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(71) Applicant: **Pappalardo, Rosario**  
**95024 Acireale (CT) (IT)**

(72) Inventor: **Pappalardo, Rosario**  
**95024 Acireale (CT) (IT)**

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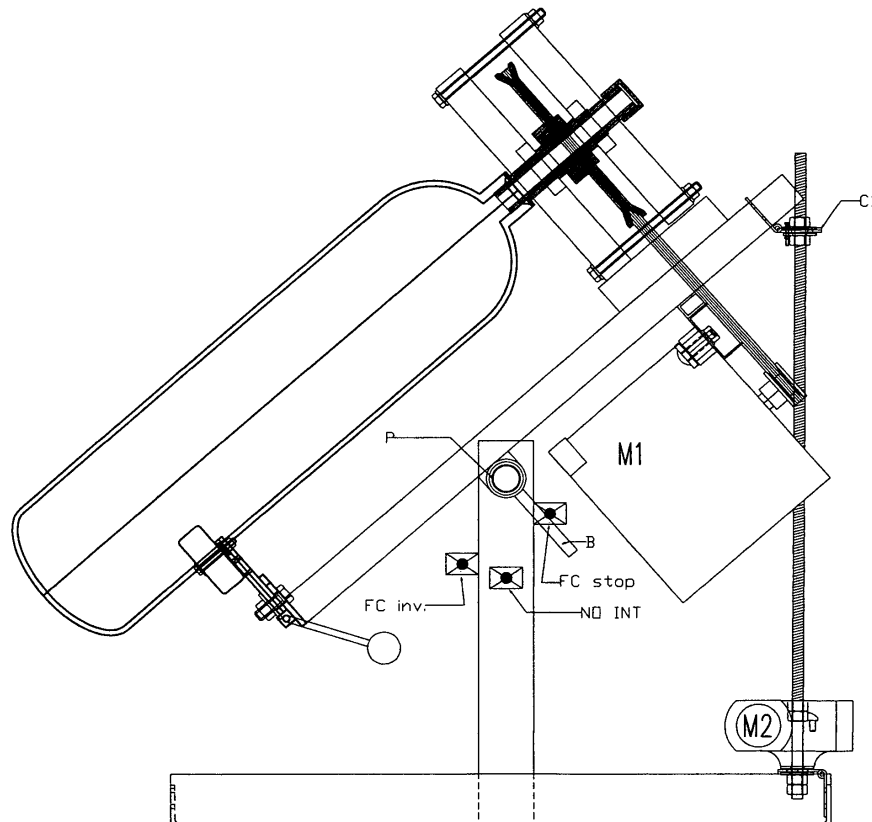
(54) **Cleaning-and-deoxidize machine the inside of tank by abrasion**

(57) The machine is useful to clean and deoxidize by abrasion the inside of metallic containers such as: cylinder for pressure gas storing, diving tanks, fire extinguishers, fuel containers; in general solid of revolution in particular of cylindrical form.

The objective is reached by inserting some abrasive material within the cylinder hard enough to remove rust from the inner part but not damage the tank.

Through the rotation applied to the tank along his axis, the abrasive material act by hitting and scraping on the inner surface of the tank.

Fig. 15



## Description

**[0001]** Invention description of a tank deoxidizing machine by abrasion, on behalf of Pappalardo Rosario living in Via Ugo Foscolo 3 - Acireale (CT), Italian citizen.

- 1) The above machine is useful to clean and deoxidize by abrasion the inside of metallic containers such as: cylinder for pressure gas storing, diving tanks, fire extinguishers, fuel containers; in general solid of revolution in particular of cylindrical form.
- 2) The represented invention may be implemented as described in attached Tables, where.

Table 1 represents the items of the main body: pulley, shaft, bearings, and supports pulley Parts 1 and 2.

