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(54)

Discharge and refilling assembly for refrigeration systems

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A discharge and refilling assembly for refrigeration systems comprising a pump unit (2) and a gauge unit (3) operatively associated to each other and possi-

bly with a source of pressurized refrigerant gas, wherein said pump unit (2) is associated to said gauge unit (3) by means of a rigid duct (8) supporting the gauge unit (3) relative to the pump unit (2).

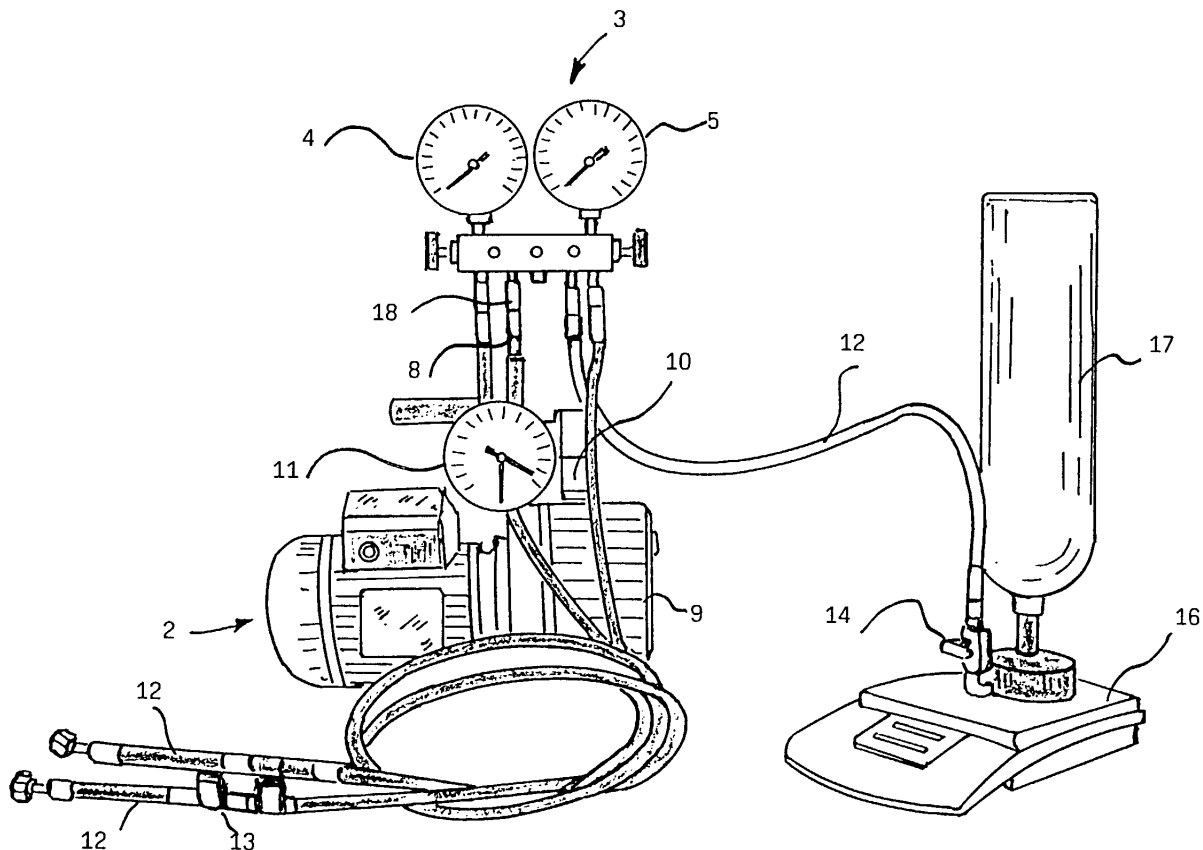


FIG. 2

Description

[0001] The present invention relates to a discharge and refilling assembly for refrigeration systems.

[0002] The existing refrigeration systems irrespective of their specific use, require at the installation or from time to time maintenance interventions comprising as main or accessory step the discharge and refilling of refrigerant inside the system.

