United States Patent [19]

Roven

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[54] **REFRIGERATION BY-PASS AND SERVICE VALVE**

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[51] **Int. Cl.** **B23b 41/08,** F16e 41/04

[58] **Field of Search** 137/317, 318; 285/197, 285/198, 199; 408/110

[56] **References Cited**

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[57] **ABSTRACT**

A refrigeration by-pass service valve. The valve comprises a pair of mating blocks adapted to be clamped together. The blocks are provided with inner complementary semi-circular walls forming a seat for copper tubing or pipe. Means for pinching the copper tubing or pipe to interrupt the flow of gas are provided in the blocks. One of the blocks is provided with a by-pass passage and means for securing a gauge and for charging a refrigeration or air conditioner hermetically sealed unit. The one block is provided with a pair of cone-shaped cutters for cutting holes in the copper pipe or tubing for communicating their pinched-off sections with the by-pass passage in the block. The cone-shaped cutters also act as valve closures for the cut holes.

5 Claims, 5 Drawing Figures

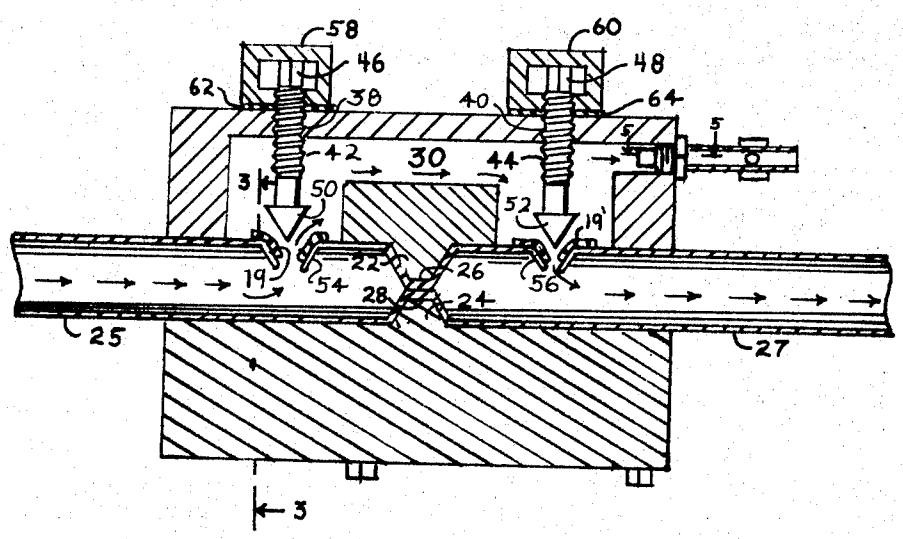


FIG. 1

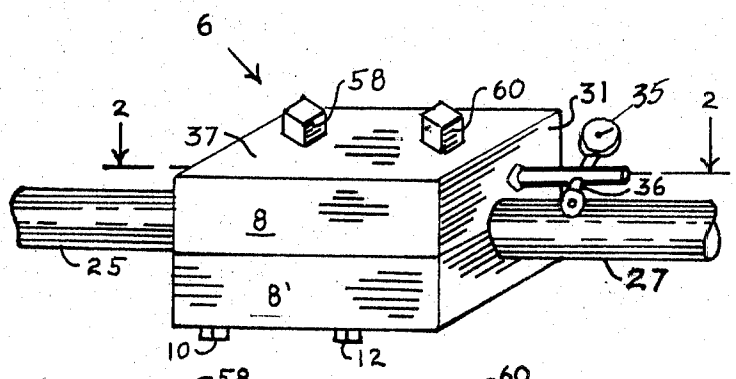
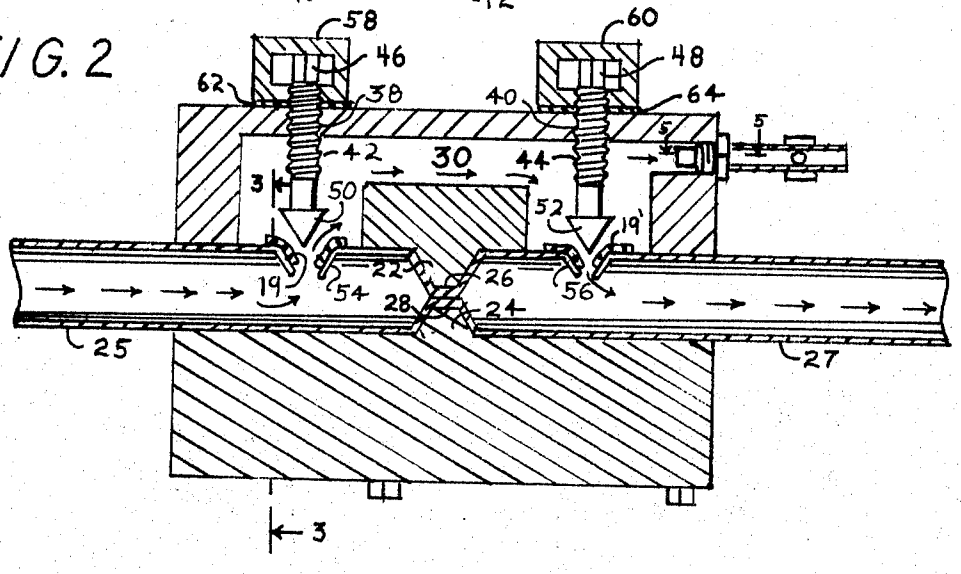


