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Valve equipment for a two-phase compound

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ABSTRACT

The equipment comprises a tap and means for connection to an installation of use and a non-return valve, the tap comprising means for delivering the liquid phase (8), means for delivering the gaseous phase (6), a transmission plunger for the liquid phase (11) and a male connector (2) arranged in order to be connected to a female connector (4) of the equipment designed to communicate with the installation, the two connectors forming a connector called a rapid connector and the non-return valve being placed in the female connector (4). The invention is readily applicable to the viticulture field.

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INVENTION TITLE: "VALVE EQUIPMENT FOR A TWO-PHASE COMPOUND"

DETAILS OF ASSOCIATED APPLICATION NO'S:

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The following Statement is a full description of this invention including the best method of performing it known to me/us:

TITLE

"VALVE EQUIPMENT FOR A TWO-PHASE COMPOUND"

The invention relates to the field of taps for containers of two-phase compounds. These taps are used for emptying or filling the containers with two-phase compound. Two-phase compounds such as sulphur dioxide have two phases that permanently cohabit within one and the same container: a liquid phase and a gaseous phase. In the viticulture field, sulphur dioxide is used in large quantities during the wine-making process. It inhibits the development of yeasts and bacteria, thereby stopping the fermentation at the desired moment and sterilizes the wine. The insertion of sulphur dioxide into a wine vat makes it possible to select the yeasts because those necessary for the wine-making process are more resistant to sulphur dioxide than the other yeasts present.

The wine-making process comprises several operations necessary to convert the grapes into wine such as chaptalization, acidification or alcohol fermentation. During these various operations, the operator must draw off gaseous and liquid samples in order to test that the wine-making process is progressing correctly. The containers comprising a mixture of wine and sulphur dioxide have two separate taps for drawing off the two phases. One tap is placed on the upper portion of the container and draws off the gaseous portion while a tap placed on the lower portion of the container makes it possible to draw off the liquid portion. The wine in the maturation phase is stored in large-volume (500 to 1000 litres) tanks or containers.

Certain containers possess only a single tap for drawing off the liquid phase and the

gaseous phase. It is then necessary to turn the container over in order to draw off the two phases in turn. Turning over containers of considerable volume comprises many dangers in terms of safety; the pivoting of the containers creates pressures and additional forces on the walls of the container and at the delivery taps, that can therefore cause the tap to break or to malfunction. The mechanisms making it possible to pivot large-volume containers require a considerable financial investment and pivoting the containers slows the rate of the measurements by the operator. Containers comprising two taps require very long connectors in order to be able to reach both the upper tap and the lower tap. In addition, working zones must be arranged at each tap in order to be able to connect the connectors.

Another disadvantage of the taps of the prior art is the connection between the tap and the connector that may have leaks of toxic or corrosive fluid. Sulphur dioxide is a toxic and corrosive substance that must be handled with caution. In industry, sulphur dioxide is used mainly for the production of sulphuric acid. Because of screw-connection, leaks may occur during the operations of emptying or filling the containers which puts the operator in danger.

The taps of the prior art comprise a male end-piece that is threaded to receive a female casing screwed onto the male end-piece using a clamping tool such as an adjustable spanner or a pipe wrench. O-rings are arranged on the male end-piece and in the female casing in order to form a sealed connector when they are assembled. To achieve the assembly, the half-connectors must be placed face to face in opposition and then screwed into one another; the seals are then one against the other. The female casing is screwed by hand initially and then with a tightening means in order to

complete the fastening. Repeated coupling and uncoupling of the connector damage the seals and the screw thread of the male end-piece. The wear of the seals creates leaks at the coupling which is a danger for the operator. The coupling of the male and female end-pieces requires the use of tightening tools that increase the fastening time and hamper the user when manipulating toxic and corrosive products.

When the coupling is established, the filling of the tank with sulphur dioxide may cause the wine in the tank to partially flow back into the connector. The male connector comprises traces of the said wine on its end-piece. After the connector has been disconnected, the said male connector is connected to another tank containing a wine of a different kind. During the feeding with sulphur dioxide, traces of wine are brought into the second tank. Wines of different origins are mixed, the wine contained in the second tank is then contaminated and loses its specification which makes the whole tank unmarketable. This is why it has been proposed to place a non-return valve in the tap. However, there is the risk that, if there is a change of temperature and wine is trapped because of the valve, there may be small explosions.

