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Mullins

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[54] **REFRIGERANT SYSTEM CHARGING AND EVACUATING MANIFOLD**

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[52] **U.S. Cl.** **62/292;** 62/77; 62/125; 141/348

[51] **Int. Cl.²** **F25D 45/00**

[58] **Field of Search** 62/292, 149, 77, 125; 141/311, 348

[56] **References Cited**

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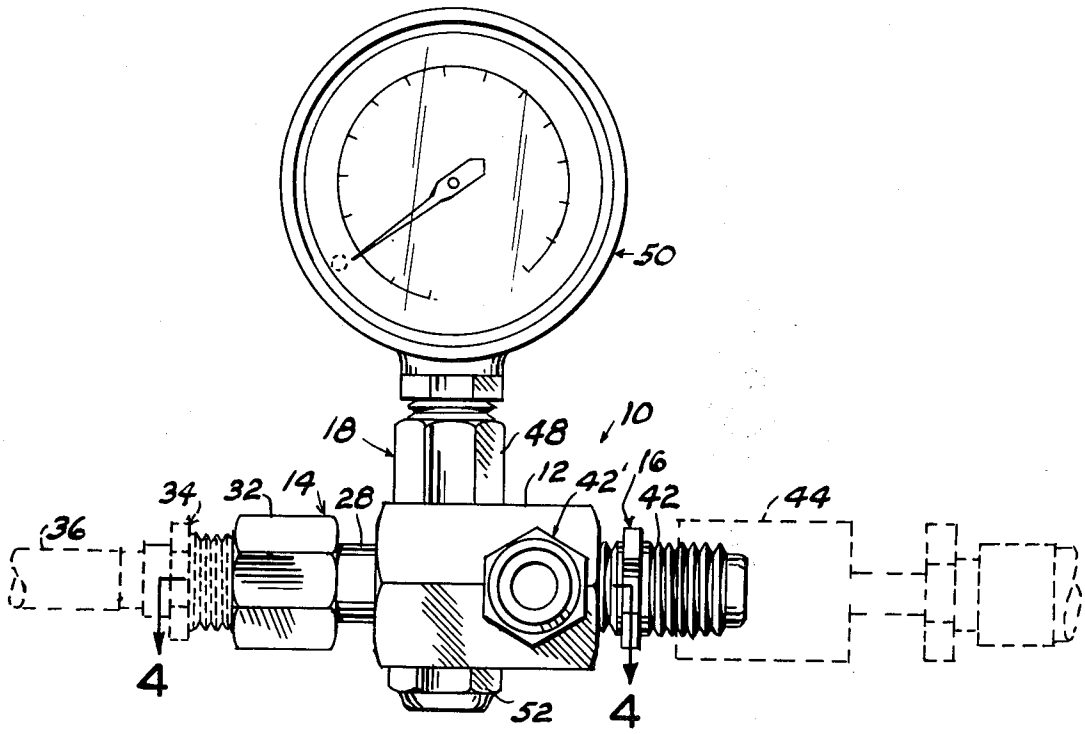
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Primary Examiner—William J. Wye
Attorney, Agent, or Firm—Robert K. Rhea

[57] **ABSTRACT**

A device for servicing closed refrigerating systems comprising a body having a passageway therethrough provided at its respective ends with means for connecting the device to an access valve of the refrigerant system and a refrigerant charging hose. A transverse bore, through the body intersecting the passageway, rotatably supports a shaft having means at one end for connection with a pressure-vacuum gauge and having a camming surface intermediate its ends longitudinally moving a plunger toward a depressible valve core by rotation of the shaft for communication with the refrigerant system.