FIG. 2



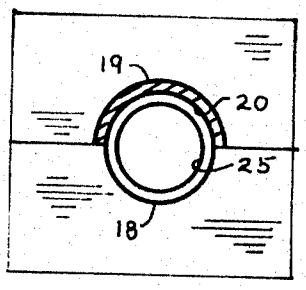


FIG. 3

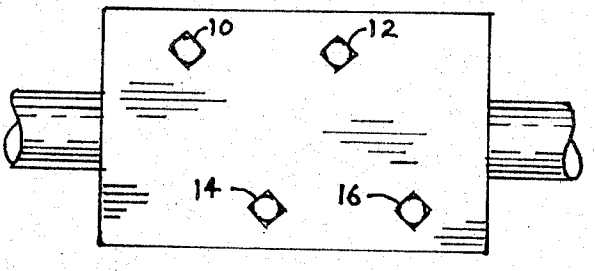


FIG. 4

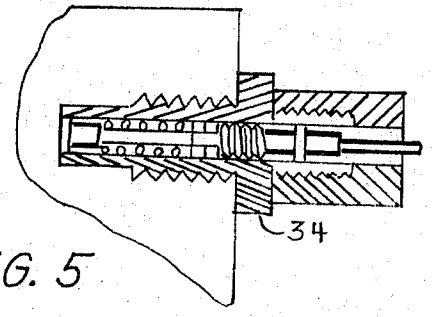


FIG. 5

REFRIGERATION BY-PASS AND SERVICE VALVE

BACKGROUND OF THE INVENTION

The invention relates to by-pass valves in general and to a by-pass valve for use in air conditioning and refrigeration systems.

An important object of the invention is to provide a refrigeration and air-conditioning by-pass valve which will permit testing of vacuum or pressure in the air-conditioning or refrigeration system without severing tubing or pipe.

Another object of the invention is to provide a device of the above character which will permit the charging of a refrigeration or air conditioning system with gas, without special attachments and without disconnecting the refrigeration or air-conditioning lines.

Yet another object of the invention is to provide a device of the above character which will permit the removal of a compressor without losing the refrigerant charge and getting moisture into the systems.

Still another object of the invention is to provide a device of the above character which will be easily accessible for servicing.

Another object of the invention is to provide a device of the above character which is simple in construction, and economical in manufacture.

Another object of the invention is to provide a device of the above character which can also be used in plumbing systems to save considerable costly time and labor.

These and other objects of the invention will become apparent from the following description and the accompanying drawing.

It is to be understood that these are given by way of illustration only and that various changes in the size and shape of parts may be made in the device without departing from the scope and concept of the invention.

IN THE DRAWING

FIG. 1 is a perspective view of the valve according to the invention and a portion of the tubing received therein and a manifold for a gage and gas inlet;

FIG. 2 is a cross-section of the valve and the tubing, taken on line 2—2 of FIG. 1;

FIG. 3 is a section taken on line 3—3 of FIG. 2;

FIG. 4 is a bottom view of the valve and a portion of the tubing received therein and

FIG. 5 is an enlarged detail, in cross-section, of the gauge receiving portion of the valve, shown in FIG. 2, on line 5—5.

Referring now to the drawing in detail, the refrigeration by-pass valve according to the invention, generally indicated by the reference numeral **6**, comprises a pair of an upper and lower mating blocks **8** and **8'**, adapted to be clamped together by means of bolts **10, 12, 14** and **16.** Both blocks are formed with inner complementary semi-circular walls **18, 20** (FIG. 3) extending part way from the end walls of the blocks towards the central portions thereof, for receiving a copper pipe or tubing **25, 27.** The semi-circular walls **18, 20** terminate as clamp portions **22, 24** for pinching the copper pipe or tubing **25, 27,** inserted between walls **18, 20,** to close off communication between portions **25,27** of the tubing when the mating faces of the blocks are brought in intimate contact by tightening bolts **10,12,14** and **16.** It will be noted that sufficient clearance is left between

clamp portions **22, 24** for accomodating the pinched wall portions **26, 28.**

The upper mating block **8** is provided with a by-pass passage **30,** the function of which will be described further in the specification. An end wall **31** of this block is further provided with a threaded bore, in which may be secured a manual valve controlled manifold **36** for attaching a pressure and vacuum gauge and for charging a refrigeration or air conditioning unit with a refrigerant.

