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54 Jack combined with an air pump and using a common drive motor.

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<b>DE-A- 3 108 208</b>	<b>GB-A- 131 805</b>
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## Description

In general, vehicles are often equipped with a wide variety of tools such as a jack and a tyre pump in order to enable drivers to carry out repairs and maintenance for example when a tyre punctures. However such tools often fill up the luggage compartment and in any case take up a lot of space in the car. Furthermore the total cost of such tools is quite significant.

DE-A-3,108,208, for example, discloses a vehicle jack which is driven by an electric motor via a screw drive.

US-A-2,458,590 discloses an automobile jack driven by an air pump, the air pump being driven by an electric motor which also drives rollers for driving the wheels of a vehicle lifted on the jack, so as to start the engine.

GB-A-131,805 discloses a combined air pump and vehicle lifting jack. In use, compressed air produced by manual operation of the jack is used subsequently to pump up the tyres of a vehicle.

None of the above prior art documents discloses an arrangement in which an electric motor drives both an air pump and a vehicle-lifting jack.

The present invention provides a combined air pump and vehicle lifting jack (as disclosed in GB 131,805) characterised by a common rotary drive motor which powers both the air pump and an oil pump, the oil pump being arranged to operate a hydraulic lifting jack and the oil pump having drain control means which can be set so as to disable the jack.

Preferred features of the invention are defined in the dependent claims.

Preferred embodiments of the invention are described below by way of example only with reference to Figures 1 to 8 of the accompanying drawings, of which:

Figure 1 is a side elevation of a combined air pump and vehicle lifting jack in accordance with the invention;

Figure 2 is an end elevation of the air pump and jack of Figure 1;

Figure 3 is a further end elevation of the air pump and jack of Figure 1;

Figure 4 is a side elevation of a horizontal combined air pump and lifting jack in accordance with the invention;

Figure 5 is a plan view of the air pump and lifting jack of Figure 4;

Figure 6 is an end elevation of the air pump and lifting jack of Figure 4;

Figure 7 shows a variant in which the jack and pump assembly are separate, and

Figure 8 is a circuit diagram of an electrical system that can be incorporated in the above embodiments.

In the embodiment shown in Figures 1 to 3, a drive motor 210 has an elongated shaft 201 which serves as the input shaft for the jack and is used to drive the piston 203 of an air pump 202 and to drive speed-reduction gears 206 and 207 as well as speed-reduction gears 206' and 207' of the jack oil pump. To enable the operator to selectively operate and control the air pump and jack, the above-said structure is further provided with a drain back flow operating valve 205 in the fluid return circuit of the outlet of air pump 202 or jack 208. The drain valve of the unit to be operated can be set at the blocked position during operation, while drain valves of the units not to be operated will be set at the respective drain position for the operating selections, thereby determining whether the air pump or jack is driven.

The jack of Figures 1 to 3 is a stand type jack, in which a stand type jack main body 260 is installed vertically on a base 261; the main body is a cylinder type oil pressure tank coupled with a stand shaft 262 which can move upward and downward under compression. A top block 263 is installed on the upper side of the stand shaft 262 and serves as a carrying member; a drive motor 210 with shaft 201 protruding from its two ends is mounted transversely in the cylinder body. On one end of the shaft is mounted a small gear wheel 206 which is coupled to a bias mechanism 204 (comprising a curved bias shaft or a bias link rod moved by a bias wheel) by means of large gear wheel 207. The bias mechanism drives a crank 209 which is coupled to a gas pump piston 203. The gas pump has an intake opening for gas input, an exhaust opening for output of compressed gas and a gas channel communicating with a pressure manometer 264.

On the other end of the shaft of motor 210 a small gear wheel 206' is mounted which engages a large gear wheel 207'. This in turn drives a bias mechanism (including a curved bias shaft or a bias link rod moved by a bias wheel) to cause bias shaft 220 to reciprocate crank set 209'. This reciprocating motion is transmitted via a coupling pin 209''' to an oil pump piston rod 209'' which reciprocates within an oil pump cylinder 208. A drain circuit piston 205 is used for drain reduction of the jack or to release drain in the non-driven state.