[0003] In order to carry out these operations refilling assemblies have been used since a long time generally comprising a pump unit and a gauge unit associated to one another through suitable hoses and both supported by an external frame. In this configuration the external frame has the function of supporting the entire assembly, particularly useful in these conditions where the operator has to act in a restricted space and must keep all the instruments near him.

[0004] Although these refilling assemblies solve the above mentioned technical problem, they have some disadvantages.

[0005] Although the frame is useful under certain conditions, it is anyway very cumbersome and does not allow maintenance operations when the space at disposal is too small.

[0006] In addition the gauge unit often must be changed according to the plant to be inspected and in this case as all the elements are fixed on the frame, time is required to disassemble the gauge unit and to assemble another gauge unit suitable for the new operation, so as to increase the maintenance costs.

[0007] Finally the known assemblies do not allow an easy use of portable balances to check the correct amount of refrigerant introduced into the circuit, because special measures must be taken with a consequent additional cost.

[0008] The object of the present invention is to overcome the drawbacks belonging to the prior art systems.

[0009] Object of the present invention therefore is a discharge and refilling assembly for refrigeration systems which is compact and practical allowing to be used in any condition checking in a precise way the system tightness and better warranting quality of the introduced refrigerant gases.

[0010] Briefly the present invention provides for a discharge and refilling assembly for refrigeration systems comprising a pump unit and a gauge unit operatively associated to each other and possibly with a source of pressurized refrigerant gas, wherein said pump unit is associated to said gauge unit through a rigid duct supporting the gauge unit relative to the pump unit.

[0011] The discharge and refilling assembly for refrigeration systems according to the present invention is characterized by the features set forth in claim 1.

[0012] Further advantageous features are indicated in the dependent claims.

[0013] Further characteristics, advantages and details of the discharge and refilling assembly for refriger-

ant systems according to the invention will be better understood by reading the following description made with reference to the accompanying drawings in which a preferred embodiment as an illustrative but not limiting example is shown.

[0014] Fig. 1 is a hydraulic diagram of the discharge and refilling assembly for refrigeration systems according to the invention.

[0015] Fig. 2 is a perspective general view of the discharge and refilling assembly shown in Fig. 1.

[0016] Fig. 3 is a partial sectional view of a detail of the discharge and refilling assembly shown in Fig. 2.

[0017] With reference to said Figs. of the drawings, the discharge and refilling assembly 1 for refrigeration systems according to the invention comprises a pump unit 2 and a gauge unit 3 operatively associated to each other and possibly to a source of pressurized refrigerant gas such as a cylinder 17 coupled to a portable balance 16 or equivalent weight measuring means.

[0018] The pump unit 2 comprises a vacuum pump 9 connected in cascade to an electromagnet valve 10, a vacuum gauge 11 and finally a rigid duct 8 connecting to a pressure gauge unit 3 and supporting the latter above said pump unit 2.

[0019] Advantageously said rigid duct 8 at the end connected to the pressure gauge unit 3 is provided with a fixed and rigid thus not flexible revolving fitting 18. More particularly said fitting comprises a first revolving knurled portion 19 to improve the user's grip, in direct contact with said pressure gauge unit 3 and provided with an inner seal 20. Said revolving portion 19 ends inside a second extension portion 21 in communication with said rigid duct 8 through a broached connection 22.

[0020] This particular solution makes easier, as it will be better illustrated hereinafter, to put into service the pressure gauge unit 3 relative to the other components of the discharge and refilling assembly, as well as its substitution according to the refrigeration systems to which said discharge and refilling assembly is applied, the whole without requiring a cumbersome and impractical external frame.

[0021] The pressure gauge unit 3 may comprise according to the needs, a number of different instruments. In the following embodiment given as an illustrative example only, there are for instance a low pressure gauge 4 connected to a first line communicating with the pump unit 2, the refrigerant cylinder 17 and a high pressure gauge 5, and to a second line communicating with a hose 12 provided near the end with a ball valve 13, said hose 12 being connected to the refrigeration system during operation.