Alternately the end wall of the upper block **8** may be provided with a spring-loaded valve **34** (FIGS. **2** and **5**) to which may be attached a pressure gauge **35.**

The top wall **37** of the upper block **8** is provided with a pair of spaced threaded bores **38, 40** in which are received threaded rods **42, 44.** The threaded rods are provided with bolt heads **46, 48** and cone-shaped cutters **50,52** and are displaceable, to and from a copper pipe or tubing **25, 27,** radially of the circumference of the latter. Thus, when a copper pipe or tubing **25,27** is clamped between blocks **8, 8'** and the threaded rods **42,44** are turned in a downward direction, the cone-shaped cutters penetrate the copper pipe or tubing and form conical valve seats, such as **54,56** therein, as will be described further in greater detail.

There are further provided removable sealing caps **58,60** which can be screwed on bolts **42, 44.** The sealing caps **58,60,** together with gaskets **62, 64** form air-tight seals, when screwed down tight against the top wall **37** of upper block **8.**

The device is used as follows:

The copper pipe or tubing **25,27** is provided with semicircular gaskets, such as **19.19'** (shown in cross-section in FIG. **2**) so that they may be aligned with the rods **42,44.** The copper pipe or tubing is lodged in the upper and lower blocks **8,8'** between the semi-circular walls **18,20,** the bolts **10,12,14** and **16** being first loosened for that purpose. With the gaskets **19,19'** aligned with the threaded cutter rods **42, 44,** the blocks **8,8'** are tigthened by means of bolts **10,12,14** and **16** until the clamp portions **22,24** will have pinched and flattened out the wall portions **26,28.** The device is thus permanently secured to the tubing. The flow of gas or fluid between the copper pipe or tubing portions **25,27** is thus interrupted.

Next, sealing caps **58** and **60** are unscrewed from the threaded rods **42,44,** to make bolt heads **46,48** accessible for turning with a suitable wrench. The threaded rods are then turned downward until cone-shaped cutters **50,52** penetrate gaskets **19,19'** and pipe or tube portion **25,27** and spread these open, thus forming conical valve seats.

It will be apparent that turning threaded rods **42, 44** upwardly, thus opening the now formed valves, will allow gas or fluid to flow through by-pass passage **30** from pipe or tube portion **25** and through pipe or tube portion **27.** At the same time the gas or fluid will be able to reach the manifold and pressure gauge **35** or a gauge attached to a spring-biased valve **34** (FIG. **5**) which can be opened when the gauge is secured to the valve.

As indicated by the arrows in FIG. **2,** the refrigerant gas normally flows from the evaporator or cooling coil unit to the compressor. Accordingly, when it is desired to test the vacuum or pressure on the compressor end of the system, the valve seat **54** is closed by the cone-shaped cutter **50** (left side of FIG. **2**) by turning the

threaded rod **42** downwards, thus sealing off the incoming gas from the evaporator side. The manifold **36** is opened to allow measurement of the vacuum or pressure by the pressure gauge proper. Depending on the condition of the compressor, an indication of a complete, good or poor vacuum will be indicated by the gauge. Similarly, the gauge may indicate pressure. The efficiency of the compressor on the suction side of the compressor may thus be determined. Furthermore, the whole compressor may be removed, without losing the gas charge and without getting moisture in. This can be accomplished by installing another by-pass valve of the same construction of the high side of the compressor and one on its suction side. On reinstallation, the compressor may be utilized to eliminate any air without the use of a vacuum pump. In normal use both cone-shaped cutters **50,52** are withdrawn from valve seats **52,54** sufficently to allow a full flow of gas through passage **30.**

To form a gas-tight seal for the threaded rods **42,44,** gaskets **62,64** are placed over the protruding ends of the rods and caps **58, 60,** are screwed on the rod ends until the gaskets are sufficiently tightened.

The by-pass valve of the above described character may be employed in a similar manner in plumbing installations. Instead of using a sweat "T" and having to cut the copper tubing or pipe the device may be secured to the tubing or pipe and a connection made in a similar manner.

I claim:

1. In a refrigeration system, isolating means for preventing air, moisture and dirt from entering the system for determining the efficiency of a compressor and removal of a compressor, said isolating means comprising a by-pass and service valve having a pair of upper and lower blocks, each of said blocks having mating semi-cylindrical grooves extending part way into said blocks and terminating as opposed pinching elements centrally of said blocks for pinching a copper tubing or pipe lodged between said semi-cylindrical grooves, means for securing said blocks in intimate contact with one another, cutter means displaceable in said upper block spaced on both sides of said pinching elements for cutting a pair of holes in a tubing or pipe, said upper block having a passageway for communicating with a pair of such cutholes, means extending from said passage for securing a gauge and gas filling manifold.

2. The device according to claim **1,** wherein said cutter means are a pair of threaded rods formed as cone-shaped cutters on one end and wrench-receiving heads on the other end, disposed outwardly of said upper block.

3. The device as claimed in claim **2,** further provided with threaded sealing caps securable to said other ends of said threaded rods and gaskets interposed between said sealing caps and said upper block for forming a gas-tight seal for said threaded rods and said upper block.

4. The device as claimed in claim **3,** wherein said means for securing said upper and lower blocks are a plurality of bolts extending through said blocks.

5. The device as claimed in claim **1,** wherein said means for securing a gauge is a spring biased valve adapted to be opened by the connection of a gauge or gas filling hose.

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