As shown in Figure 1 the large gear wheel 207' has a reduced diameter portion in the periphery of which a circumferential array of holes 207'' (which may be screw holes) are formed. These can accommodate an operating rod, so that the oil pump can be driven by back and forth motion by hand.

Figures 4, 5 and 6 show a coaxial horizontal-type jack. The jack is mounted on wheels 273 which are mounted on wheel shaft 272 at one end of the jack body. A drive rod 281 driven by a

hydraulic oil pressure tank 280 is coupled with a rising arm assembly 274 by a coupling pin 276, the rising arm plate 274 being mounted on a rod 275 which acts as the centre of oscillation. Consequently, as plate 274 swings about rod 275, an upright arm 277 coupled to plate 274 by coupling pin 278 rises and lifts a supporting block 279.

A common drive motor 210 having a shaft 201 protruding at each end is mounted on one side of the jack body. One end of the shaft has a small gear wheel 206 mounted thereon, which drives a bias mechanism 204 (including a curved bias shaft or a bias link rod moved by the bias wheel) via a large gear wheel 207. Thus it can move the crank 209 and hence gas pump piston 203 to pump gas. The gas pump has an intake opening for gas input, an exhaust opening for output of compressed gas and a gas channel communicating with a pressure manometer 264. The other end of the output shaft of motor 210 has mounted thereon a small transverse gear wheel 206' and which drives a large gear wheel 207''. This in turn drives a bias mechanism (including a curved bias shaft or a bias link rod moved by bias wheel) which drives a crank 220'. The reciprocating motion of crank 220' is transmitted by a coupling pin 209''' to a piston rod of the oil pump 280. A drain circuit piston 205 is provided for draining purposes in order to prevent the drive. The rear portion of the large gear wheel is provided with a circumferential array of holes 207''' (which may be screw holes) for accommodating an operating rod which can be driven back and forth by hand to drive the jack oil pump.

The above-described various combined air pump and hydraulic jack devices using a common drive motor can be of the separate type as shown in Fig. 7

Furthermore the above-mentioned jack devices can be of the AC/DC dual purpose type as shown in Fig. 8. As shown in Fig. 8, inside the base a transformer 401 is provided to transform the household power supply into a low voltage output. Its low voltage output end is connected to a rectifier 402 for rectifying the low voltage output and is connected in parallel with a socket 403. Socket 403 can be used to supply DC to energise the above said DC motor 404 and drive the air pump or jack. Socket 403 can also be used as a DC output socket for charging purposes. Alternatively an output terminal can be added for this purpose. A switch 405 is connected in series with the input of the DC motor 404 to cut off the DC motor 404, when the circuit serves as a charging power supply.

## Claims

1. A combined air pump and vehicle lifting jack characterised by a common rotary drive motor (210) which powers both the air pump (202) and an oil pump (208), the oil pump being arranged to operate a hydraulic lifting jack (260, 262, 263; 280, 281, 274-279) and the oil pump having drain control means (205) which can be set so as to disable the jack.
2. A combined air pump and vehicle lifting jack as claimed in claim 1 wherein both the oil pump (208) and the air pump (202), have drain valve means (205) which can be set so as to disable the air pump and jack selectively.
3. A combined air pump and vehicle lifting jack as claimed in claim 2 wherein said motor (210) has an elongate double-ended shaft (201) having respective end portions projecting from the motor, one of said end portions being coupled to said air pump (202) and the other of said end portions being coupled via reduction gearing (207) to said oil pump (208), said hydraulic jack including a generally horizontally disposed hydraulic cylinder (280), which drives a piston (281) in the horizontal direction, the piston (281) being coupled to an offset portion (276) of a swinging link (274) which drives a support arm (277) in the vertical direction, the support arm carrying a supporting block (279) for lifting a vehicle.
4. A combined air pump and vehicle lifting jack as claimed in any preceding claim, further comprising a mains transformer (401) having a low-voltage output winding coupled via a rectifier (402) and a switch (405) to said motor (404), a D.C. input/output socket being connected in parallel with said motor to enable the motor to be driven by an external D.C. supply as an alternative to the mains and to enable a low voltage D.C. output to be taken from said terminals when said transformer is energised from the mains and said motor is disconnected by said switch.

