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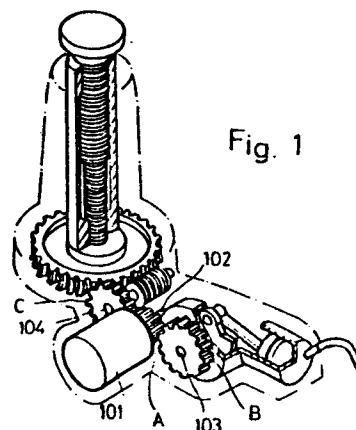
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54 **Jack combined with an air pump and using a common drive motor.**

57 This invention relates to a combined pneumatic jack/air pump device including an hydraulic motor selectively operable to drive the jack or the air pump independently or simultaneously.



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TITLE OF THE INVENTION

A Jack having the pneumatic air pump functions and using a common drive motor.

BACKGROUND OF THE INVENTION

Since the conventional vehicular accessories  
5 respectively include the air pump, jack, trouble market  
which often jam the luggage compartment, this design  
uses a common drive motor acting as the drive element of  
the original air pump and the electric jack, and also to  
drive the tire air pump and the hydraulic pump of the  
10 electric hydraulic jack in order to pump air into the  
tire and jack into motion, common mortar and the  
concerning mechanism make the costs lowered, the  
structure simplified, the required space reduced and  
also achieves the dual functional effect.

15 SUMMARY OF THE INVENTION

Generally, the vehicles often are equipped with a  
wide variety of the vehicular affiliated tools such as  
the jack, tire air pump, trouble maker etc. for the  
drivers to conduct the repair and maintenance jobs  
20 themselves during the emergency situations whenever my  
common troubles like tire punctures take place, however  
the great number of these accessory tools often jam the  
luggage compartment occupying a large space in the car,  
besides the costs to buy them form a burden to the  
25 vehicle owners, therefore, the invention designs a  
compound tool with multiplification functions of the

common motor-driven air pump and jack to improve the above-said defects.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a view of the example of the multiaxial coupled and separately operated jack having the air pump functions and using the common motor.

Fig. 1-1 is a view of the example of the length way adjustment type jack having the air pump functions and using the common motor.

10 Fig. 1-2 is a view of the example of the sideway adjustment type having the air pump functions and using the common motor.

Fig. 1-3A is a view of the example of the electromagnetic clutch operated jack having the air pump functions and using the common motor.

Fig. 1-3B is a view of the mechanical clutch operated jack having the air pump functions and using the common motor.

20 Fig. 2-1, 2-2 & 2-3 is a three-side view of the stand type applicable example of the co-axial and coupling jack and air pump fluid circuit installed with a drain valve.

Fig. 2-4, 2-5 & 2-6 is a three-side view of the lain type applicable example of the co-axial and coupling jack and air pump fluid circuit installed with a drain valve.

Fig. 2-7 is a view of the applicable example of the co-axial coupling type gas pump and guild rod risen

jack having the mechanical clutch operation.

Fig. 2-8, 2-9 & 2-10 is a view of the applicable example of co-axial and coupling type gas pump and shear jack.

5        Fig. 3 is a view of the example of separate type jack having the air pump functions and using the common motor.

Fig. 4 is a view of the example with the functions of the AC/DC air pump, jack and charger.

10    DETAILED DESCRIPTION OF THE INVENTION

In general, most vehicular jacks are of the manual type, and in recent years, the jacks directly driven by the electric supply on the vehicle have been marketed to help the people handle the vehicles with troubles,  
15    similarly, the electric air pump to inflate the tires have also provided assistances to the people, unavoidable, the above said two tools are costlier than the conventional manual ones, because of the expensive drive motors, but the opportunity to commonly use these  
20    two tools are very often, for instance, at the tire punctures, the jack has to be used to jack up the car body to change the flat tires and to pump the air into the replaced tires, after it is repaired since the above said two tools are separate respectively, this is often  
25    not an ideal arrangement, in response to the above said defects, the invention provides a jack having the air pump functions and using a common drive motor, so to

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use a common motor can reduce the costs required and the air pump and the jack are in integral structure with a smaller space and easy to carry for the users, the main feature of this design lies in that a single drive motor produces the multiplification functions to drive the air pump or jack into motion, and based on this principle, various mutual compatible structural states are as follows:

A. Multi-axial coupling separate operating type:

10 The main features of this practical application is described as follows: as shown in Fig. 1, the output shaft 102 of the drive motor 101 has a gear A for the selective coupling with the gear B to drive the air pump shaft 103 into motion or the gear C on the rotary shaft 15 104 of the oil hydraulic pump of the spiral jack or oil hydraulic jack, ie. to move the relationship position among the gears groups A, B, and C achieves the coupling between the gears A and B to drive the air pump in motion using forward and reverse rotation of the motor 20 and the gears A and C coupled, whereas the motor is made to drive upward and downward the operating state of the jack as for the changes of the above said gear relationship, the lengthway displacement changes of the gear A can be in two states, ie. coupling with the gear 25 B or C as shown in Fig. 1-2; besides, an electro-magnetic clutch 105 or mechanical clutch 106 may be provided in the shaft of the gear B or C to achieve

this purpose as shown in Fig. 1-3A and 1-3B; since the above said means are so common in the machinery structures that is known to the skilled men of arts, no detailed repetition on it is needed here.

5           B. Co-axial coupling type

          This is another structural way among the above said air pump and jack drive shaft and the DC drive motor, as shown in Fig. 2-1 to 2-6, construction is shown the drive motor 210 has an elongated shaft 201 which is  
10   used to drive the piston 203 of the air pump 202 and velocity reducing toothed wheel set 206 and 207 and also serves as the input shaft for the jack at the same time for driving velocity reducing toothed wheels 206' and 207' of jack oil pump. To make the operator conduct the  
15   selections on the operating and controlling the air pump and jack, the above-said structure is further provided with an operating device, so when it is used drive the oil pump 208 of the oil hydraulic jack, the elongated shaft 201 is used to drive the oil pump 208, in this  
20   design, a drain back flow operating valve 205 is provided 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 the operation, while drain valves of the units not to be  
25   operated will be set at the respective drain position for the operating selections, thereby determining to drive the air pump or jack.

Fig. 2-1, 2-2 and 2-3 is an applicable example of the stand type jack, in which as shown in Fig. 2-1, a stand type jack main body 260 is installed vertically on the based seat 261; the main body is a cylinder type oil pressure tank coupled with a stand shaft 262 which can move upward and downward under the compression; a top block 263 is installed on the upper side of the stand shaft 262 and serves as carrying working piece; a drive motor 210 with shaft 201 at its two ends is fixed transversely in the cylinder body, its end has a small toothed wheel 206 and a bias mechanism 204 (including bias curved shaft or bias link rod moved by bias wheel) coupled with large toothed wheel 207, thus it can transmit the force to crank 209 and then moves gas pump piston 203 to generate the gas pump function between the piston and gas pump; the gas pump has an intake opening for gas input, an exhaust opening for output of compressed gas and a gas channel connecting to a pressure manometer 264; then another output end shaft of the motor 210 transmits the force to a small toothed wheel 206' and further moves another set of large toothed wheel 207'; a bias mechanism (including bias curved shaft or bias link rod moved by bias wheel) is located at an end of the large tooth wheel 207', in which bias shaft 220 moves crank set 209' and the forth and back pump movement function is generated by the outer tank 208 of the oil pump and the coupling

movement of coupling pin 209''' and oil pump piston rod  
209''; a set of drain circuit piston 205 is used for  
drain reduction of the jack or for the release of drain  
in order to showing a non-driven situation; the back  
5 side of large toothed wheel is shown a ladder type  
structure with a smaller diameter, on which minimum a  
set of axial hole 207" (or screw hole) is installed for  
inserting an operating rod, so that the driving of jack  
oil pump can be done by the forth and back motion with  
10 the band.