[0022] Said high pressure gauge 5 is in a similar way connected to a first line communicating with said pump unit 2, refrigerant cylinder 17 and said low pressure gauge 4, and to a second line communicating with a hose 12 provided near the end with a ball valve 13, also said hose 12 being connected to the refrigeration system during operation. Said first lines connecting the low

and high pressure gauges 4, 5 with the pump unit 2 and the cylinder 17 are provided with low and high pressure valves 6, 7 respectively.

[0023] Said cylinder 17 coupled as shown to a balance 16 is connected through a ball valve 14 to a hose 12 whose other terminal portion ends on a couple of valves 15 from which the refrigerant line is starting, connected to said first lines of the low and high pressure gauges 4, 5 respectively.

[0024] The operation of the above described discharge and refilling assembly 1 is generally identical to that of the known assemblies. In practice the following steps are indeed carried out: connection to the refrigeration system through the hoses 12 connected to the low and high pressure gauges 4 and 5; discharge and tightness check of the refrigeration system through the pump 9 and the elements connected thereto; refilling of refrigerant through the cylinder 17 and a weight measuring means; check of the operative pressures of the refrigeration system by reading the gauges 4 and 5 and disconnection of the discharge and refilling assembly 1 at the end of the operations.

[0025] On the contrary there are considerable differences in the easiness with which the pressure gauge unit may be changed by using the most suitable type for the kind of refrigerant charged in the system on which the different operations are carried out. In this way any possibility of contamination among the various refrigerants used in different refrigeration systems is avoided as well.

[0026] Indeed to carry out said change it is sufficient to operate on the revolving fitting 18 in communication with the duct 8 by acting on the first revolving portion 19 to unlock the previously installed gauge unit, then to connect the gauge unit most suitable for the subsequent operation by acting again on said portion 19 with a tightening action, said operation being effected in few seconds.

[0027] Moreover the provision of the duct 8 associated at the lower end with the pump unit 2, in view of the particular upper revolving fitting with the gauge unit 3, allows to avoid any contamination between oil of the vacuum pump 9 and the refrigeration system under maintenance.

[0028] A further difference occurs during the operation of checking the tightness of the refrigeration system in view of the provision of the vacuum gauge 11 and the electromagnetic valve 10 checking possible leaks with great precision.

[0029] At last as there is no need of a frame to which the whole discharge and refilling assembly 1 is fixed, the wide use of electronic portable balances of programmable or non-programmable type, to check the amount of gas introduced into the refrigeration system during the refilling operation, is made more practical.

[0030] Of course to the embodiment previously described as an illustrative and non-limiting example, many modifications, adaptations, integrations, varia-

tions and substitutions may be made however without falling outside the scope of the present invention as set forth in the following appended claims.

Claims

1. A discharge and refilling assembly for refrigeration systems comprising a pump unit (2) and a gauge unit (3) operatively associated to each other and possibly with a source of pressurized refrigerant gas, **characterized in that** said pump unit (2) is associated to said gauge unit (3) by means of a rigid duct (8) supporting the gauge unit (3) relative to the pump unit (2)
2. The discharge and refilling assembly for refrigeration systems according to claim 1), **characterized in that** said rigid duct (8) at the end connected with said gauge unit (3) is provided with a fixed and rigid revolving fitting (18) to make easier connection and disconnection of said gauge unit (3).
3. The discharge and refilling assembly for refrigeration systems according to claim 2), **characterized in that** said revolving fitting (18) comprises a first knurled revolving portion (19) in direct contact with said gauge unit (3), provided with an inner seal (20), said revolving portion (19) ending inside a second extension portion (21) in communication with said rigid duct (8) through a broached connection (22).
4. The discharge and refilling assembly for refrigeration systems according to claim 1) **characterized in that** said pump unit (2) is provided with a vacuum gauge (11) and an electromagnetic valve (10) associated to a vacuum pump (9) to check tightness of said refrigerant systems.
5. The discharge and refilling assembly for refrigeration systems according to claim 1), **characterized in that** said source of pressurized refrigerant gas comprises at least a cylinder (17) of pressurized refrigerant gas associated to a weight measuring means to check the weight of the gas introduced by said cylinder (17) into said refrigeration systems.
6. The discharge and refilling assembly for refrigeration systems according to claim 5), **characterized in that** said weight measuring means comprises an electronic balance (16) even of programmable type.