## Revendications

1. Combinaison d'une pompe à air et d'un vérin de levage de véhicule caractérisée par un moteur d'entraînement rotatif commun (210) qui fournit de l'énergie à la fois à la pompe à air (202) et à une pompe à huile (208), la pompe à huile étant disposée de façon à faire fonctionner un vérin de levage hydraulique (260, 262, 263 ; 280, 281, 274-279) et la pompe à

- huile comportant des moyens de contrôle de purge (205) qui peuvent être réglés de façon à mettre la vérin hors service.
2. Combinaison d'une pompe à air et d'un vérin de lavage de véhicule telle que revendiquée à la revendication 1 dans laquelle la pompe à huile (208) de même que la pompe à air (202) comportent des moyens formant valve de purge (205) qui peuvent être réglés de façon à mettre hors service la pompe à air et le vérin de façon sélective. 5
  3. Combinaison d'une pompe à air et d'un vérin de lavage de véhicule telle que revendiquée à la revendication 2 dans laquelle ledit moteur (210) comporte un arbre allongé à double extrémité (201) dont les parties d'extrémité respectives font saillies en dehors du moteur, une desdites parties d'extrémité étant accouplée à ladite pompe à air (202) et l'autre desdites parties d'extrémité étant accouplée par l'intermédiaire d'un réducteur à engrenages (207) à ladite pompe à huile (208), ledit vérin hydraulique comportant un cylindre hydraulique disposé sensiblement horizontalement (280) lequel entraîne un piston (281) dans le sens horizontal, le piston (281) étant couplé à une partie décalée (276) d'une liaison oscillante (274) qui entraîne un bras support (277) dans le sens vertical, le bras support portant un bloc support (279) pour soulever un véhicule. 10 15 20 25 30
  4. Combinaison d'une pompe à air et d'un vérin de lavage de véhicule telle que revendiquée dans l'une quelconque des revendications précédentes comportant en outre un transformateur (401) relié au secteur électrique comportant un bobinage de sortie à basse tension couplé par l'intermédiaire d'un redresseur (402) et d'un interrupteur (405) audit moteur (404), une prise de courant d'entrée et de sortie en courant continu étant connectée en parallèle audit moteur pour permettre à celui-ci d'être entraîné par une source d'alimentation externe en courant continu comme variante par rapport au secteur et pour permettre une sortie en courant basse tension continu d'être prélevée à partir desdites bornes lorsque ledit transformateur est mis sous tension à partir du secteur et que ledit moteur est déconnecté par ledit interrupteur. 35 40 45 50
- men Drehantriebsmotor (210), der sowohl die Luftpumpe (202) als auch die Ölpumpe (208) betätigt, wobei die Ölpumpe so angeordnet ist, daß sie einen hydraulischen Heber (260, 262, 263; 280, 281, 274 bis 279) aktiviert, und die Ölpumpe eine Ablaßsteuereinrichtung (205) hat, die so eingestellt werden kann, daß sie den Heber abschaltet.
2. Fahrzeugheber kombiniert mit einer Luftpumpe nach Anspruch 1, bei welchem sowohl die Ölpumpe (208) als auch die Luftpumpe (202) Ablaßventileinrichtungen (205) haben, die so eingestellt werden können, daß die Luftpumpe und der Heber selektiv abgeschaltet werden können.
  3. Fahrzeugheber kombiniert mit einer Luftpumpe nach Anspruch 2, bei welchem der Motor (210) eine langgestreckte doppelendige Welle (201) mit von dem Motor jeweils vorstehenden Endabschnitten aufweist, wobei einer der Endabschnitte mit der Luftpumpe (202) und der andere der Endabschnitte über ein Untersetzungsgetriebe (207) mit der Ölpumpe (208) gekoppelt ist, der hydraulische Heber einen insgesamt horizontal angeordneten Hydraulikzylinder (280) aufweist, der einen Kolben (281) in der horizontalen Richtung antreibt, der Kolben (281) mit einem versetzten Abschnitt (276) eines Schwinggestänges (274) gekoppelt ist, welches einen Stützarm (277) in der vertikalen Richtung antreibt, und dar Stützarm einen Stützblock (279) zum Heben eines Fahrzeugs trägt.
  4. Fahrzeugheber kombiniert mit einer Luftpumpe nach einem vorhergehenden Anspruch, welcher weiterhin einen Netztransformator (401) mit einer Niederspannungsausgangswicklung, die über einen Gleichrichter (402) und einen Schalter (405) mit dem Motor (404) gekoppelt ist, und eine Gleichstrom-Eingangs-/Ausgangsbuchse aufweist, die parallel zu dem Motor geschaltet ist, so daß der Motor von einer externen Gleichstromspeisung als Alternative zum Netz angetrieben und ein Niederspannungs-Gleichstromausgang von den Klemmen abgenommen werden kann, wenn der Transformator vom Netz aktiviert und der Motor durch den Schalter abgeschaltet ist.