Table 2 represents the base of the machine viewed by up, front and side

Table 3 represents the adjustable support, item by item and wholly assembled

Table 4 represents the main Engine M1 and the Engine M2 with endless screw

Table 5 represents the main body viewed by up, front and side

Table 6 represents the fully assembled machine viewed by side, at starting with a 10 lt. tank

Table 7 represents the fully assembled machine viewed by side, in an intermediate state with a 10 lt. tank

Table 8 represents the electric layout for the machine operation

3.1) Scope of the invention is to have a reliable machine able to effectively clean and deoxidize the interior of metallic containers of various capacities hereafter called tank.

3.2) The machine can be used during the test phase, for the visual check of the tank's status as well as for the ordinary maintenance.

3.3) The objective is reached by insert some abrasive material within the cylinder hardness enough to remove rust the inner part but do not damage the tank.

3.4) Through the rotation applied to the tank along his axis, the abrasive material act by hit and scrape on the inner surface of the tank.

3.5) Inclination of the main body on both directions let the abrasive material to reach the top and bottom of the cylinder making uniform the treatment inside the tank.

3.6) The amount of abrasive material is adjustable and depends on the capacity of the tank.

3.7) Inclination of the tank on both axes decrease when the length of the tank increase, and it can be fixed by changing the elevation of the end stop "FC inv" and "FC stop" table 6/8 Fig.15.

3.8) The rotation speed of the tank around his axis can be adjusted based on the result expected. How-

ever, it cannot get over the critical speed in order to avoid the abrasive material adhere to inner surface due to the centrifugal force. Decrease the speed rotation of M2 and increase the elapsed time consequently if needed.

4.1) The tank support Fig. 9 table 3/8 is adjustable according to the tank's diameter. It's keep up the tanks avoid risk of possible damage of the mouthpiece's thread.

4.2) The tank support keeps up all the containers having diameter between the minimum aperture Fig. 10 and the max aperture Fig. 9, keeping aligned the tank axes and the machine shaft.

4.3) The above device consist of 3 items table 3/8 : Item "1" Fig. 6, Item "2" Fig. 7 and Item "3" Fig. 8. Items "1" and "2" once put beside can horizontally slide to each other. In this way the rubber wheels fixed on the above items, come close to each other or go away accordingly to the screw's "V" Fig. 9 direction of rotation (clockwise or counterclockwise). At the same time, the buttonholes on the two items ("1" and "2") determine the vertical displacement of the transit where the bolts fixed on the item "3" joined to the main body can slide. Thus, the two items ("1" and "2") slide on both the directions, horizontal and vertical.

5.1) Preparation: insert some abrasive material into the tank. It can be composed by ceramic material broken to pieces or metallic material. It can be combined with scatter sand, water or other cleaning fluid if needed.

5.2) Adjust the holder device accordingly to the tank's diameter. Screw the tank's mouthpiece to the machine's shaft table 6/8 Fig. "15". Use an adapter if needed.

5.3) In the prototype illustrated, the machine at the beginning is completely slanting on a side. For the start turn on the connection "FC INV", put the switch "SEZ" ON and push for few seconds the "START" button. The relays "RL1", "RL2", "RL3", "RL4" and "RLT" will be energized and "M1" and "M2" will start.

5.4) The status bar "B" releases "FC STOP" that maintains energized the relay "RL1" even if the button "START" will be released.

5.5) Through a strap the engine "M1" drag on the pulley and the shaft where the tank is fixed. The container will start to spin around its axis. The engine "M2" gives to the threaded shaft a rotational movement (clockwise) and attract the hinge "C1" (Fig. 15). In this way the tilt of the machine "M" versus the pivot "P" will gradually decrease.

5.6) When the main body has an hint in the range (-10 degree, +10 degree), the status bar pushes on the connection "NC INT" enabling the intermittence "INT" and slowing down the race of "M2". In this way the treatment will focus on the tank's sidewalls. When the hint overcomes the above range, the connection "NC INT" is released and the intermittence

"INT" is stopped.