The invention aims to alleviate at least some of all these disadvantages and to propose a tap for a container of a two-phase compound arranged so that a single tap can deliver the liquid phase and the gaseous phase of the compound and that the connection is made without tools or seals.

In the field of refrigerating fluids, taps are known that contain a plunger for the liquid phase.

Therefore, the invention relates to valve equipment for a two-phase compound, comprising a tap and means for connection to an installation of use and a non-return valve, the tap comprising means for delivering the liquid phase, means for delivering the gaseous phase, a transmission plunger for the liquid phase and a male connector arranged in order to be connected to a female connector of the equipment designed to communicate with the installation, the two connectors forming a connector called a rapid connector and the non-return valve being placed in the female connector.

The invention is notable particularly in that the tap is connected to the installation of use by a rapid connector, and by mounting the non-return valve not only in the tap itself but in the connector in this instance, its female portion, being without any risk either of explosion or of unintentional mixture of liquid. It will be noted that the invention has integrated a rapid connector in the tap and removed the non-return valve from the tap.

The invention makes it possible to gain access to the two phases of the compound through a single outlet orifice. It is possible to draw off the liquid and gaseous phases without turning the container over. The drawing off of the various phases is then made easier and hence quicker. Large volume containers are no longer turned over and make it possible therefore to prevent impacts and pressure changes, which could weaken the tap of the equipment.

The connection made by a rapid connector ensures a seal of the connection and a risk-free handling of the compound.

The invention will be better understood with the aid of the following description, with reference to the appended drawing in which:

- Figure 1 is a view, partially in section, of the tap of the invention furnished with a plug;
- Figure 2 is a view, partially in section, of the female connector of the rapid connector of the tap of Figure 1;
- Figure 3 is a view, partially in section, of the male connector of the rapid connector of the tap of Figure 1; and
- Figure 4 is a view, partially in section, of the female connector coupled to the male connector of the tap.

The valve equipment that will now be described comprises a body 1 and a male outlet orifice 2, this male orifice 2 being coupled to a female connector 4.

As shown in Figure 1, the body of the tap 1 comprises three cylindrical stages that are out of alignment; the top stage supports a delivery handwheel for the gaseous phase 6 that can rotate relative to the axis X_1. The second stage, out of alignment with the first, supports a delivery handwheel for the liquid phase 8 that can rotate on the axis passing through the centre of the handwheel and perpendicular to the plane defined by the orthogonal axes (x,y). The male outlet orifice is placed laterally on the second stage of the body of the tap. A plug 19 covers the male outlet orifice, this plug 19 is connected to a chain 17 held on the body of the tap by means of a chain fastener 18. A double-phase body forms the bottom stage of the body 1 of the tap. This double-phase body comprises an orifice for the gaseous phase 9 and a transmission plunger for the liquid phase 11 extended at its end by a cannula 10.

As shown in Figures 1 and 3, the male outlet orifice 2, situated on the second stage of the tap, comprises a tiered cylindrical body having an annular shoulder 21 on its outer casing followed by an annular narrowing 22 thus forming a retention groove.

The female connector 4, as shown in Figure 2, has a tiered cylindrical body. A safety tubular casing 42 of annular shape covers the end of the body of the female connector 40. The safety tubular casing 42 is secured by a retaining ball 43 and a retaining ring 44. A tubular casing spring 41 is situated between the body of the female connector 40 and the safety tubular casing 42. At the end of the female connector 4, under the safety tubular casing 42, orifices 51 are made on the circumference of the body 40 of the female connector. These orifices are arranged to correspond with locking balls 52 placed between the safety tubular casing 42 and the body of the connector 40.

The female connector has a non-return valve 45 held by a stem 58 onto which a coil spring 46 is rolled. The coil spring 42 is supported at its base by a stop washer 48. This washer 48 is supported by an annular retaining ring 47 which holds the coil spring 46 together with the stop washer. A flat seal of the valve 54 is placed between the valve 45 and the body of the female connector 40.