#### Ansprüche

1. Fahrzeugheber kombiniert mit einer Luftpumpe, **gekennzeichnet** durch einen gemeinsa-

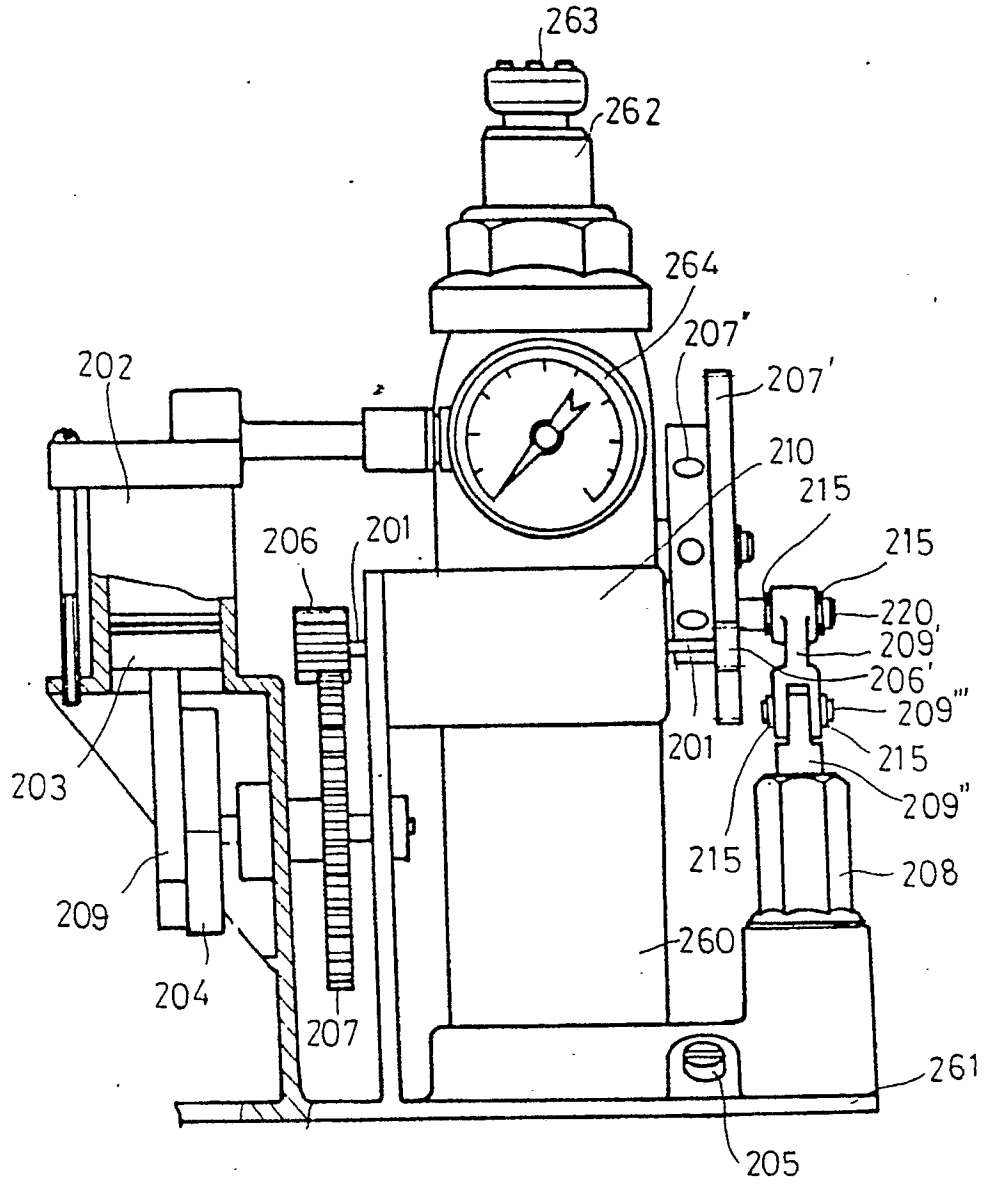


Fig. 1

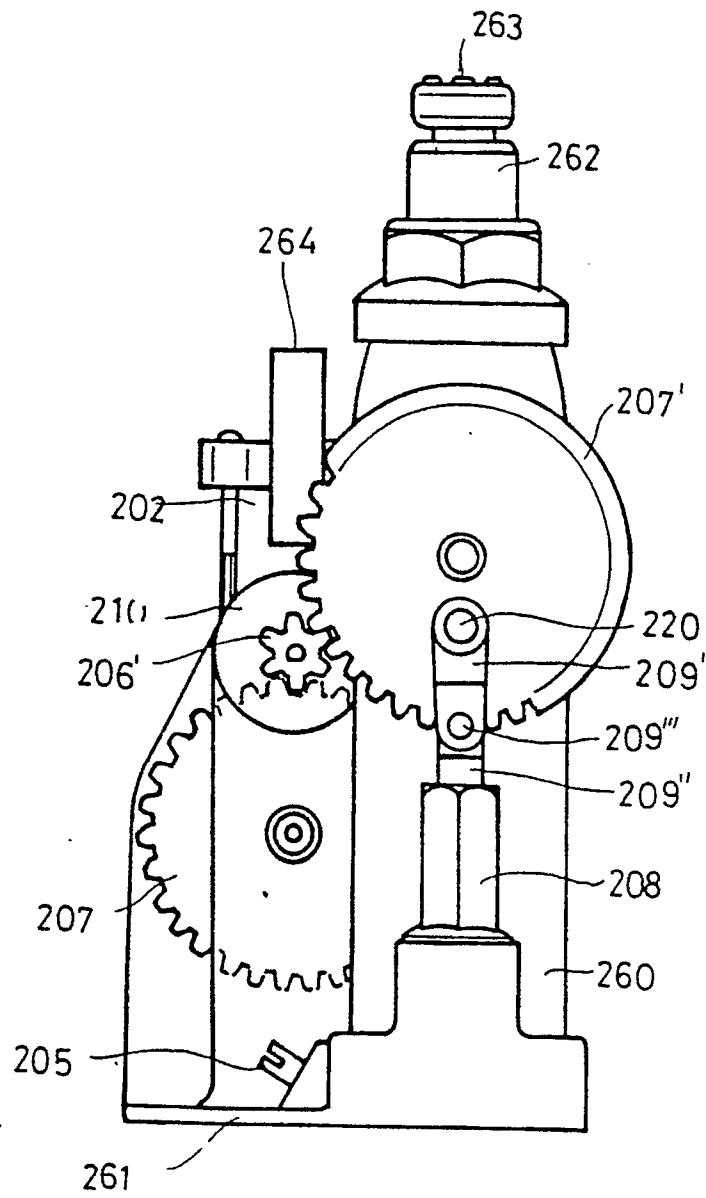