Fig. 2-2 is a sectional diagram of Fig. 2-1; Fig 2-  
3 is another sectional diagram of Fig. 2-1; Fig. 2-4, 2-  
5 and 2-6 is an applicable example of this co-axial lain  
type jack, in which its structure is same as the  
15 traditional lain type jack, a wheel shaft 272 and wheel  
273 are installed on the one side of the lain type  
machine body and a wheel 273 is installed on the other  
side for motion driving; a drive rod 281 driven by an  
active oil pressure tank 280 is coupled with a risen arm  
20 set 274 using the coupling pin 276, the risen arm set  
274 is coupled with two openings on the upper side of  
the machine body 271 using a set of penetrated rod 275  
and it acts as the centre of the oscillation to accept  
the driving of the drive rod 281 on the active oil tank  
25 and then to move the upper arm 277 coupled with the  
other coupling pin 278 at its other end for the upward  
or downward motion of the supporting block 279; its



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main characters : a set of common drive motor 210 with the end shaft 201 at its two ends is fixed on the one side of the machine body; its end has a small toothed wheel 206 and a bias mechanism 204 (including bias  
5 curved shaft or bias link rod moved by bias wheel) coupled with large toothed wheel 207, thus it can move the crank 209 and then gas pump piston 203 to generate the gas pump function between the piston and gas pump; the gas pump has an intake opening for gas input, an  
10 exhaust opening for output of compressed gas and a gas channel connecting to a pressure manometer 264; the other output shaft of motor 210 moves a small umbrella toothed wheel 206' and then a large toothed wheel with the disc type side teeth 207'''; the bias mechanism  
15 (including bias curved shaft or bias link rod moved by bias wheel); the crank 220' and the forth and back pump motion function is generated by the outer tank 208 of the oil pump and the coupling motion of the coupling pin 209''' and oil pump piston rod 209'''; a set of drain  
20 circuit piston 205 is used for the drain in order to showing a non-driven situation; the back side of large toothed wheel is shown a ladder type structure with a small diameter, on which at least a set of axial hold 207" (or screw hold) is installed for inserting an  
25 operating rod, so that the driving of the jack oil pump can be also done by the forth and back motion with the hand.

the other example of the above said co-axial coupling way is shown in Fig. 2-7, in which the mechanical type clutch operating and controlling method conducts the operating selections on the air pump of spiral jack. In the example shown in Fig. 2-7, its constructions is described as follows:

-- an air pump 202 directly couples with the rear side of the drive motor 210 or has a pull/push or rotary movable mechanical structure to make the air pump 202 become engaged or disengaged with the motor 210.

-- the front shaft of a positively or reversely driven motor 210 is in an elongated shaft shaped, and is in a terraced rod shape 211 with a slightly smaller diameter, and the diameter of its front section is larger, the middle section of the said terraced rod has an axial key slot 212 and its end section has threads 213, the end of its smaller terraced rod also has lock opening 214, the end of the elongated shaft close to the motor has an annular slot 216 to receive a limiting snap ring 215 therein;

-- a worm rod 216 with a smooth round hole inside couples with the drive female worm gear 217 of the spiral jack, its one end close to the motor is flat and smooth, whilst the other end has a tooth-shaped surface 218 for coupling transmission and its centre has a hole 219 with a slightly inward recess;

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-- a ring-shaped spring 220 to be set into the said recess hole 219;

-- an annular structure for the tooth-shaped surface 218 of the above said worm rod for the transmission coupling its feature lies in that it has a round hole 221 in its centre, its side to couple with the tooth-shaped surface 218 of the worm rod using for coupling transmission has an opposite and complementary tooth-shaped structure 222 and a recess shaped hole 223 to receive the above-said ring spring 220 also has an axial key slot 224, an elongated strip shaped key slot 225 is to be set into a place between the above said key slot 224 and the key slot 212 of the shaft to make both of them mutually conduct the transmission; this transmission coupling annular structure is to make the annular structure tightly press against the ring-shaped spring 220 when the annular structure is pushed by an external force and then couple with the coupling tooth 218 on the side face of the worm rod for transmission, and when the tightly pressing external force vanished, the ring shaped structure is bounced away by the spring 220;

-- an operating ring 226 having threads inside couples with the threads 213 on the end of the terraced rod with a larger diameter on the front section of the elongated shaft, the tightly screwing of the ring 326 into the threads 213 is to force the transmission

coupling annular structure and to engage the worm rod and also the release thereon, thereby making both of them bounced apart by the ring-shaped spring for separation;

5       -- an auxiliary knob 227 uses a fixed pin 228 to insert the pin hole 214 of the end of smaller diameter of the elongated shaft of the motor for manually fixing the motor shaft in order to convenience the operation, when the above said operating ring is rotated.

10       To join the above-said structure, we can conduct the following operations;

      -- To tightly screw the operating ring is to tightly press the coupling ring and the worm rod thereby making them driven by the motor into motion, which, in  
15 turn, drive the female worm gear with threads inside to drive the screw of the spiral-type jack jacking up, or the reverse revolution of the motor makes the spiral-type jack lowered downwardly;

      -- to release the operating ring is to make the  
20 coupling ring and the screw separated and thus the jack structure part not driven by the motor into motion;

      -- if the relationship between the air pump and the motor is of the direct coupling, it is constantly driven by the motor since the required horse power is  
25 constantly smaller than that of the jack, that the air pump is used concurrently with the jack will never adversely affect the driving over the jack, in

consideration of the economic type, it way is adoptable, and if it is necessary to conduct the clutch actions, it can conduct the clutch action and add usual mechanic or electro-magnetic clutch according to the needs.

5        Fig. 2-7 shows its structure used for the drive of shear jack, its applicable example are shown in Fig. 2-8, 2-9 and 2-10, in which the based seat 280 is used for installation of 4 sets of supporting arms 281 on it; the lower parts of supporting set is coupled with the based  
10    seat using coupling pin 282, and its upper parts is also coupled with the supporting plate using a coupling pin 282; its two ends are coupled using screw hole pin 285 for the penetration of screw rod 216', the chute 289 on the guide rod is limited by the coupling pin 288 of  
15    penetrated hole 287 with the limited pin 286, thus the guide rod 216' is limited for its rotation; the relationship of the guide rod and coupling pin 288 with the penetrated hole 287 is the rotation in the original position, so that the screw hole pin 285 combined  
20    screwedly by guide rod 216' is moved and let supporting arm 281 move upper supporting plate for upward and downward motion.

