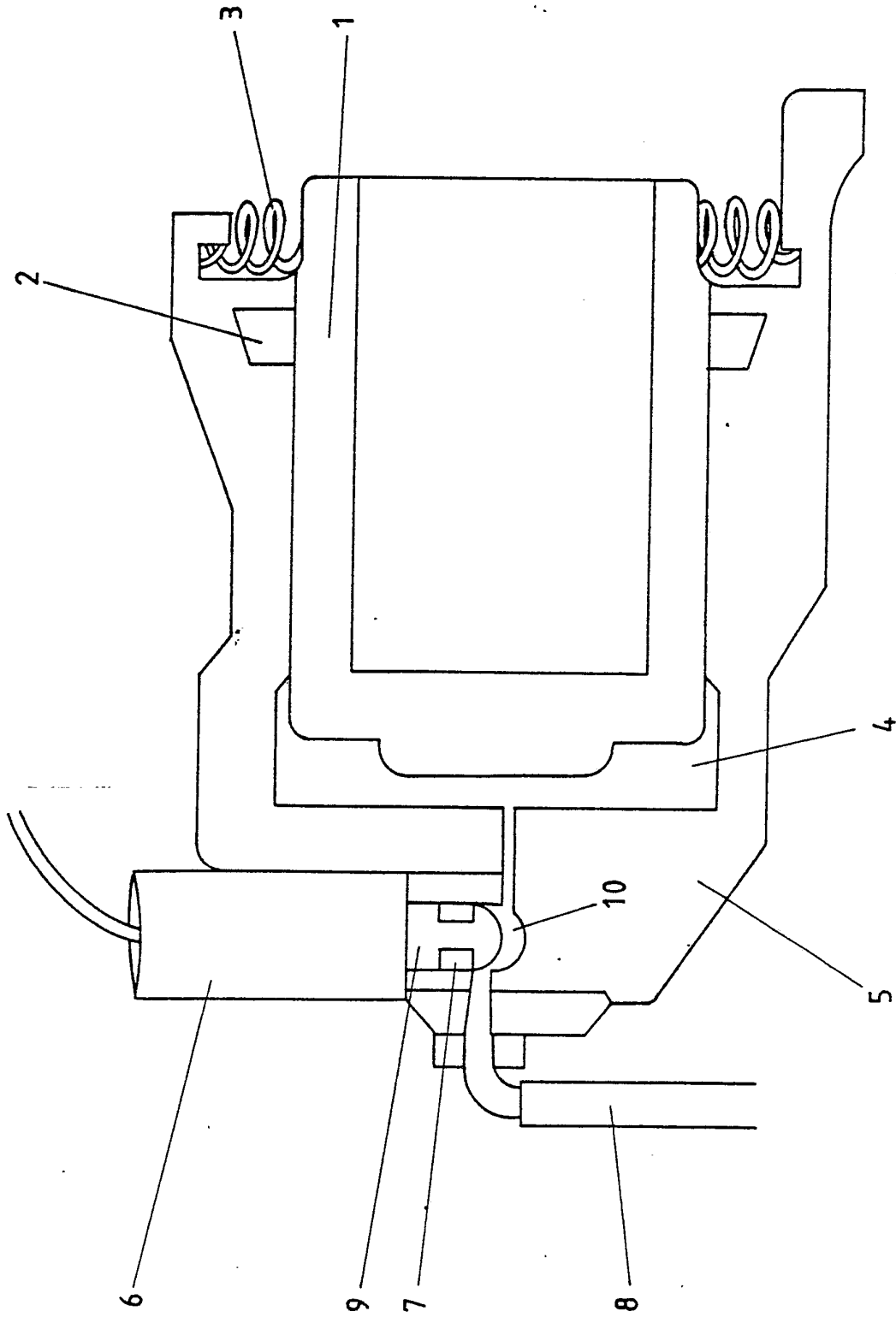


FIG. 1