5.7) The machine continues its race up to the status bar move the closing hob of "FC INV" (Pic. 16). It remains open until the initial position of the hob is manually restored. 5

5.8) When "FC INV" is open the relay "RL3" is released and the voltage polarity at ends of "M2" is inverted. It rotates in the opposite direction and through the hinge brings back the main body at its initial position. 10

5.9) Crossing the horizontal line the rotational speed of "M2" is slowed down by "INT". The treatment finish when the status bar "B" acts on "FC stop" cutting the power to "M1" and "M2".

5.10) When done, screw off the tank from the machine and clean and dry the inner part of the cylinder. 15

6.1) Many possible variants of the prototype illustrated may be implemented (without go out of the scope of this invention).

6.2) Going more deeply; the pulley can be replaced by gears and/or chains, the rotational speed can be adjusted by some mechanical or electronic device. 20

6.3) The inclination can be adapted by a hydraulic jack and the inclination speed regulated through one of the system described. 25

## Claims

1. Cleaning-and-deoxidize Machine the inside of tank by Abrasion, **characterized in that** the rotation applied to the tank along his axis 30
2. Cleaning-and-deoxidize Machine the inside of tank by Abrasion, as claimed in claim 1 **characterized in that** inclination of the main body on both directions 35
3. Cleaning-and-deoxidize Machine the inside of tank by Abrasion, as claimed in the above claims **characterized in that** The tank support Fig. 9 table 3/8 is adjustable according to the tank's diameter 40
4. Cleaning-and-deoxidize Machine the inside of tank by Abrasion, as claimed in the above claims **characterized in that** the tank's rotational capability adjustable via a transmission box and/or electronic devices. 45
5. Cleaning-and-deoxidize Machine the inside of tank by Abrasion, as claimed in the above claims **characterized in that** the tank's tilt capability adjustable via a transmission box and/or electronic devices. 50

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Fig.1

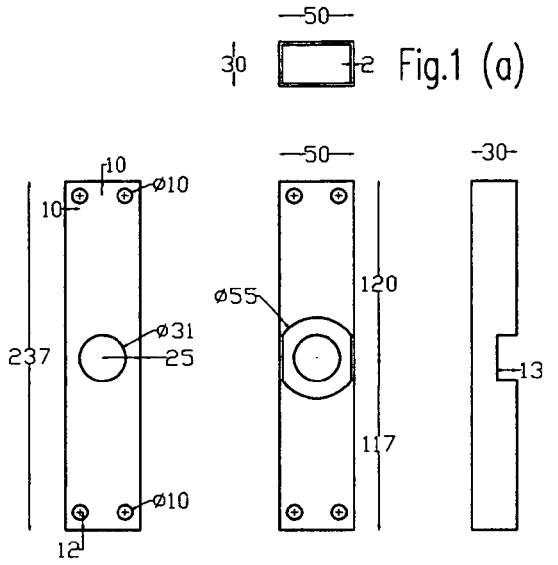


Fig.1 (b)

Fig.1 (c)

Fig.1 (d)

Fig.2

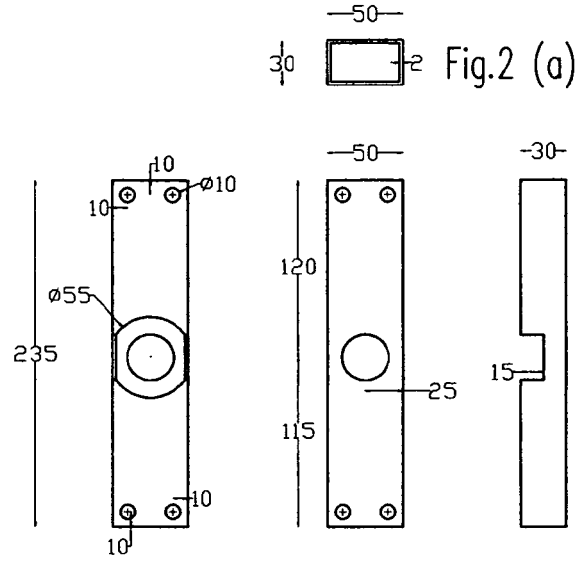


Fig.2 (b)

Fig.2 (c)

Fig.2 (d)