      The above-said various air pump and oil pump devices applicable to the oil hydraulic jacks and using  
25    a common drive motor can be further in the exemplary state of the separate type just like the marketed pumps and the jack bodys as shown in Fig. 3 to conveniently

meet the requirements of the special places, so this is the structural example which can be changed in its design and uses.

The above-said various compound structures can be further made into the AC/DC dual purpose type as shown in Fig. 4, its feature lies in that 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 the low voltage output, its output end can also be connected in parallel to the socket 403 on the above said DC input end to drive the above said DC motor 404 for driving the air pump or jack into motion, and this input socket 403 can make the DC output to act as a charger, or an output terminal is added to serve as a charger, thereby further making the invention become a tri-functional compound tool form, in this structure, a switch 405 is connected in series with the input end of the DC motor 404 to cut off the DC motor 404, when it serves as a charging power supply.

The above said various descriptions and examples mainly provide the compound device of the air pump and the jack using a common motor as the objective of the invention with disclosures concerning the practicalizable evidences and various mutually compatible means, if compared with the conventional separately installed motors, the

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common motor in the invention has indeed the  
multiplification effects, especially its means with the  
economic benefits are simple and feasible, so this is a  
practicalizable design without any doubt.

CLAIMS:

1. A compound device of the air pump and the jack using a common drive motor is mainly joined and composed by an air pump and a jack to be driven by a motor in rotary movement, in which the jack is screwed type after  
5 the velocity reducing drive, or shear type after the velocity reducing drive of the motor, or the oil hydraulic tank type moved by the motor drive oil pump, the major features of which lies in that both of them are driven by the same motor.

10

2. The motor, the jack and the input shaft of the air pump of the claim 1 comprises the transmission of the motor and the air pump and the jack in an equipment to cut off or to couple the linkable and separable  
15 operating and controlling over both of them or either of them.

3. As described in the claim 1, the relationship of the motor and the jack and the air pump input shaft  
20 comprise simultaneous drive of two parts. The simultaneous input type for the air pump and the jack of the claim 1 comprises the direct co-axial joining the air pump and the drive shaft of the oil hydraulic pump; its structures comprise:

25 Stand type jack body 260 is equipped on the based seat 261; its body is a cylinder oil hydraulic tank,



in which a stand shaft 262 which can move upward and downward under the compression in coupled; a top block 263 is installed on the upper parts of the stand shaft 262 for carrying the working piece; a drive motor 210 with the shaft 201 at its two ends are fixed transversely in the cylinder body; at its end, a small toothed wheel and a large toothed wheel 207 coupled with the bias mechanism (including bias curved shaft or bias link rod moved by the bias wheel) for moving crank 209 and then the gas pump piston 203, thus the gas pump function is generated between the piston and the gas pump body 202; the gas pump has an inlet opening for the gas input, an exhaust opening for the output of the compressed gas and a gas channel connecting a pressure manometer;

The another output end shaft of the motor 210 moves a small toothed wheel 206' and a large toothed wheel 207'; a bias mechanism (including the bias curved shaft or bias link rod moved by the bias wheel) is located at end of the large toothed wheel 207', in which bias shaft 220 moves the crank set 209' and the forth and back pump movement function is generated by the outer tank 208 of the oil pump and coupling movement of the coupling pin 209''' and the oil pump piston rod 209''; a set of the drain circuit piston 205 is used for the drain reduction of the jack or for the release of the

drain in order to showing a non-driven situation;

The back side of the large toothed wheel is shown a ladder type structure with a smaller diameter, on which at least a set of axial hole 207'' (or screw hole) is installed for inserting an operating rod, thus the driving of jack oil pump can be also done by the forth and back movement with the hand.

4. The co-axial drive jack of the gas pump and the oil pump shown in claim 3 besides having the lain type machine body also has the following features:

a set of the common drive motor 210 with the end shaft 201 at its two ends is fixed on the one side of the machine body and its end has a small toothed wheel 206 and a bias mechanism 204 (including bias curved shaft or bias link rod moved by the bias wheel) coupled with the large toothed wheel 207, thus it can move the crank 209 and then the gas pump piston 203 to generate the gas pump fuction between the piston and the gas pump; the gas pump has an intake opening for thegas input, and exhaust opening for the output of the compressed gas and a gas channel connecting to a pressure manometer;

The another ouput shaft of the motor 210 moves a small umbrella toothed wheel 206'' and then a large toothed wheel with the disc type side teeth 207''';

the bias mechanism (including bias curved shaft or bias link rod moved by the bias wheel) is located at the end of a large toothed wheel); the crank 220' and the forth and back pump motion function is generated by the outer  
5 tank 208 of the oil pump and the coupling motion of the coupling pin 209''' and the oil pump piston rod 209''; a set of the drain circuit piston 205 is used for the drain in order to showing a non-driven situation;

The back side of the large toothed wheel is shown a  
10 ladder type structure with a small diameter, on which at least a set of the axial hole 207'' (or screw hole) is installed for inserting an operating rod, thus the driving of the jack oil pump can be also done by the forth and back movement with the hand.

15

5. The structure features of the co-axial coupling drive screw type jack shown in claims are described as follows:

an air pump 202 directly couples with the rear side  
20 of the drive motor 210 or has a pull/push or rotary movable mechanical to make the air pump 202 become engaged or disengaged with the motor 210;

the front shaft of a positively or reversely driven motor 210 is in an elongated shaft shaped, and its end  
25 is a terraced rod shape 211 with a slightly smaller diameter, and the diameter of its front section is larger, the middle section of the said terraced rod has

an axial key slot 212 and its end section has threads 213, the end of its smaller terraced rod also has lock opening 214, the end of the elongated shaft close to the motor has an annular slot 216 to receive a limiting snap  
5 ring 215 therein;

a worm rod 216 with a smooth round hole inside couples with the drive female worm gear 217 of the spiral jack, its one end close to the motor is flat and smooth, while its other end has a tooth-shaped surface  
10 218 for the coupling transmission and its center has a hole 219 with a slightly inward recess;

a ring-shaped spring 220 to be set into the said recess hole 219;

an annular structure for the tooth-shaped surface  
15 218 of the above said worm rod for the transmission coupling its feature lies in that it has a round hole 221 in its centre, its side to couple with the tooth-shaped surface 218 of the worm rod using for the coupling transmission has an opposite and complementary  
20 tooth-shaped structure 222 and a recess-shaped hole 223 to receive the above said ring spring 220 also has an axial key slot 224, an elongated strip-shaped key slot 225 is to be set into a place between the above said key slot 224 and the key slot 212 of the shaft to make both  
25 of them mutually conduct the transmission; this transmission coupling annular structure is to make the

annular structure tightly press against the ring-shaped spring 220 when the annular structure is pushed by an external force and the couple with the coupling tooth 218 on the side face of the worm rod for the  
5 transmission, and when the tightly pressing external force vanished, the ring-shaped structure is bounced away by the spring 220;

an operating ring 226 has the threads inside coupling with the threads 213 on the end of the terraced  
10 rod with a larger diameter on the front section of the elongated shaft, the tightly screwing of the ring 326 into the threads 213 is to force the transmission coupling annular structure and to engage the worm rod and also to release thereon, thereby making both of them  
15 bounced apart by the ring-shaped spring for the separation;

an auxilliary knob 227 uses a fixed pin 228 to insert the pin hole 214 of the end of the smaller diameter of the elongated shaft of the motor for  
20 manually fixing the motor shaft in order to convenience the operation, when the above said operating ring is rotated.