Fig. 2

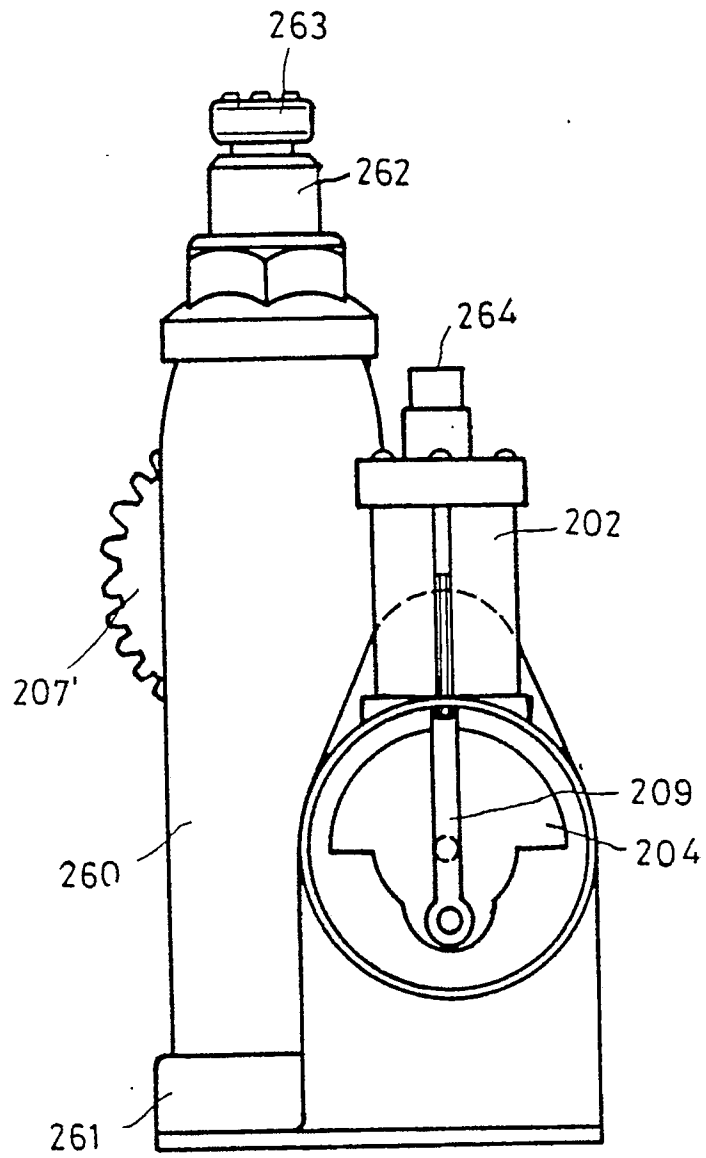


Fig. 3