Fig.3

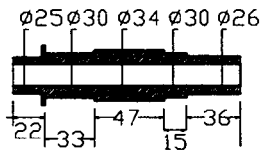


Fig.3 (a)

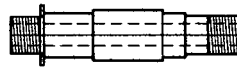


Fig.3 (b)

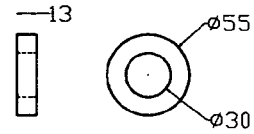


Fig.4

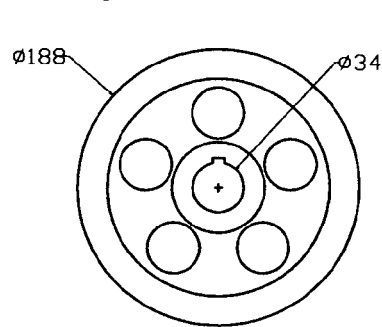


Fig.4 (a)



Fig.4 (b)

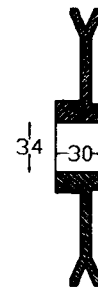


Fig.4 (c)

Fig.5

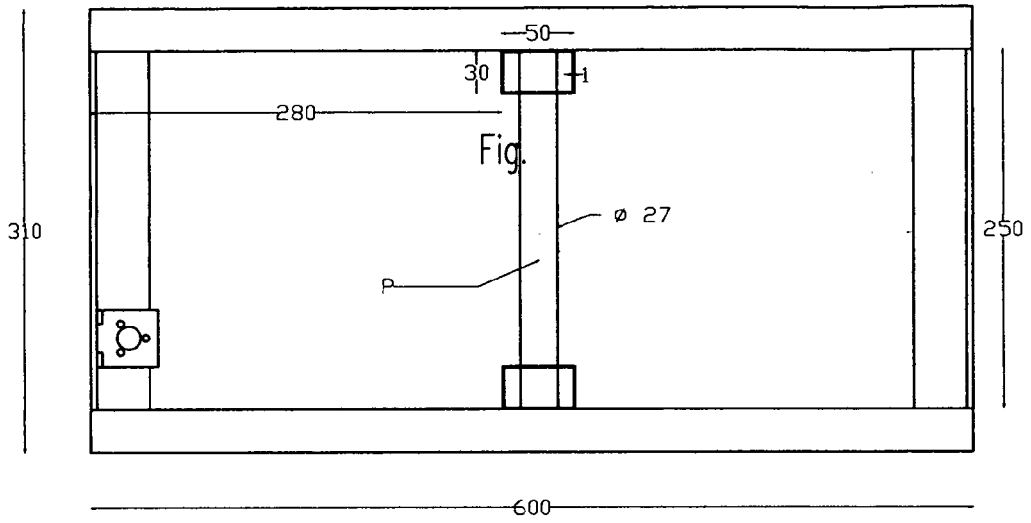


Fig.5 (a)

Fig.5 (b)

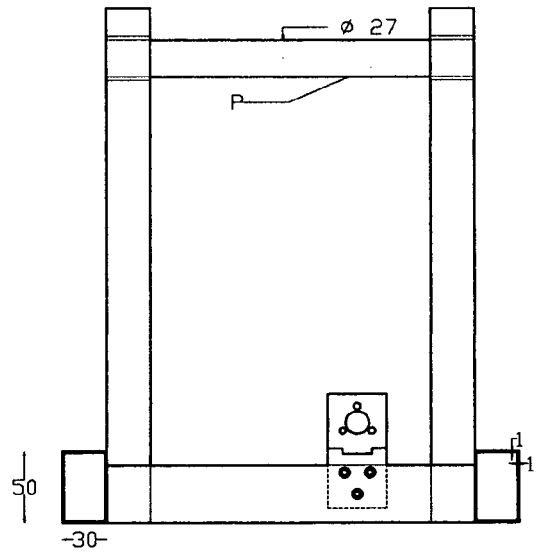


Fig.5 (c)