6. The structure features of the co-axial coupling  
25 drive shear type jack shown in claim 1 are described as follows:

the based seat 280 is used for the installation of  
4 sets of the supporting arms 281 on it; the lower parts  
of the supporting set is coupled with the based seat  
using coupling pin 282 and its upper parts is also  
5 coupled with the supporting plate using a coupling pin  
282; its two ends are coupled using the screw hole pin  
285 for the penetration of the screw rod 216';

the chute 289 on the guide rod is limited by the  
coupling pin 288 of the penetrated hole 287 with the  
10 limited pin 286, thus the guide rod 216' is limited for  
its rotation; the relationship of the guide rod and the  
coupling pin with the penetrated hole 287 is the  
rotation in the original position, so that the screw  
hole pin 285 combined screwed by the guide rod 216'  
15 is moved and let the supporting arm 281 move upper  
supporting plate for upward and downward motion.

7. The place between the oil hydraulic or jack and  
air pump oil hydraulic pump device using a common drive  
20 motor of the claim 1, 3 and 4 can be the discrete  
structural form for the pump and the jack body.

8. The compound structure of the claims 1, 3, 4  
and 7 can be further made into the AC/DC dual purpose  
25 type, the feature of which lies in that inside base, a  
transformer is provided to transform the household power  
supply into a low voltage output, its low voltage output

end is connected to a rectifier for the low voltage  
output, its output end can also be connected in parallel  
to the socket on the above said DC input end to drive  
the above said DC motor for driving the air pump or jack  
5 into the motion, and this socket can make the DC output  
to act as a charger, or an output terminal is added to  
serve as a charger, thereby further making the invention  
a tri-functional compound tool form, in this structure,  
a switch is connected in series with the input end of  
10 the DC motor to cut off the DC motor, when it serves as  
charging power supply.

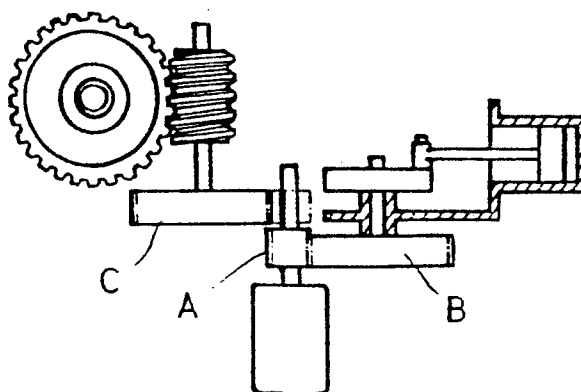
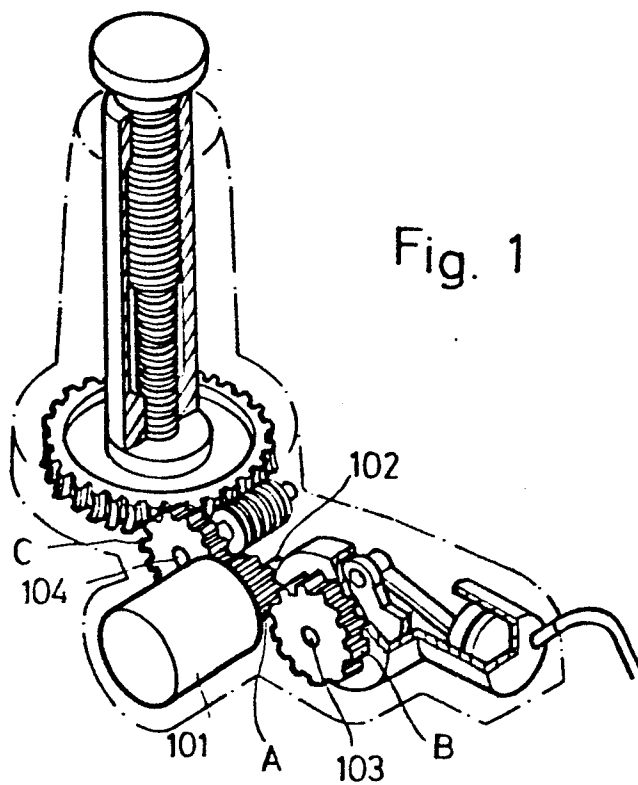