4 Claims, 5 Drawing Figures



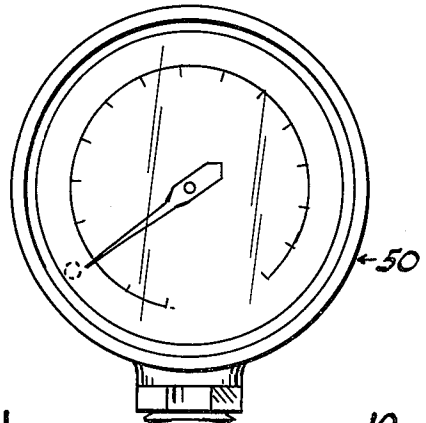


FIG. 1

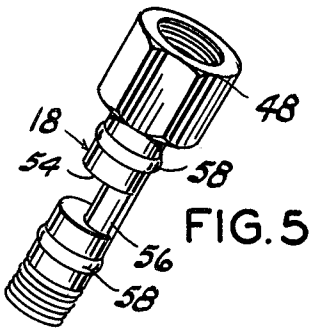
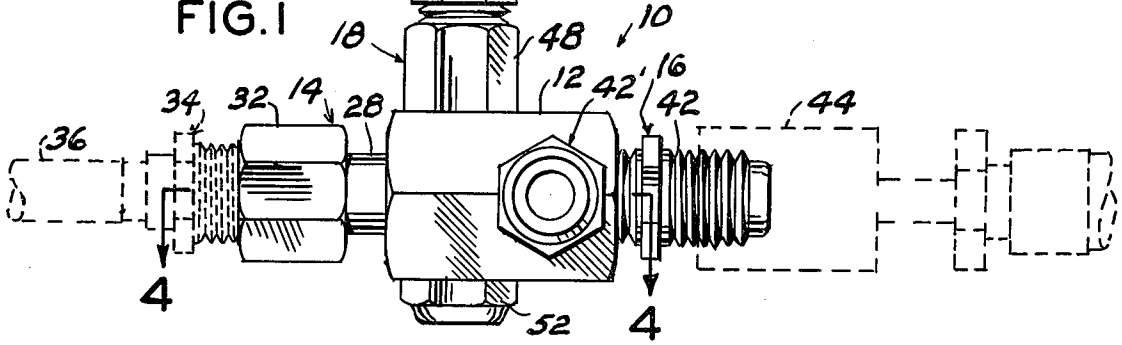