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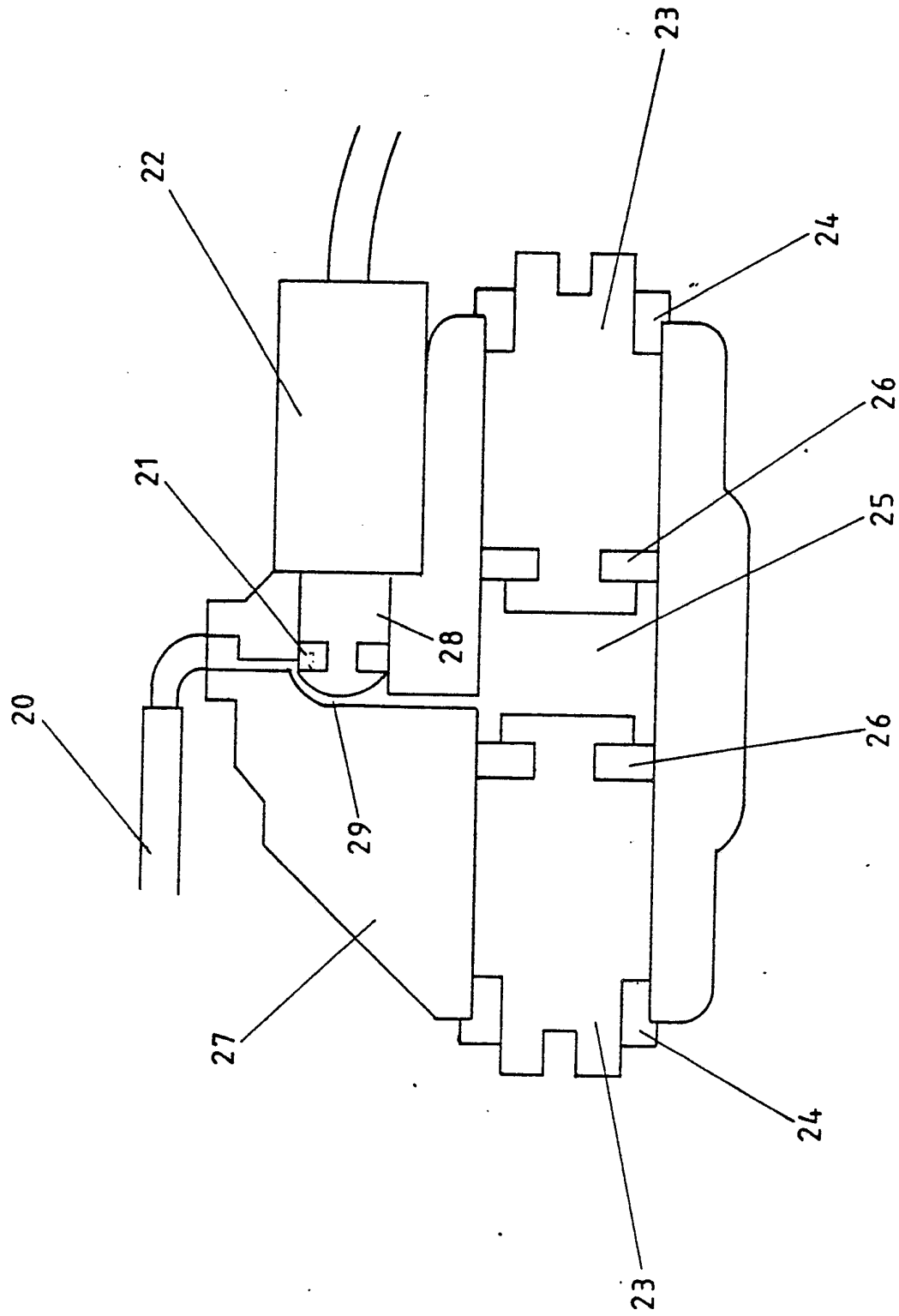