Fig. 1-1



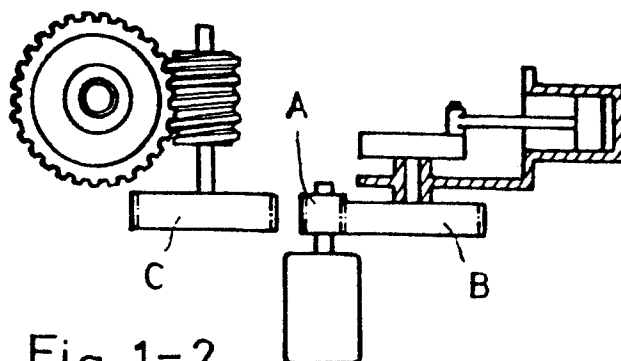


Fig. 1-2

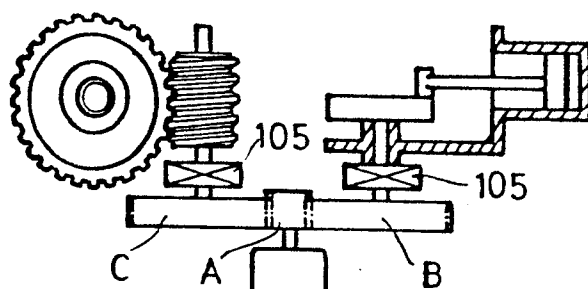


Fig. 1-3A

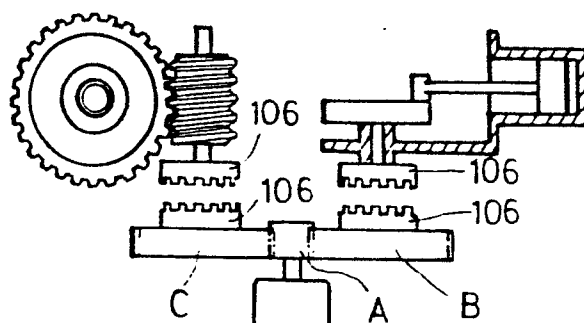


Fig. 1-3 B

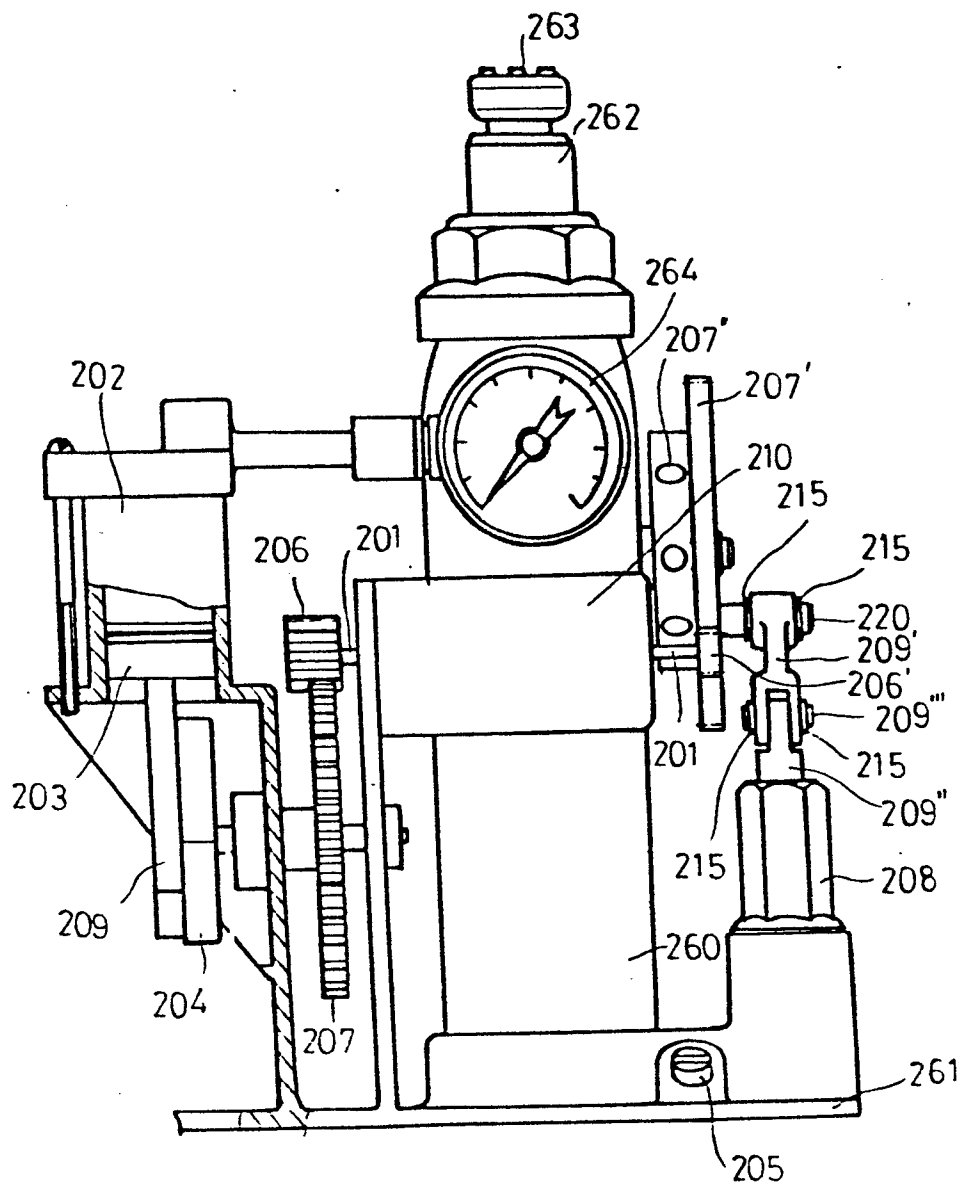


Fig. 2-1

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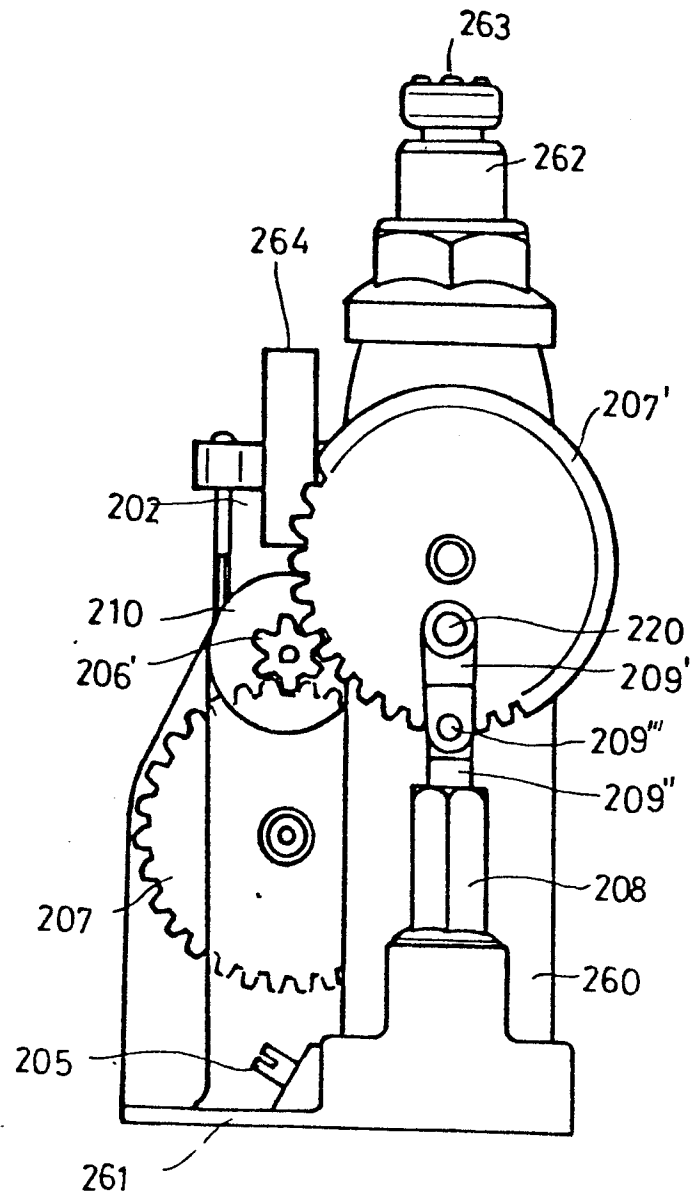


