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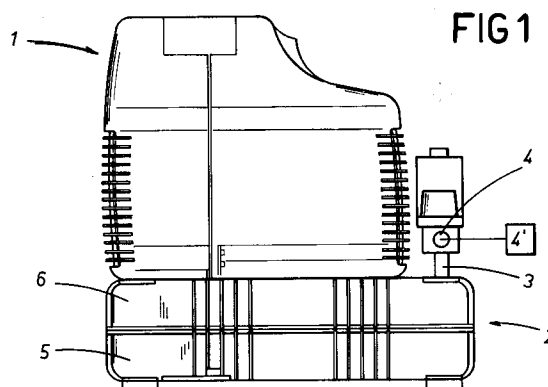
(11) Publication number:

0 560 739 A2

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **93830087.8**(51) Int. Cl.⁵: **G05D 16/00**(22) Date of filing: **04.03.93**(30) Priority: **06.03.92 IT BO920076**(43) Date of publication of application:
15.09.93 Bulletin 93/37(84) Designated Contracting States:
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I-40121 Bologna (IT)(54) **A tank pairable to a compressor for aeriform substances.**

(57) The invention relates to a tank (2) pairable with a compressor (1) of aeriform substances, which tank (2) is composed of two reciprocally connected shells (5, 6) with the interpositioning of a gasket (7) by means of screws (24) to determine the reciprocal connection of respective determined portions of the said shells (5, 6); at least one shell (6) is equipped with a plurality of threaded holes (12, 26, 29) for connecting the compressor (1) to the tank (2) and for connecting the tank (2) to a utiliser unit (4').

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The invention concerns a tank which is pairable to a compressor for aeriform substances.

In particular, the invention refers to a tank which can be connected to the outlet mouth of an air compressor and to a utiliser apparatus activatable by the compressor itself, with the aim of regulating the pressure with which the air reaches the utiliser apparatus.

The prior art embraces tanks with the above aim which are usually composed of a cylindrical shell made from sheet metal to which ends the respective cup elements or bottom elements are connected. The cylindrical shell is usually made from a sheet of roller-levelled or beaten metal, some zones of which are connected by welding. The bottom elements are also usually welded to the said shell, as are sleeves, in determined zones of the shell, which sleeves are destined to support control instruments as well as connection mouths between the compressor and the utiliser apparatus of the compressed air. Also by means of welding, support elements for wheels are frequently connected to the inferior portion of the tanks, while support elements for the compressor are connected to the superior portion.

The presence of the said welding in the above-described prior art tanks can give rise to problems in the hermetic sealing of the welding itself, since in order to avoid problems of corrosion originating from the passage of time and facilitated by the conditions of tension existing in metal arranged in proximity to the welding areas, they can be coated with superficial treatments but cannot be internally inspected or treated, unless special openings are made in the tank itself, internally to the said tanks.

Since each tank model is usually compatible, for reasons of standardisation, with more than one compressor model, the relative support elements for wheels and the support elements for the compressor, as well as the various sleeves and outlet mouths, must be connected by means of welding to the tank itself in different positions according to the compressor which will be used, and the relative holes in the cylindrical shell and the bottom elements have to be made time-by-time, in accordance with the type of compressor which will be coupled to the tank, in different positions, with considerable complications in the production procedure.

Also to be noted is the anti-accident norm which prohibits the vehicular transport of compressors together with their relative tank full of compressed air, since a simple bump of one of the afore-mentioned sleeves against an object could cause the welding to break and thus bring about the very dangerous detachment of the sleeve from the tank.

The aim of the present invention is thus to eliminate the above-mentioned drawbacks by providing a tank which is associable to an air-compressor completely free of welded seams, and thus extremely reliable and safe, and which can easily be designed in such a way as to be pairable, without any need for modification, to several compressor types.

A further aim of the present invention is to provide a tank of the above-mentioned type which is easily internally inspectable, and which can easily be internally protectively treated, that is by anodic oxidation.

The invention, as it is characterised in the claims, solves the problem by providing a compressor for aeriform substances, characterised in that it comprises at least two shells which are reciprocally connected with the interpositioning of gasket means, there also being envisaged screw means for the reciprocal connection of determined respective portions of the said shells, at least one said shell being equipped with a plurality of threaded holes for the connection of the said compressor to the said tank, and also for the connection of the tank itself to a utiliser unit.

Preferably, the said tank comprises two reciprocally facing shells, the shells exhibiting a plurality of housing recesses of respective end portions of the said screw means.

In a preferred embodiment of the present invention, the said tank comprises a non-return valve arranged internally to the tank and connecting the internal cavity of the tank itself with the delivery section of the said compressor.

The characteristics and advantages of the present invention will better emerge from the detailed description that follows, of an embodiment of the invention, herein illustrated purely in the form of a non-limiting example in the accompanying figures, in which:

- figure 1 shows a schematic frontal view of an air compressor to which a tank made according to the present invention is connected;
- figure 2 shows a plan view of the inside of a portion of the tank of figure 1;
- figure 3 shows a plan view of the outside of a further portion of the tank of the invention;
- figure 4 shows a lateral view, partially in section and made according to line IV-IV of figure 3, of the portion of tank illustrated in figure 3;
- figure 5 shows a lateral view in section, according to line V-V of figure 3, of the portion of tank of figure 3; and
- figure 6 shows a further lateral view in section, according to line VI-VI of figure 3, of the portion of tank of figure 3.