FIG. 2

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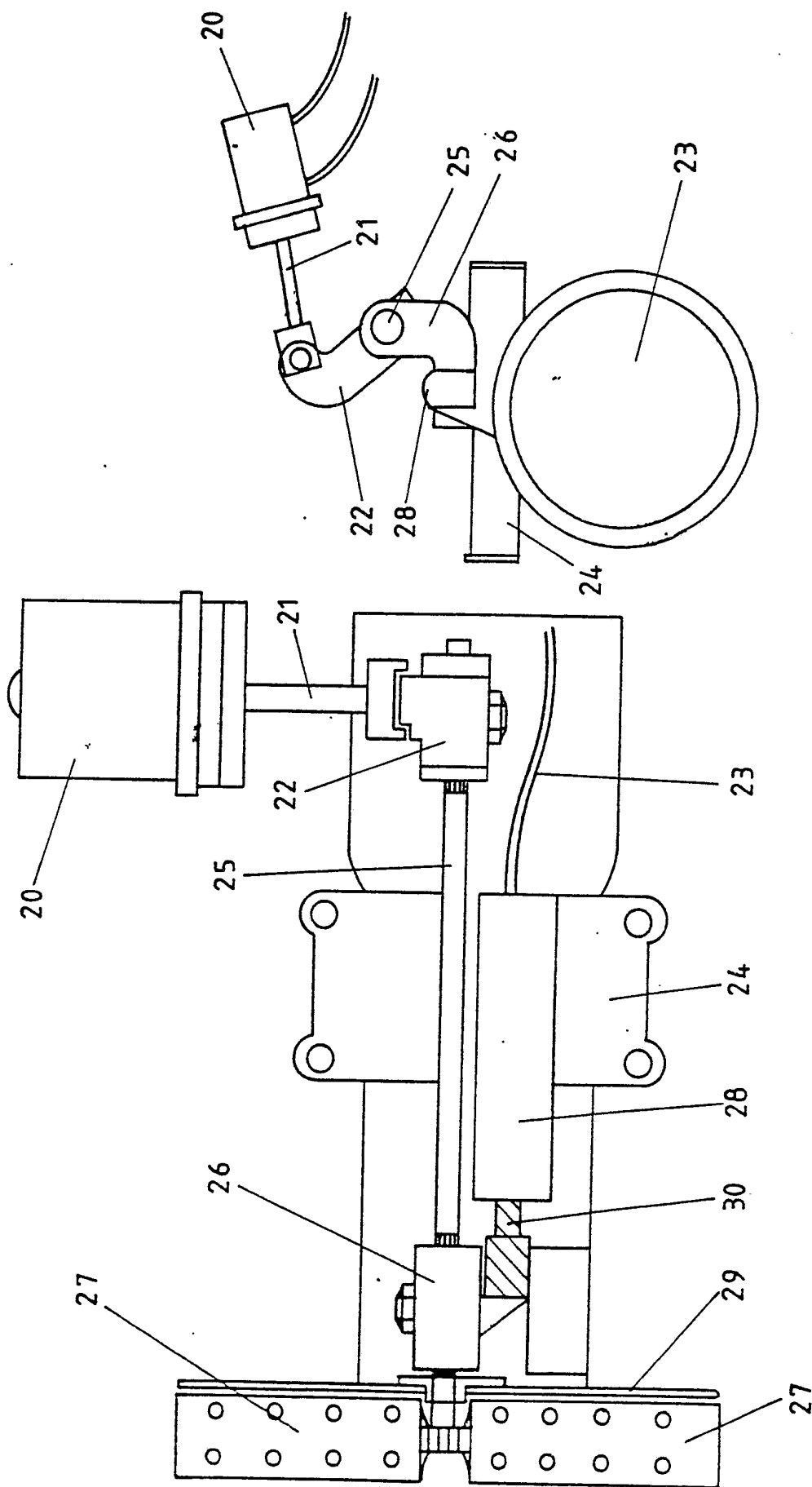