Fig. 2-2

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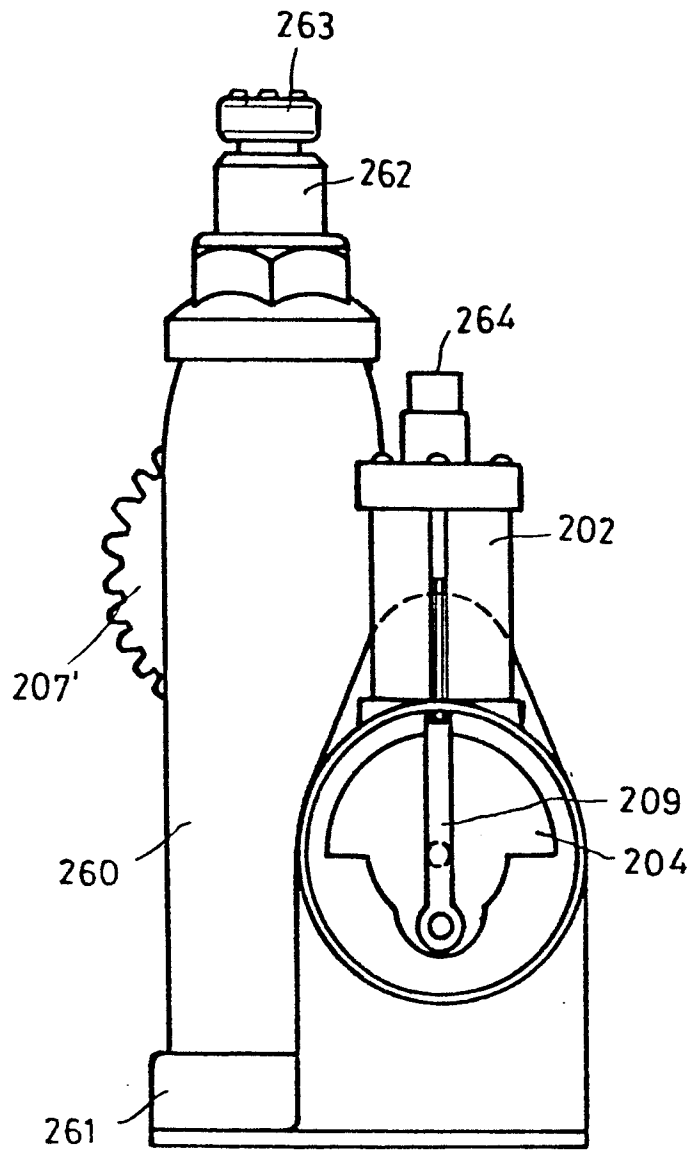