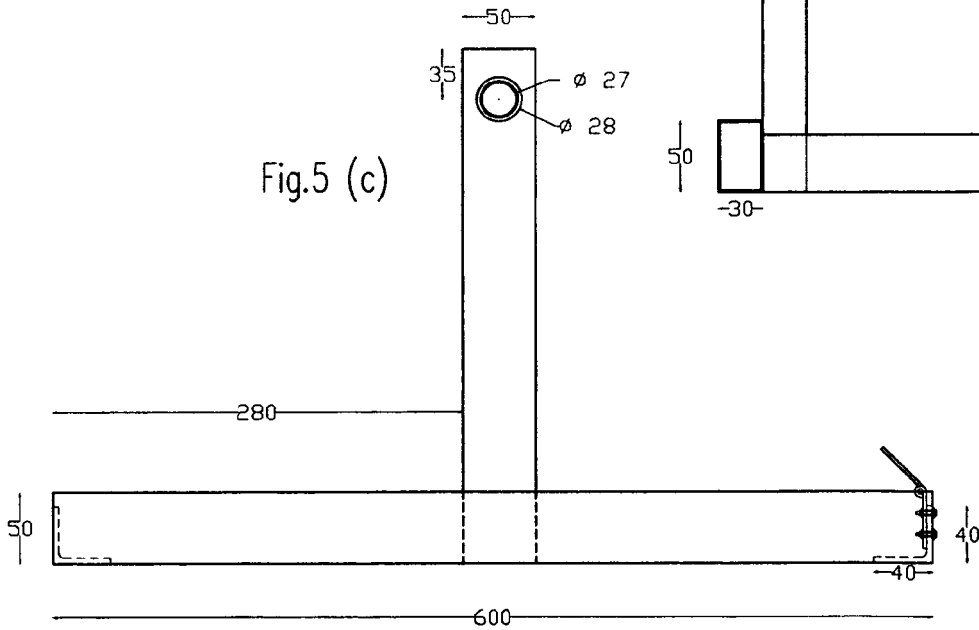


Fig.6

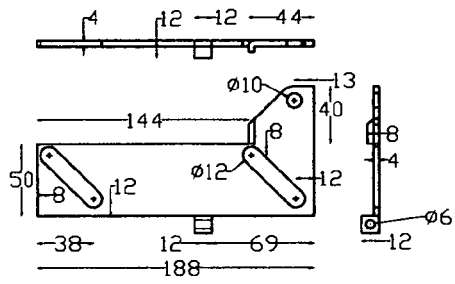


Fig.7

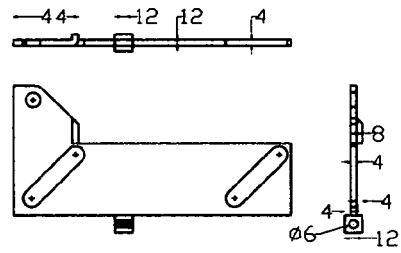


Fig.8

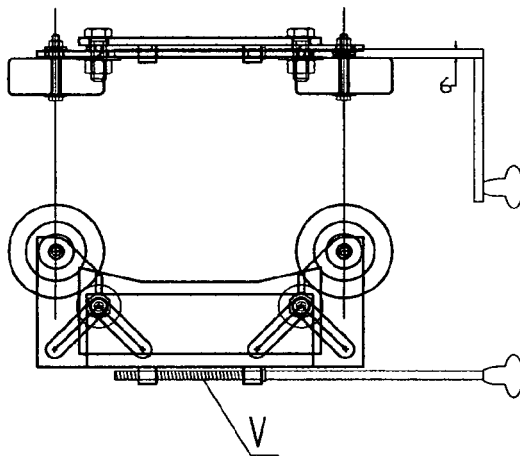
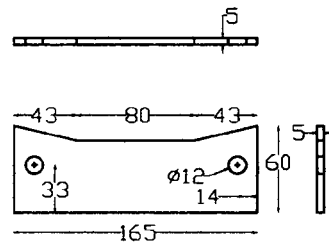