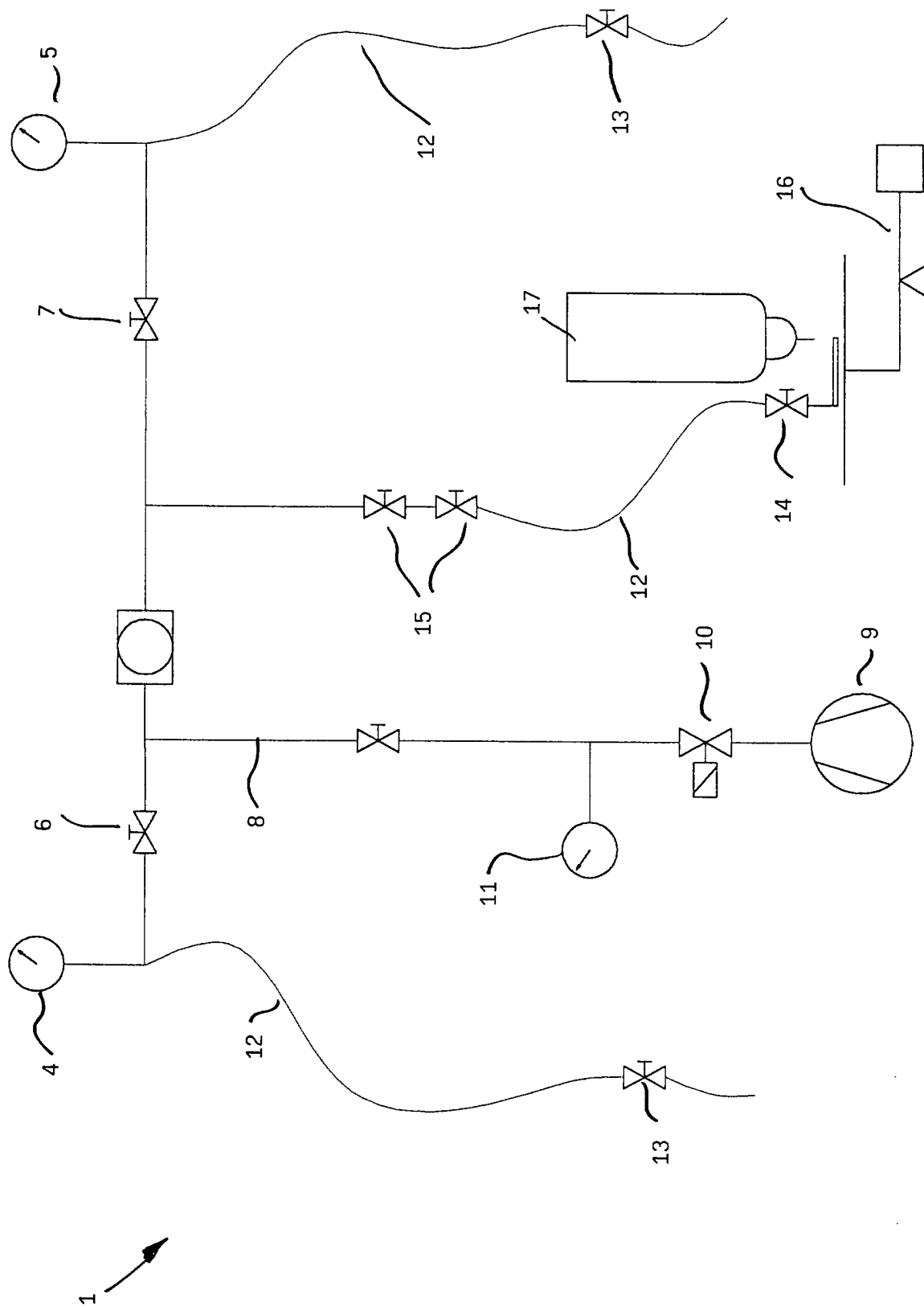


FIG. 1

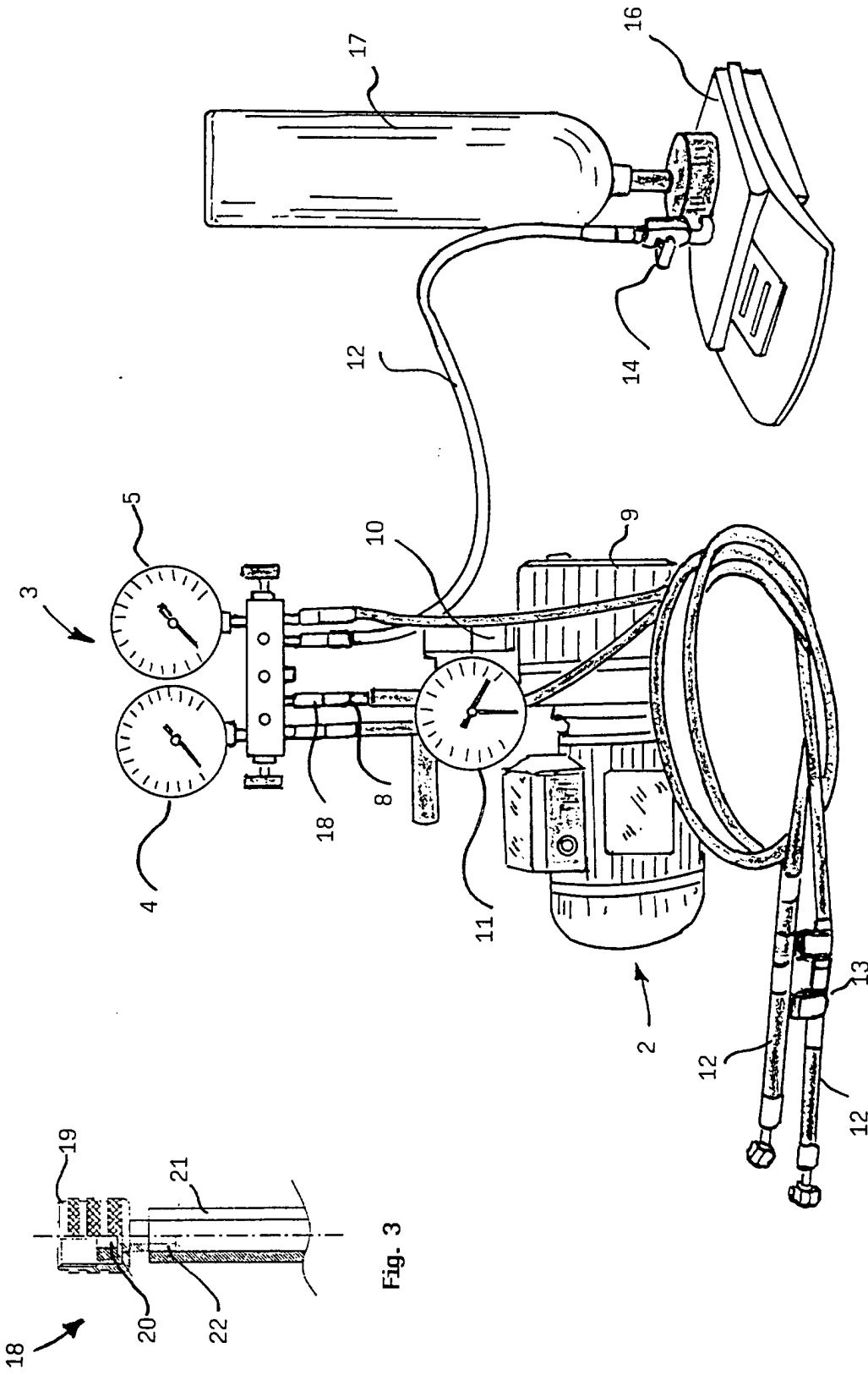


FIG. 2

Fig. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 20 1415

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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 January 2002	Examiner Busuiocescu, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 01 20 1415

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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