Fig. 2-3

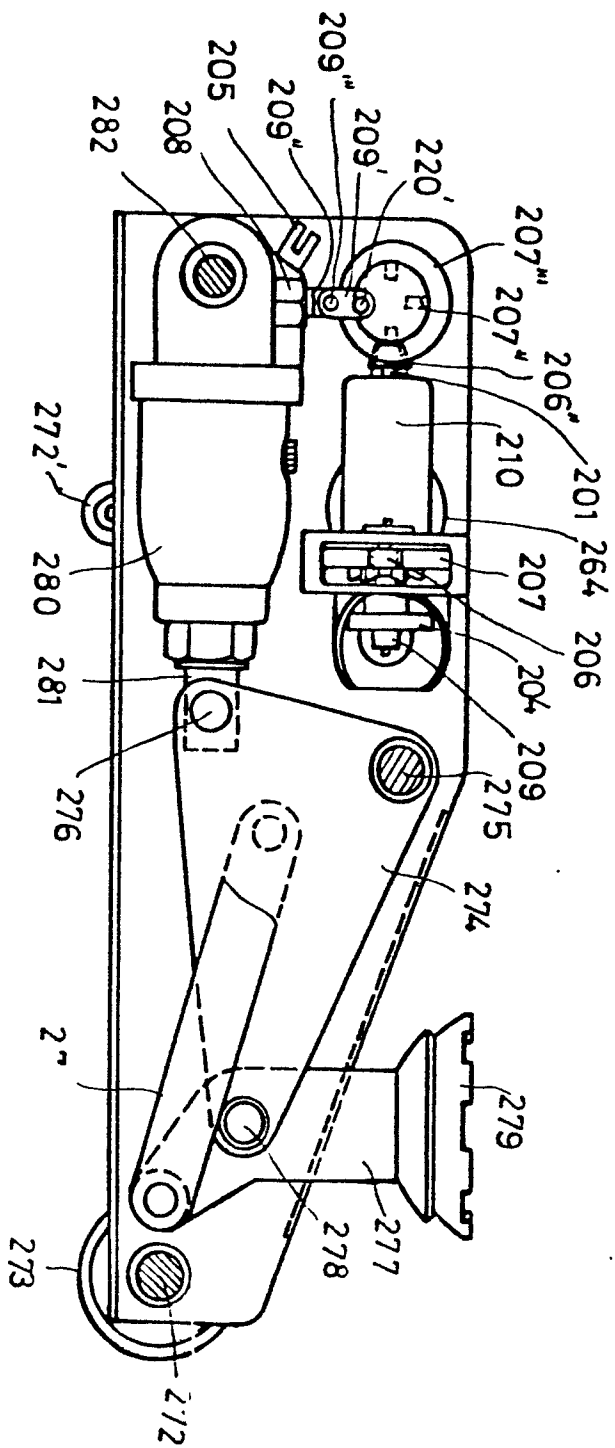


Fig. 2-4

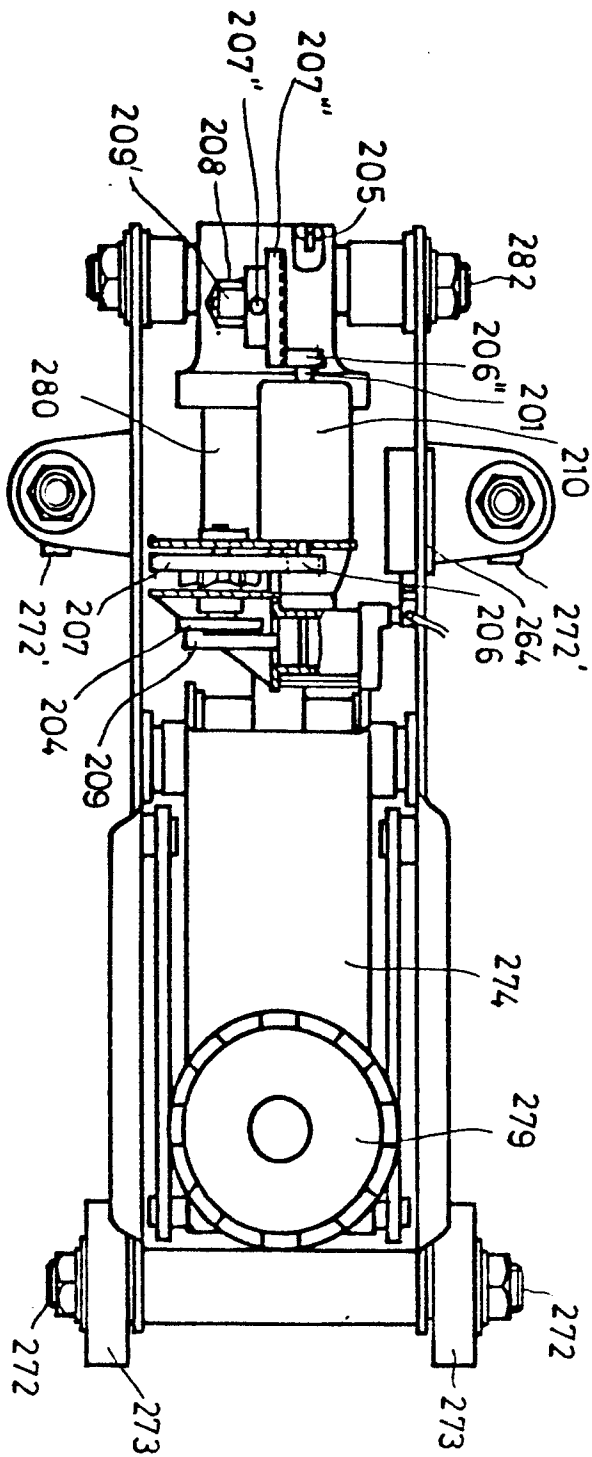


Fig. 2-5

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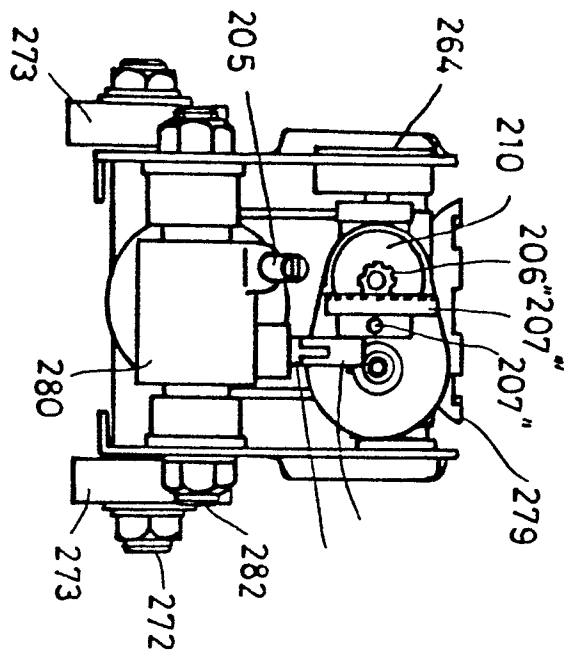