With reference to the figures, and in particular to figure 1, 1 denotes in its entirety an air compressor 1 superiorly supported by a tank 2 and exhibiting an outlet mouth (not illustrated) connected (not shown) to an inlet mouth (of which more hereinafter) of the tank 2. In a first embodiment, a vertical sleeve 3, connected to a superior surface of the tank 2 and in internal communication with it through a hole (of which more hereinafter), leads to a measuring instrument, constituted for example by a pressure gauge, which is connected by means of a conduit 4 to a compressed air utiliser unit 4'.

The tank 2 is essentially constituted by a box structure exhibiting in substance the shape of an internally hollow parallelepiped, and is subdivided by a horizontal plane into two halves 5 and 6, respectively inferior and superior and more or less equal to each other. The said two halves 5 and 6 differ only with regard to the presence and/or the position of a plurality of holes that, as will become clearer hereinafter, cross the said halves 5 and 6 in different positions. When the tank 2 is assembled, the two halves 5 and 6, which hereinafter will be referred to as "shells", are connected to each other in a way which will be better described hereinafter, with the interpositioning of a gasket 7 (only partially illustrated in figure 2) which guarantees a hermetic seal.

As can be seen in figure 3 in particular, where the lower shell 5 is seen from below and from the outside of the tank 2, the said lower shell 5 is realised through high-pressure die-casting and is superiorly defined by a horizontal and substantially rectangular wall 8. Close to the end and median zones of the longer sides of the horizontal wall 8, as well as at two internal portions of the horizontal wall 8 itself reciprocally connected by an axis 9 which is parallel to a longitudinal axis of the tank 2, the horizontal wall 8 projects vertical axis cup-recesses 10 internalwise of the tank 2 which are also present on corresponding portions of upper shell 6 shown in figure 2. The recesses 10 exhibit respective substantially cylindrical lateral surfaces (see also figure 6) and are limited, at their axial ends internal to the tank 2, by respective circular bases 11 coaxially crossed by respective vertical holes 12 (see figures 5 and 6) the function of which will become clearer hereinafter.

The edges of the horizontal wall 8 are rounded and both shells 5 and 6 are ribbed by a plurality of projecting strengthening ribs 13, parallel among themselves for each shell and normal to the edge, which interest both the horizontal wall 8 and the adjacent lateral walls 14 and 15 of the shells 5 and 6 (14 denotes the longer lateral wall).

According to figures 2 and 4, the internal surface of the upper shell 6 (and, though not illus-

trated, the internal surface of the lower shell 5 too) is ribbed by a plurality of projecting ribs 16 which connect the recesses 10 among themselves and, by intersecting other ribs 17 developing parallel to the horizontal direction of the shorter walls and other ribs 18 developing parallel to the horizontal direction of the longer walls 14, strengthen a multiplicity of reciprocally ribbed zones of the wall 8, 14 and 15.

According to what is illustrated, in particular in figure 3, a recess 10 arranged close to the superior right edge of edge of the shells 5 and 6 communicates laterally, as is better shown in figure 5, with a flaring 19 of the horizontal wall 8 projecting towards the inside of the tank 2. The flaring 19 has a substantially rectangular shape in plan view (figure 3) and is defined, at its bottom projected towards the inside of the tank 2, by an inclined and substantially rectangular wall 20 which determines a progressive diminution of its section as it proceeds towards the inside of the tank 2. The depth of the flaring 19 measured according to a normal direction to the horizontal wall 8 progressively decreases starting from the portion of the flaring 19 itself communicating with the recess 10 it begins from.

At a portion adjacent to a wall 15 of shorter length, the horizontal walls 8 of both shells 5 and 6 are equipped (see figures 2 and 3) with a recess 21 projecting vertically towards the inside of the tank 2. The recess 21 also interests the wall 15 it is adjacent to, and exhibits a base 22 which is parallel to the bases 11 of the recesses 10, in a median portion of which base 22 a vertical-axis threaded hole 23 is bored.

The modalities of use of the tank 2 will now be described.

The tank 2 is assembled by connecting the two shells 5 and 6 to each other, after having interpositioned, between the substantially vertical walls 14 and 15, the afore-mentioned gasket 7, by means of a plurality of screws 24 (figures 2 and 3) the stems of which cross respective couples of holes 12, preferably at least partially threaded, vertically aligned and bored in the bases 11 of the recesses 10.

Obviously, after having positioned the shell 6 over the other shell 5, the recesses 10 of the two shells 5 and 6 are vertically aligned in couples.

A sealing substance might be arranged before the assembly between the said holes 12 and the stems of the screws 24.