FIG. 5



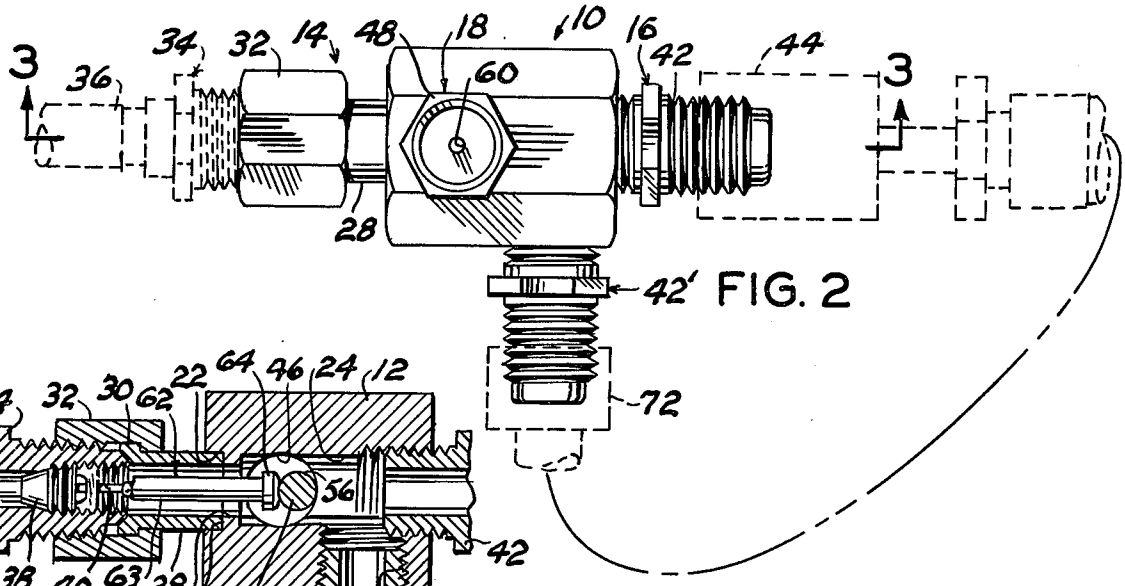


FIG. 2

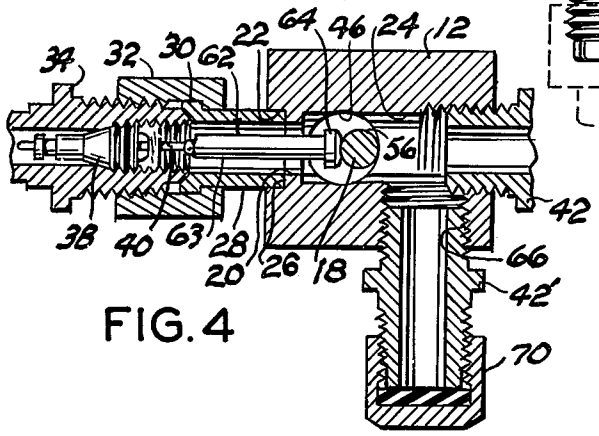


FIG. 4

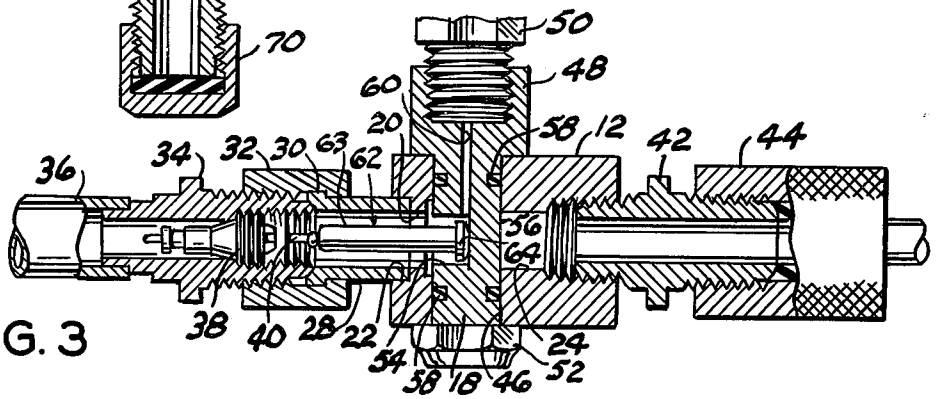


FIG. 3

REFRIGERANT SYSTEM CHARGING AND EVACUATING MANIFOLD

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to closed refrigerating systems and more particularly to a manifold for removing or adding fluid refrigerant to the system.

The term "refrigerating system" as used herein is intended to mean any system which utilizes a compressible evaporative fluid to remove heat from an enclosed space, such as refrigerators and air conditioners. The maintenance of such a system requires that the refrigerant system be tested and additional refrigerant fluid added thereto if the fluid contained by the system is below a predetermined pressure. Similarly, a malfunctioning refrigerant system sometimes must be evacuated of refrigerant fluid in order to effect repairs and thereafter recharge the system. For this purpose the refrigerant lines are usually provided with one or more access fittings which contain a spring urged depressible stem for opening and closing a valve core which is utilized by the present invention in servicing the system.

2. Description of the Prior Art

Most refrigerant servicing devices of this type, commonly referred to as charging manifolds, are bulky in overall configuration and are provided with two or more valves which must be opened and closed during operation. The passageway through the prior art devices and valves being of relatively small size and consequently inefficient when evacuating refrigerant fluid from the lines.

This invention provides a relatively small in overall configuration charging and evacuating manifold, when compared with prior art manifolds, having a refrigerant passageway therethrough which is substantially greater in cross sectional area than the full open position of the access fitting valve with which it is connected for easily conveying the volume of gas being removed from the refrigerant system and which contains a cam equipped shaft for moving a plunger toward and away from a depressible valve core stem for opening and closing the valve.

SUMMARY OF THE INVENTION

A generally cylindrical body is provided with a longitudinal passageway having means at one end for connection with a refrigerant access valve and having means at its other end for connection with a refrigerant charging hose. A transverse bore, through the body, intersecting the gas passageway, is provided with means at one end to receive a vacuum-pressure gauge. Intermediate its ends the shaft is recessed to provide a cam surface for longitudinally moving an elongated access valve core depressing plunger by rotating the shaft 180°. The end portion of the shaft, between its camming surface and its connection with the pressure gauge, is longitudinally bored to provide communication between the gas passageway and the pressure gauge. A second 180° rotation of the shaft permits the spring urged valve core stem to longitudinally move the plunger with the cam and close the access valve. A lateral port, in the body adjacent its end portion opposite the access valve connecting means, is provided with a fitting for connection with a second evacuating hose when evacuating a refrigerant system with the fitting being normally closed by a dust cap, or the like, when not in use.