Fig. 2-6

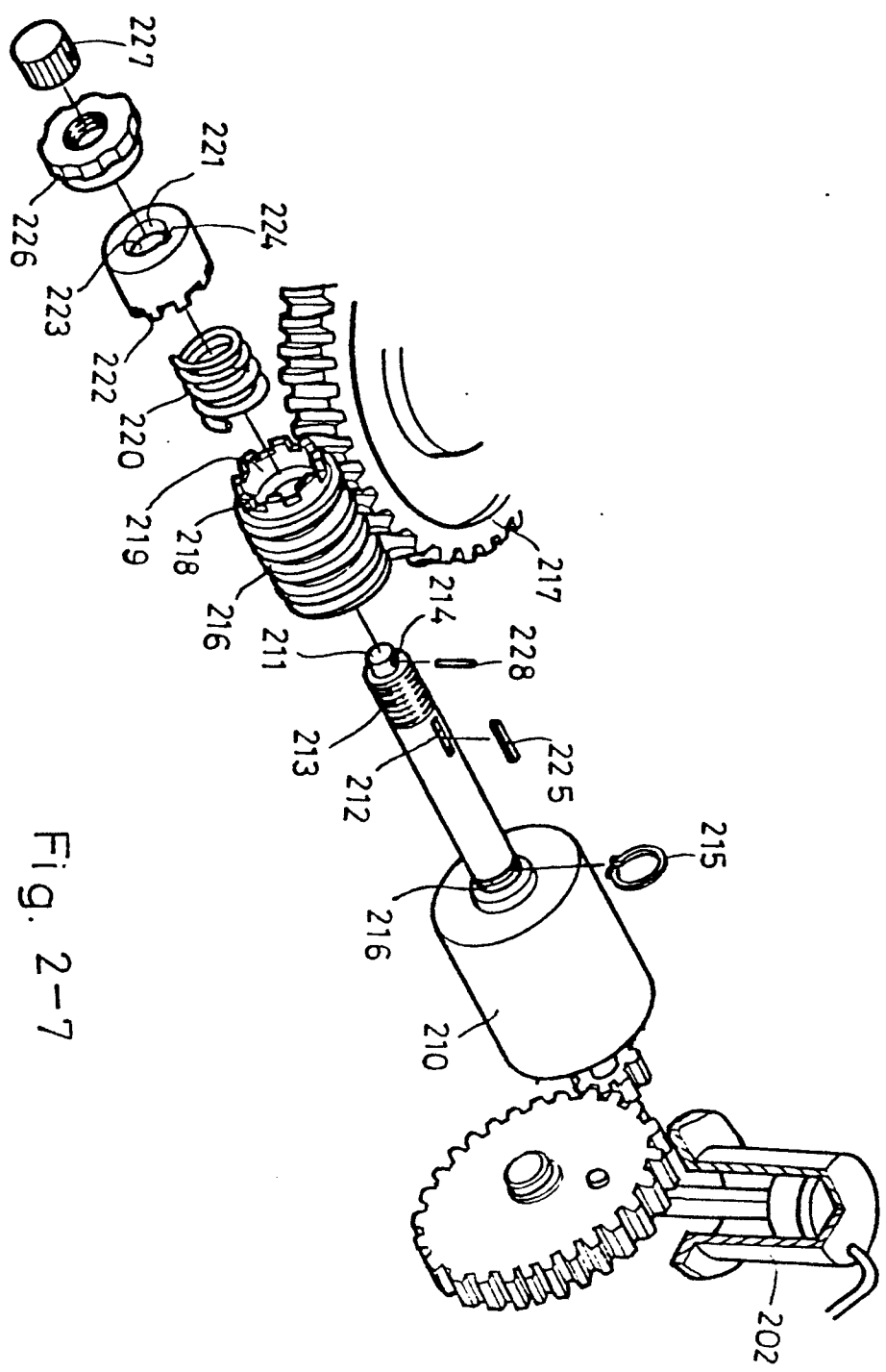


Fig. 2-7



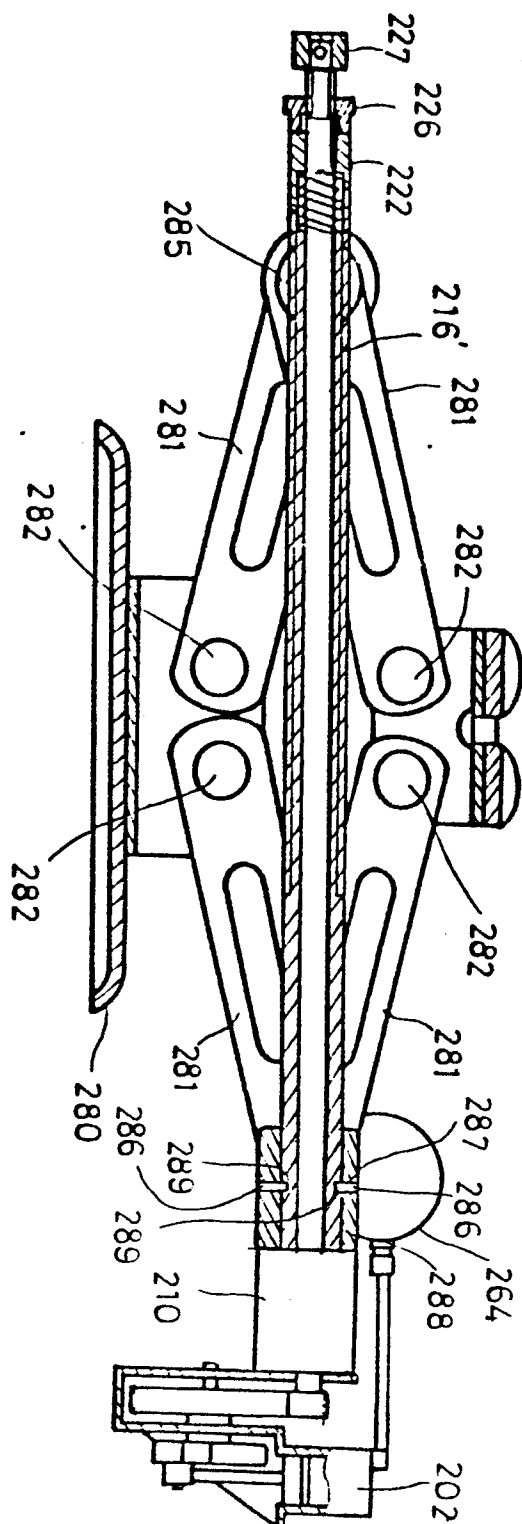


Fig. 2-8

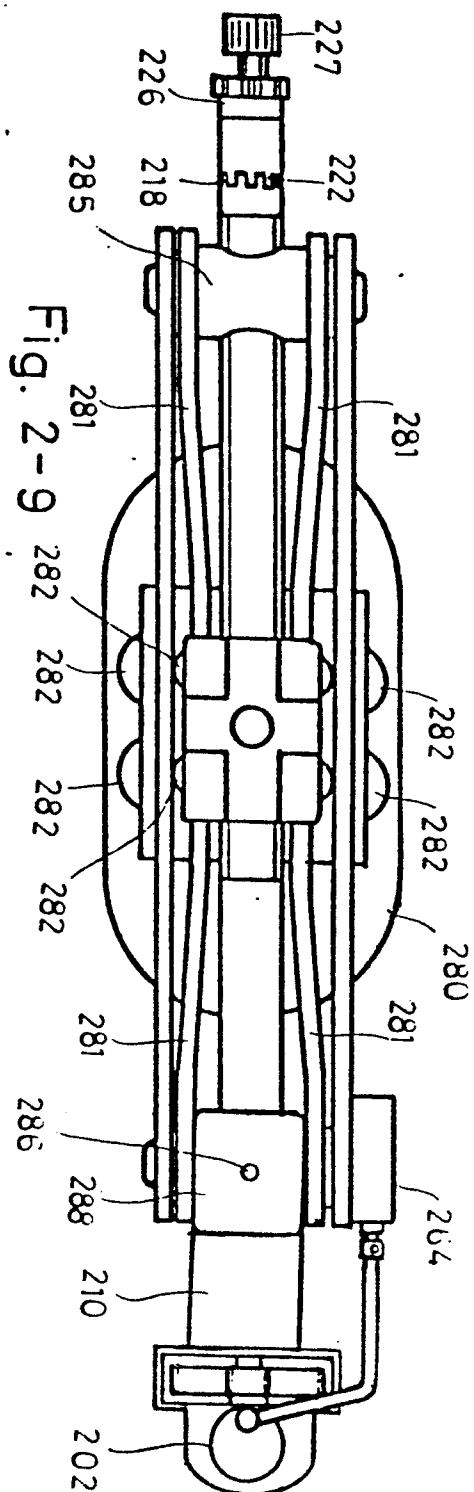
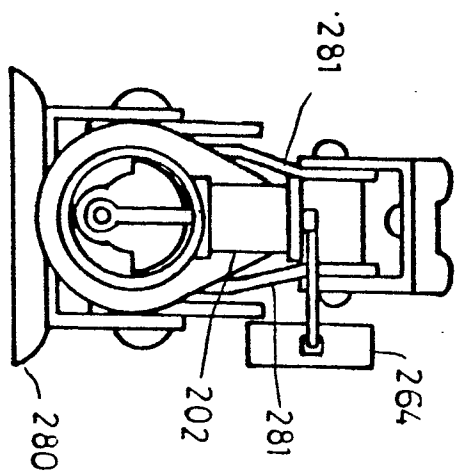


Fig. 2-10



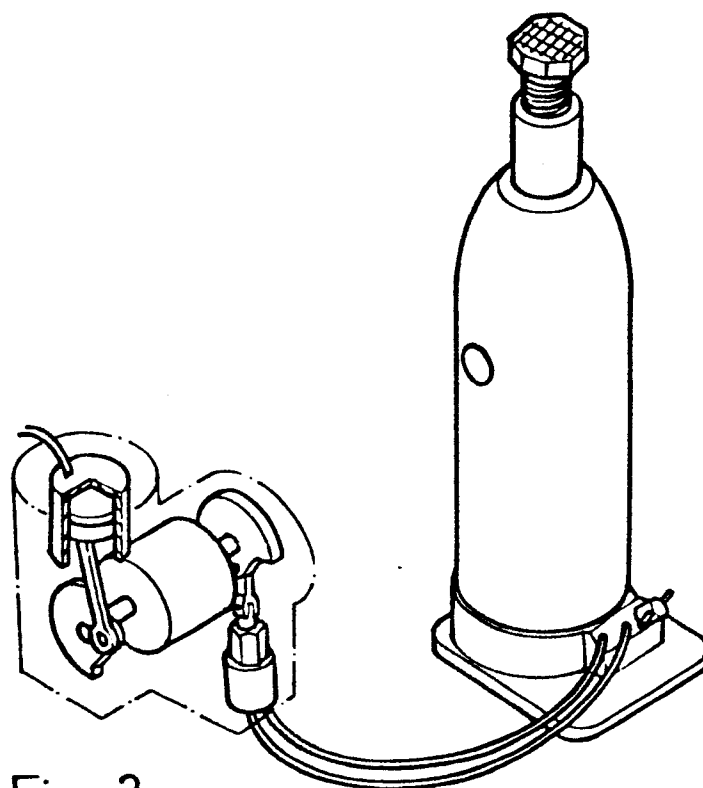


Fig. 3

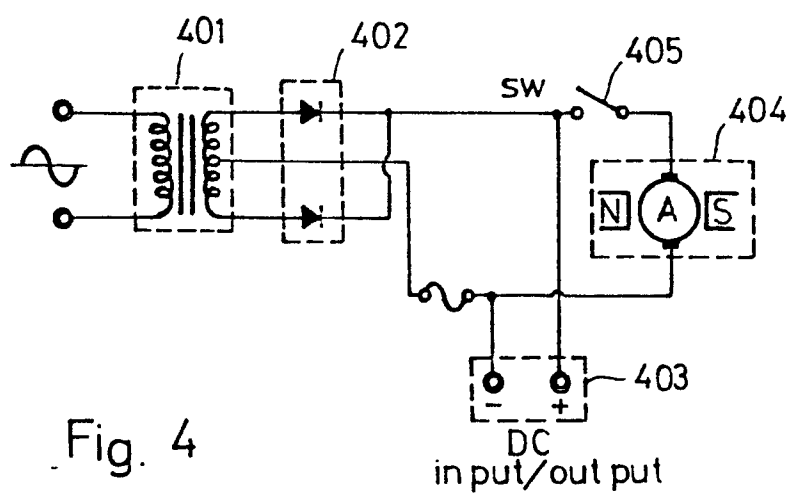


Fig. 4