Fig.9

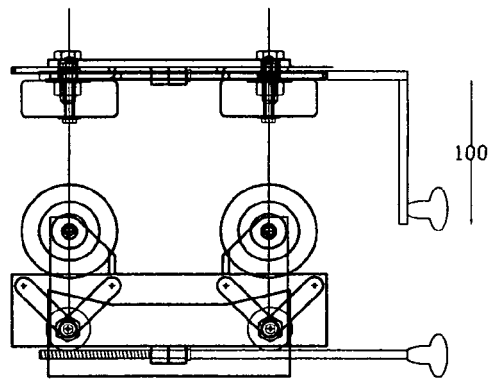
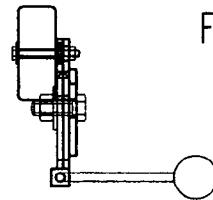


Fig.10

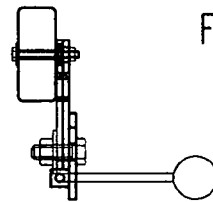


Fig.11

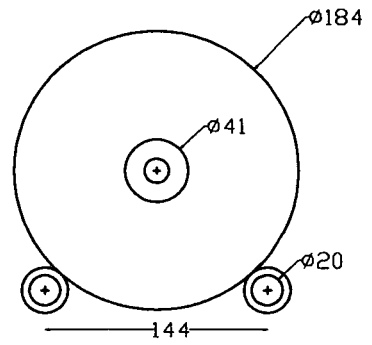
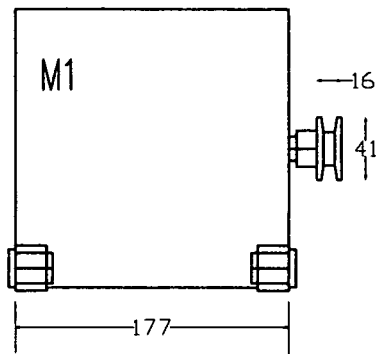


Fig.12

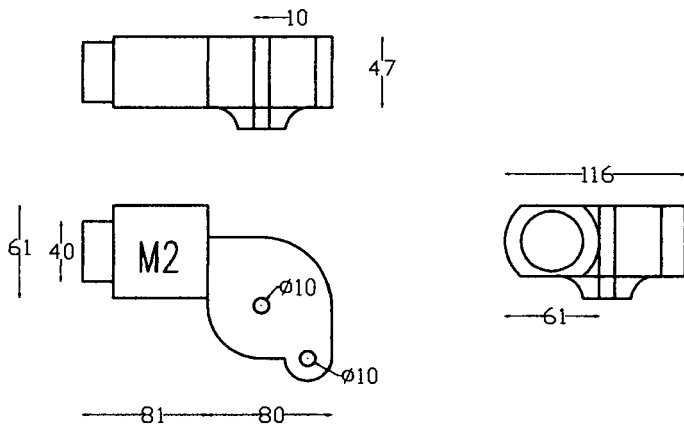


Fig.13

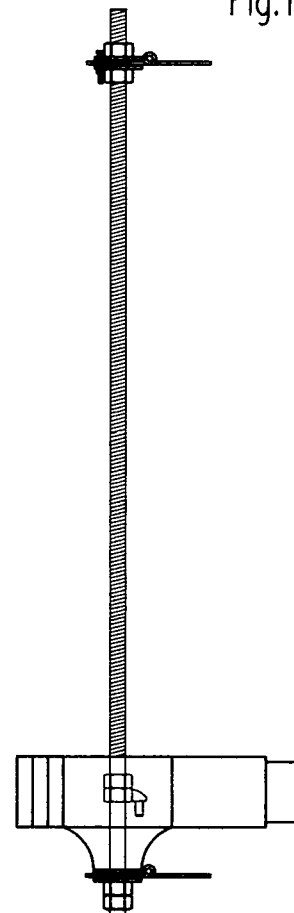


Fig.14

Fig.14 (a)