FIG. 4

FIG. 3

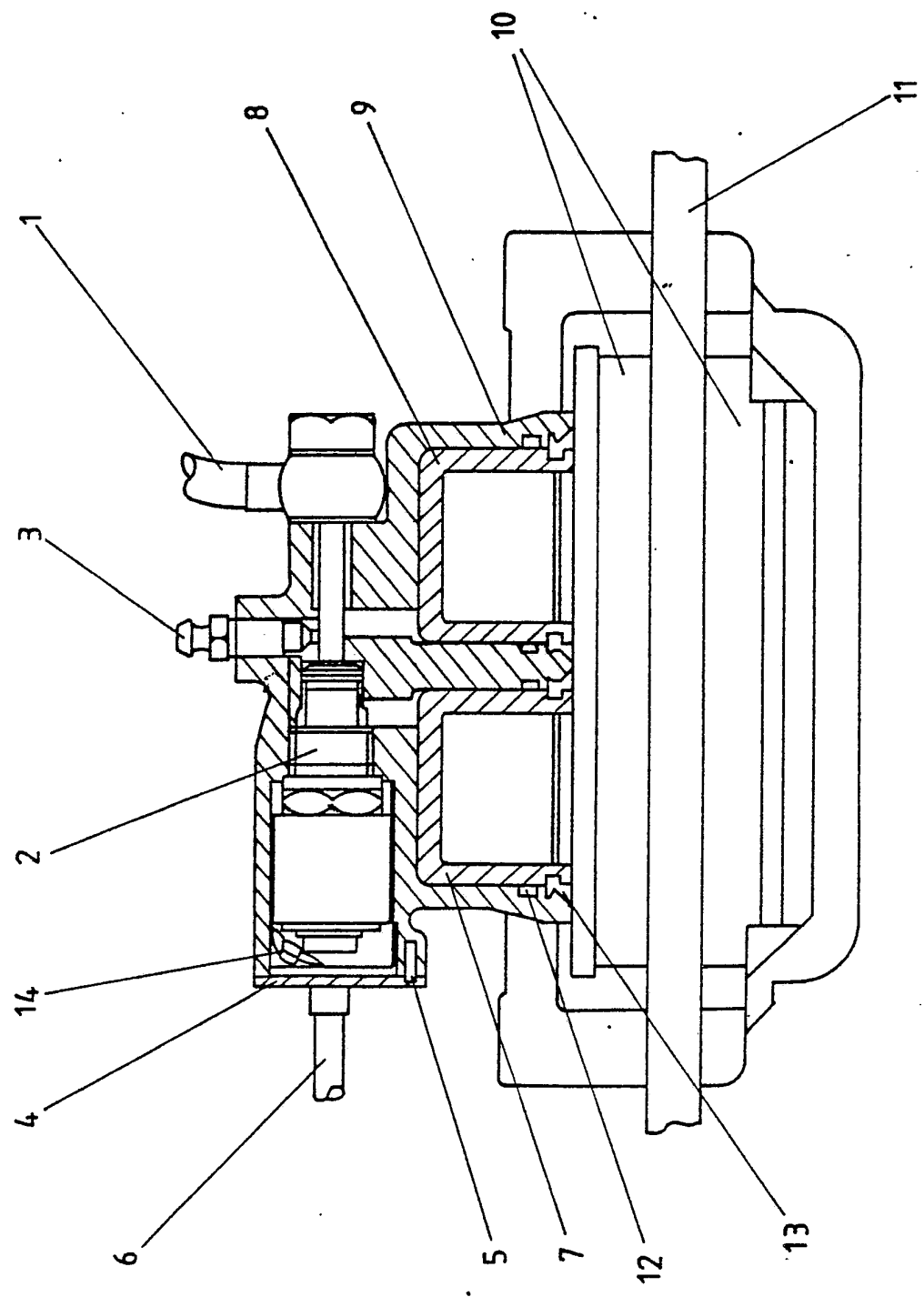


FIG. 5