Consequently to what has been written hereinabove, leaving aside the holes 12 in the shells 5 and 6 (which are kept sealed by their relative screws 24) and a plurality of holes whose function and positions will be better defined hereinafter, the tank 2 is completely airtight, and is

much safer than prior art tanks 2 when full, because in the case of overpressure the gasket 7 breaks before the tank 2 itself can explode. Furthermore, the presence of the ribbing 16, 18 and 18 guarantees, even when the tank 2 is full of compressed air, a perfect maintenance of shape of the tank 2, since they considerably increase the mechanical resistance of the tank 2 and enable it to tolerate internally considerable overpressures without giving rise to any drawbacks.

As can be seen in figure 2, at an intermediate zone of the horizontal wall 8 a plurality of threaded holes 26 are bored in special thicker sections 27 of the horizontal wall 8, which holes 26 are arranged at specially chosen zones with the aim of enabling a connection to be made to the wall 8, by means of screws (not illustrated), of different compressor models. Naturally the holes 26 which are not used to connect a compressor 1 to the shell 6 can be stopped by means of the simple insertion of screws (not illustrated), possibly surface-treated with a sealing substance. Alternatively, the shell 6 could be equipped, immediately before its connection to the shell 5, only with the necessary holes 25, bored at only a part of the thicker zones 27.

It should be noted that at least a part of the holes 12 or 26 of the lower shell 5 could be used to connect to the lower shell 5 support elements for the tank 2 constituted, for example, by wheels (not illustrated). If so desired, the said screws 24 crossing the holes 12 present in the bases 11 of the recesses 10 could be used to obtain the above-mentioned result.

As shown in figures 2 and 3, at an adjacent portion to a wall 14 the wall 8 of each shell 5 and 6 is equipped with two side-by-side thicker parts 28, in each of which a respective threaded hole 29 can be made, aimed at placing the inside of the tank 2 in communication respectively with the said outlet mouth of the compressor 1 and the said utiliser unit 4'.

According to a second embodiment of the present invention, the said recess 21 is envisaged to have the aim of having arranged in it a pressure gauge 21', or another necessary measuring instrument, so that the measuring instrument in question communicates with the inside of the tank 2 through the hole 23, does not project from the general shape of the tank 2 and is considerably protected from bumps. Similarly, the flaring 19 permits the repaired housing of a conduit 19' connecting a portion of the compressor 1 or the said utiliser unit 4' with the inside of the tank 2 through the hole 12 bored at the bottom of the recess 10 adjacent to the flaring 19 itself.

In a preferred embodiment of the present invention, the delivery section (not illustrated) of the compressor 1 communicates with the inside of the

tank 2, for example through one of the holes 29, by means of a non-return valve 30 of known type housed in the tank 2 itself, which valve permits the entrance of compressed air into the tank 2 and prevent any return of the same towards the compressor 1. This arrangement of the valve 30 internally to the tank 2 guarantees the absolute protection of the valve 30 itself from bumps.

It is obvious from the preceding description how the tank 2 fully reaches the predetermined aims, since it is completely without welded seams, and is extremely reliable and safe, and easily designable so as to be pairable, without need for modifications, with several types of compressor.

Furthermore, the tank 2 can easily be internally inspected and internally surface-treated with protective substances.

Claims

1. A tank pairable to a compressor for aeriform substances, characterised in that it comprises at least two shells (5, 6) which are reciprocally connected, with the interpositioning of gasket means (7), screw means (24) also being provided for the reciprocal connection of respective determined portions of the the said shells (5, 6), and at least one said shell (6) being equipped with a plurality of threaded holes (12, 26, 29) for connecting the said compressor (1) to the said tank (2) and for connecting the said tank (2) to a utiliser unit (4').
2. A tank as in claim 1, characterised in that at least a part of the said threaded holes (26) are selectively usable for connecting a compressor (1) to the tank (2).
3. A tank as in claims 1 or 2, characterised in that it comprises two shells (5, 6) which concavities face each other, the said shells (5, 6) exhibiting a plurality of recesses (10) for housing respective portions of ends of the said screw means (24).
4. A tank as in claim 3, characterised in that at least one said shell (5, 6) exhibits at least one further recess (21) for housing a measuring instrument (21') connected with the inside of the said tank (2).
5. A tank as in any of the preceding claims from 1 to 4, characterised in that at least one said shell (5, 6) exhibits at least a flaring (19) for housing a conduit (19') connecting the inside of the said tank (2) to a portion of the said compressor (1).

6. A tank as in any of the preceding claims from 1 to 4, characterised in that at least one said shell (5, 6) exhibits at least one flaring (19) for housing a conduit (19') connecting the inside of the said tank (2) with the said utiliser unit (4'). 5
7. A tank as in any of the preceding claims from 1 to 6 characterised in that it comprises a non-return valve (30) arranged internally to the said tank (2) and connecting the internal cavity of the tank (2) with a delivery section of the said compressor (1). 10
8. A tank as in any of the preceding claims, characterised in that surfaces of the said shells (5, 6) internal to the said tank (2) are ribbed by a plurality of strengthening projecting ribs (16-18). 15
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9. A tank as in any of the preceding claims, characterised in that determined portions of the surfaces of the said shells (5, 6) external to the said tank (2) are ribbed by a plurality of strengthening projecting ribs (13). 25

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