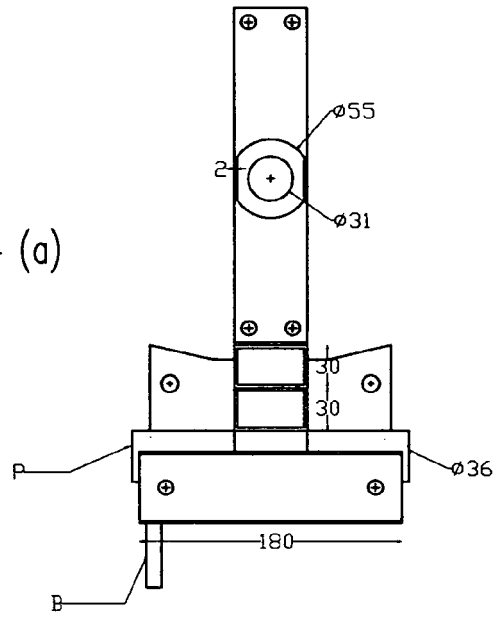


Fig.14 (b)

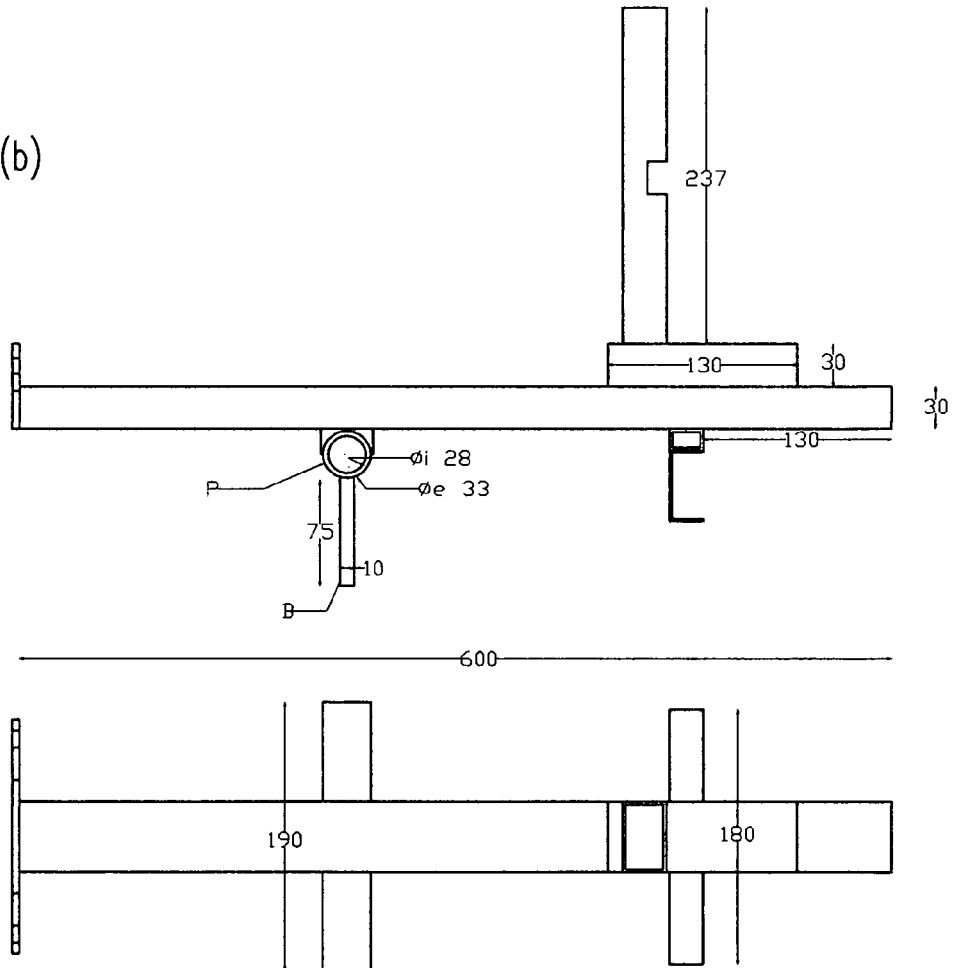


Fig.14 (c)