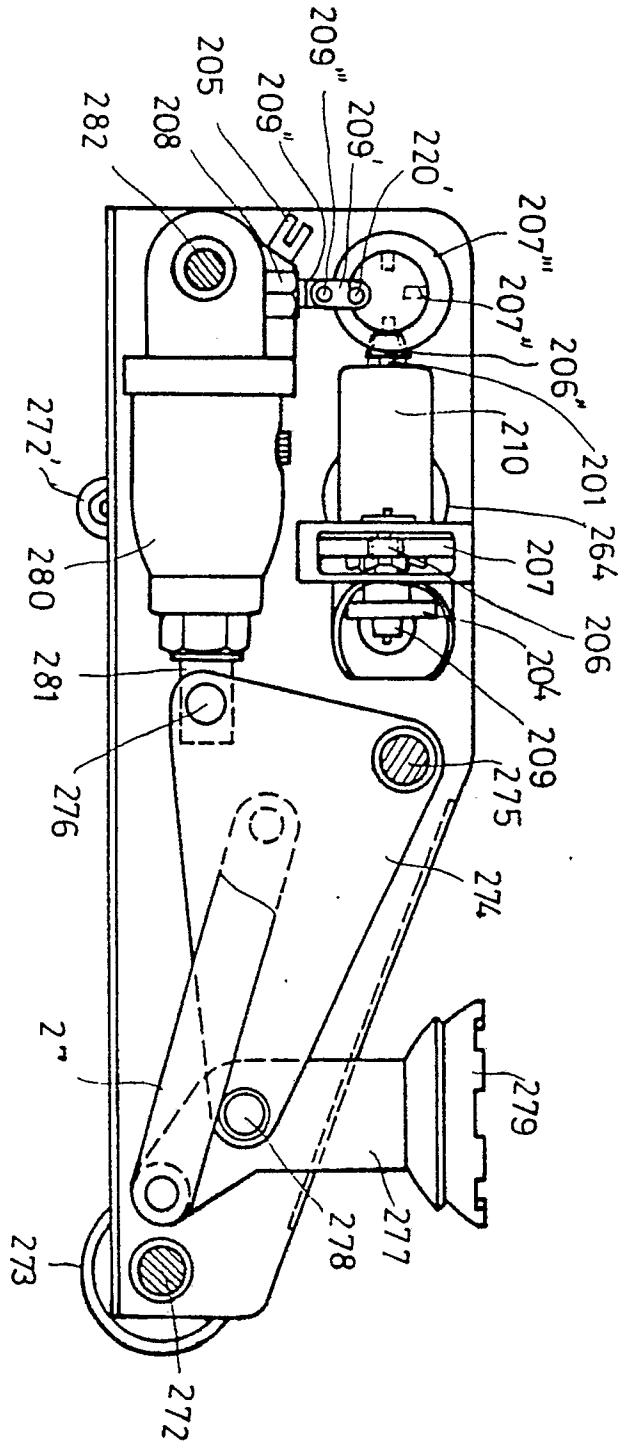


Fig. 4

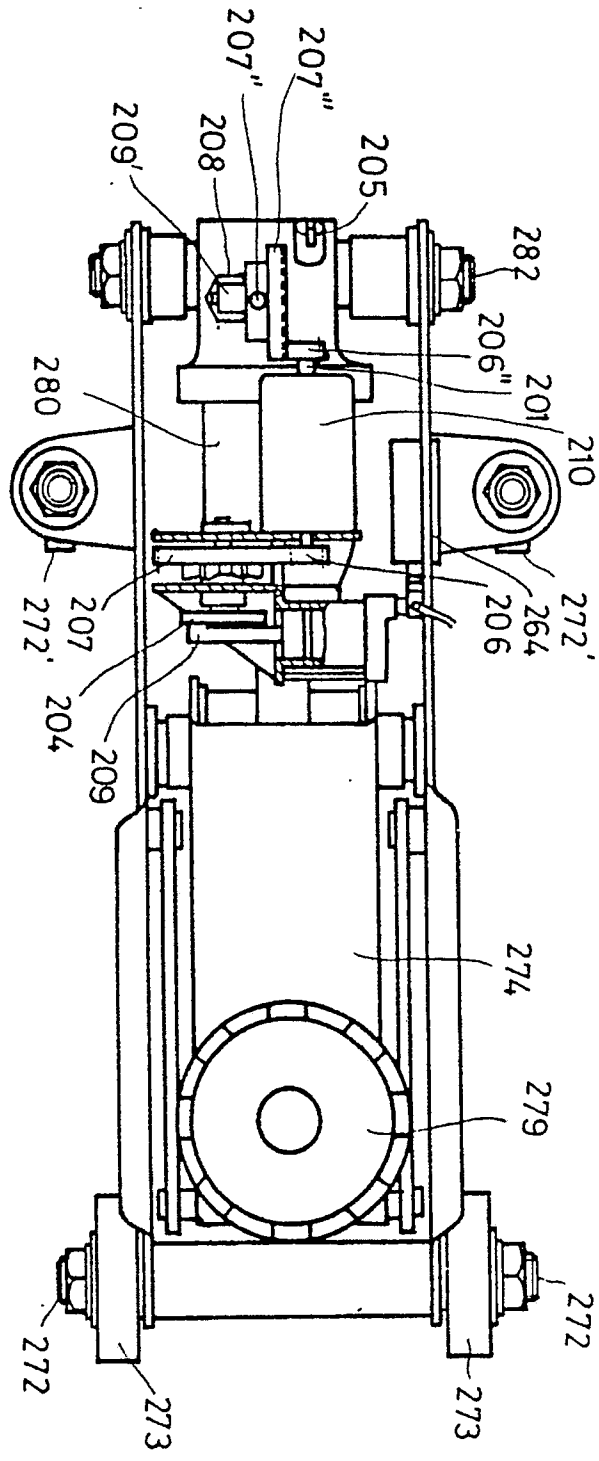


Fig. 5