To extract the liquid phase from the container, the handwheel for delivering the liquid phase 8 is rotated which causes the liquid to rise through the cannula 10 and the transmission plunger for the liquid phase 11 under the pressure of the gaseous phase. The liquid phase is guided into the two-phase body 12 up to the male outlet orifice 2.

To extract the gaseous phase from the container, the handwheel for delivering the gaseous phase 6 is rotated which causes the gas to rise under pressure through the orifice 9. The gaseous phase is then guided into the two-phase body 12 up to the outlet orifice 2.

The outlet orifice 2 makes it possible to be connected to an installation of use in order to empty or fill the container.

The female connector is connected to the male connector in two stages. First of all, the female connector 4 is brought to the body of the male connector 2. Then, the safety tubular casing is turned on the connection axis W, the locking balls 52 move and are housed in the orifices 51 in order to become blocked between the tubular casing 42 and the annular narrowing 22 of the male connector as shown in Figure 4. The female connector 4 is thus locked in translation on the connection axis W. The O-ring 53 provides the seal of the connection at the tubular casing.

When the gaseous phase or the liquid phase is drawn off, the non-return valve 45 situated in the female connector is pushed by the exiting compound. The spring 46 is compressed up to the stop washer 47 and the non-return valve 45 allows the compound in the container connected to the female connector 4 to pass through.

When drawing-off is complete, the valve 45 returns to its original position and the flat valve seal 54 provides the seal at the female connector. When the connector is disconnected, it is necessary to rotate the safety tubular casing 42 while compressing the spring 41; this makes it possible to release the balls from the orifices 51 and to

disconnect the two portions of the connector.

Naturally, a delivery handwheel has been described but that could have been a delivery handle. Similarly, locking balls have been described but a bayonet lock would be suitable.

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CLAIMS

1. Valve equipment for a two-phase compound, comprising a tap and means for connection to an installation of use and a non-return valve (45), the tap comprising means for delivering the liquid phase (8), means for delivering the gaseous phase (6), a transmission plunger for the liquid phase (11) and a male connector (2) arranged in order to be connected to a female connector (4) of the equipment designed to communicate with the installation, the two connectors forming a connector called a rapid connector and the non-return valve (45) being placed in the female connector (4).

2. Equipment according to Claim 1 such that the female connector (4) comprises locking means (52) in order to secure the connector.

3. Equipment according to Claim 1 wherein the transmission plunger for the liquid phase (11) is terminated by a cannula (10).

4. Equipment substantially as hereinbefore described with reference to the accompanying drawings.

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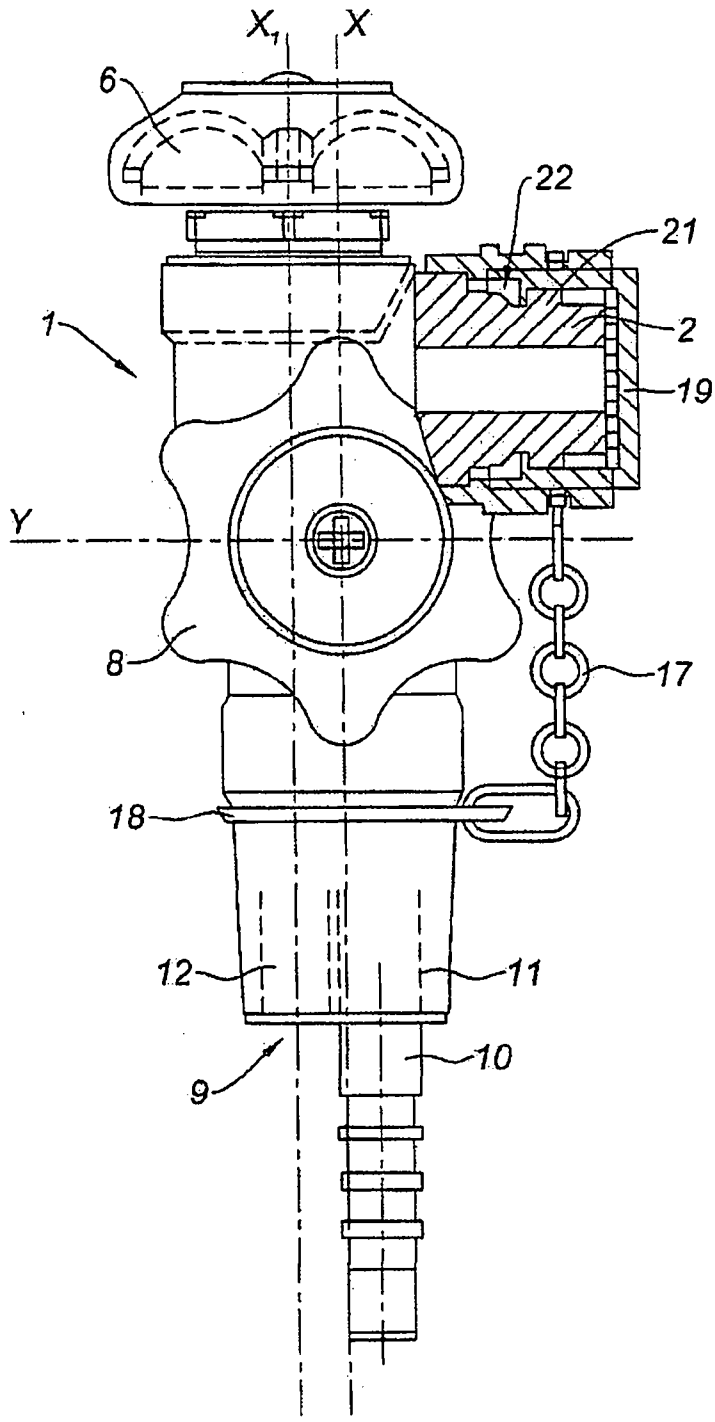