Fig. 15

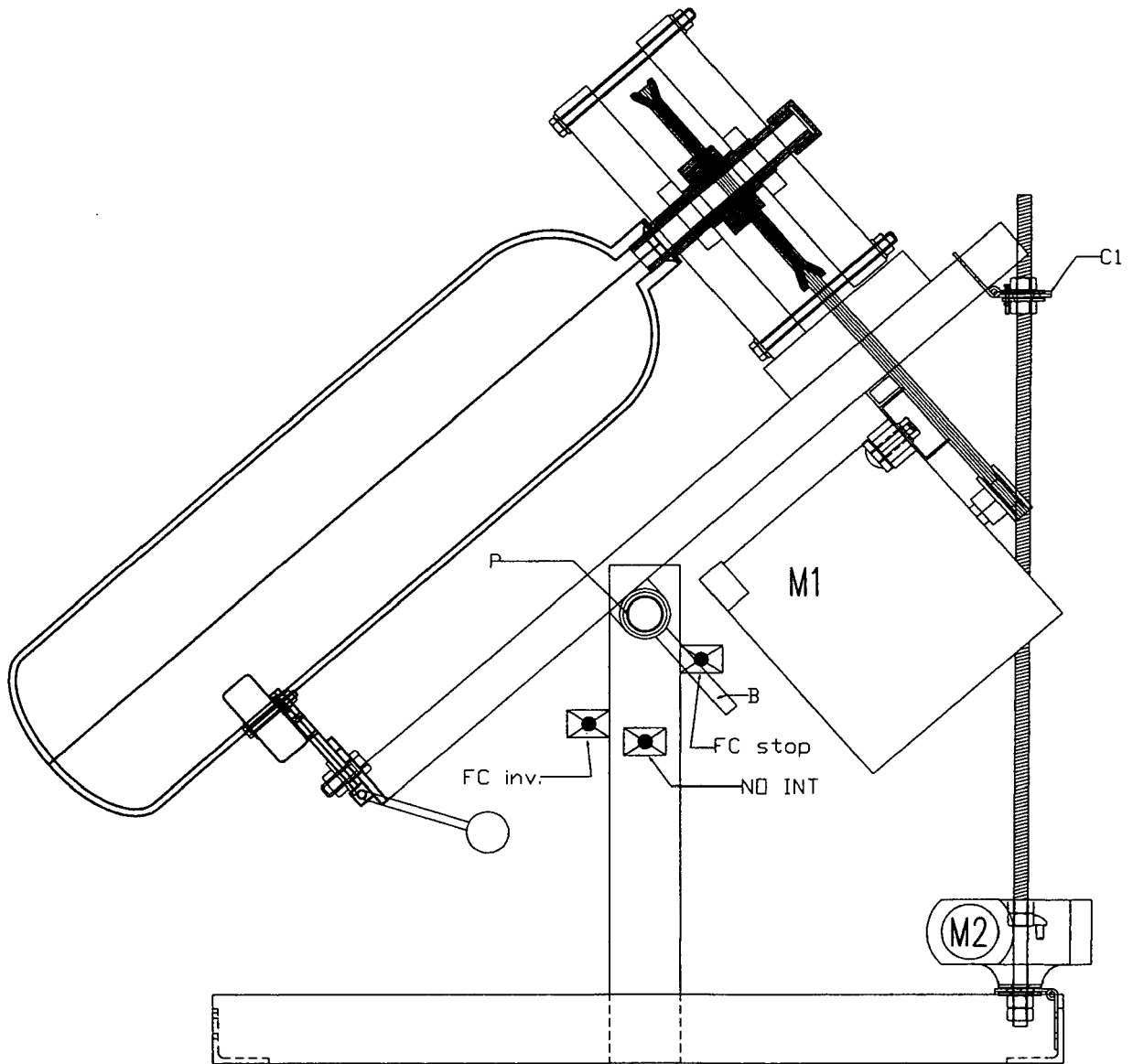


Fig.16