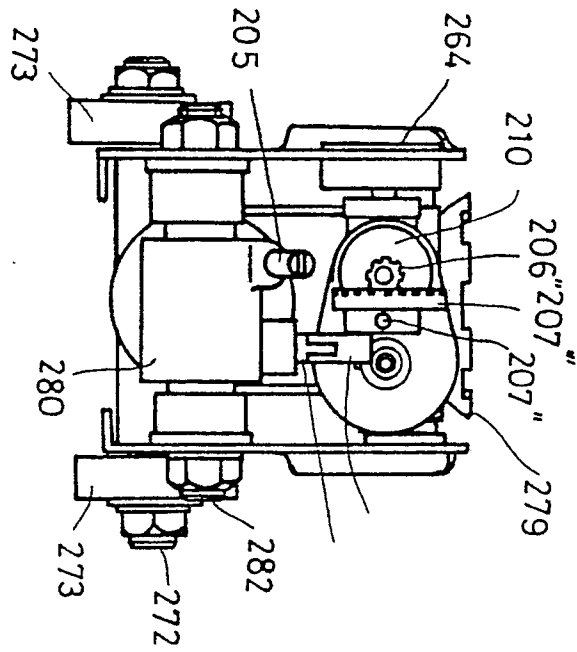


Fig. 6

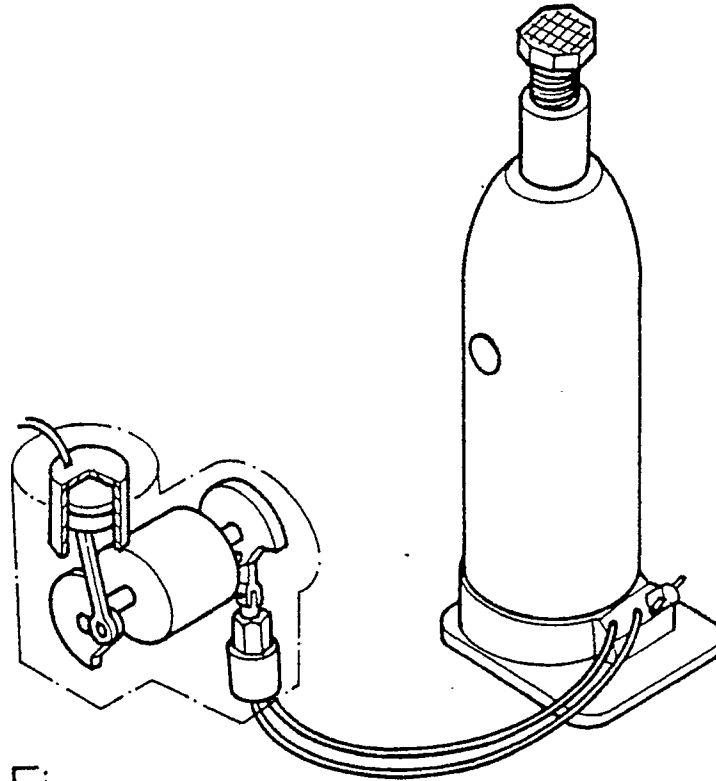


Fig. 3