Fig. 1

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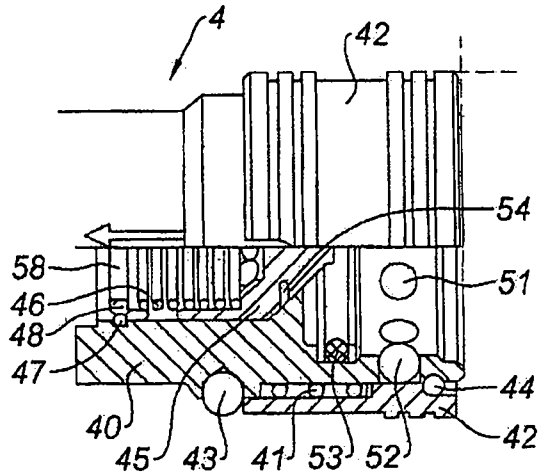

Fig. 2

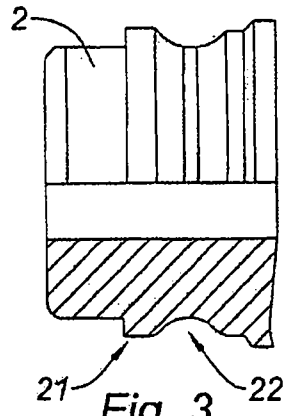

Fig. 3

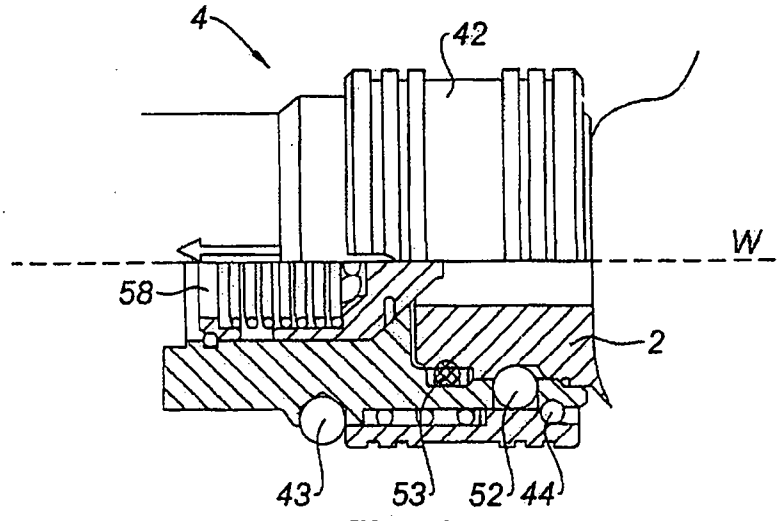

Fig. 4