The principal object of this invention is to provide an improved refrigerant system servicing manifold for attachment to a refrigeration access valve without loss of refrigerant for quickly evacuating a refrigerant system of refrigerant fluid or adding fluid as needed and which is relatively small in overall dimensions.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of the device connected with a pressure-vacuum gauge and illustrating, by dotted lines, its connection with a refrigerant access valve and one end portion of a charging hose;

FIG. 2 is a top view of FIG. 1 with the pressure gauge removed and illustrating, by dotted lines, the opposite end of the charging hose connected with a lateral port equipped fitting when the device is not in use;

FIG. 3 is a fragmentary vertical cross sectional view taken substantially along the line 3—3 of FIG. 2;

FIG. 4 is a fragmentary horizontal cross sectional view taken substantially along the line 4—4 of FIG. 1 and illustrating a dust cap closing the lateral port fitting; and,

FIG. 5 is a perspective view of the cam equipped rotatable shaft, per se.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Like characters of reference designate like parts in those figures of the drawings in which they occur.

In the drawings:

The reference numeral **10** indicates the device, as a whole, comprising a body portion **12** having first and second threaded connectors **14** and **16** at its respective ends and a transverse cam shaft **18.** In the example shown, the body **12** is formed from hexagonal stock but obviously other cross sectional shapes may be used, if desired. The body **12** is longitudinally bored, as at **20,** to form a passageway therethrough and is counterbored, as at **22** and **24,** from its respective ends to form an annular shoulder **26** adjacent one end. The counterbore **22** coaxially receives one end portion of the first connector means **14** which comprises a short tube **28** abutting the shoulder **26** and having an annular flange **30** at its other end surrounded by a nut **32.** The nut **32** threadedly engages an access fitting **34** secured to a refrigerant line **36.** The access fitting **34** contains an air valve core **38** having a depressible stem **40** normally closing the bore of the access fitting **34.**

The counterbore **24** is internally threaded for receiving the second connector means **16** comprising a tubular fitting **42** having its opposite ends threaded for connection with the body **12** and receiving an internally threaded sleeve **44** forming one end portion of a conventional valve depressor refrigerant gas supply tubular member commonly called a "charging hose". The valve depressor, not shown, normally contained by the sleeve **44,** is removed to provide a greater volume of fluid flow therethrough.

The end portion of the body **12,** adjacent its connection with the first connector means **14,** is transversely bored, as at **46,** intersecting the gas passageway for receiving an intermediate portion of the shaft **18.** The shaft **18** is characterized by an internally threaded nut-like end portion **48** for connection with a conventional pressure-vacuum gauge **50** and externally threaded at

its other end portion for receiving a nut **52** for maintaining the shaft connected with the body **12.** Intermediate its ends and aligned with the gas passageway, the shaft is transversely recessed, as at **54,** to form a cam surface **56** for the purposes presently explained. An annular groove is formed in the shaft on opposite sides of the recess **54** for receiving sealing members, such as O rings **58.** The shaft is also longitudinally bored, as at **60,** from its nut-like end portion to communicate with the recess **54.**

Plunger means **62** is longitudinally disposed within the gas passageway and extends between the cam surface **56** and adjacent the end of the valve core stem **40.** The plunger means **62** comprises a shank **63** provided, at one end, with a head **64** contacting the camming surface **56.** Obviously, a smaller diameter shaft **18** may be used with the cam surface formed on a peripheral portion of its surface, if desired.

The body **12** is further provided with a lateral threaded bore **66** communicating with the passageway for receiving a third connector means **42'** comprising a similar threaded end tubular fitting for the purposes presently explained.

The manifold may be used without the pressure gauge **50** by inserting a plug, not shown, into the shaft end portion **48** or alternatively the shaft bore **60** may be omitted.

OPERATION

In operation the device **10,** having the pressure-vacuum gauge **50** connected therewith with the plunger means **62** and shaft **18,** in the position shown by FIG. **3,** is connected by the first connector means **14** to the access valve fitting **34.** The second connector means **16** is connected with the charging hose sleeve **44.** A dust cap **70,** or the like, normally closes the third connector means **42'** (FIG. **4**). The shaft **18** is rotated by manually rotating the pressure gauge **50 180°** from its position in FIG. **3** about the longitudinal axis of the shaft **18** which longitudinally moves the plunger means **62** toward the air valve core stem **40** thus opening the access fitting **34** so that pressure within the line **36** is then indicated by the pressure gauge. Additional refrigerant may then be applied to the line **36** from the charging hose and when a desired pressure is reached, as shown by the gauge **50,** the shaft **18** is again rotated **180°** to its original position so that the valve core stem **40** is released and moves the plunger means **62** therewith and maintains contact between the plunger head **64** and the shaft cam surface **56.**

In the event the refrigerant line **36** is to be evacuated of refrigerant gas, a second charging hose, not shown, is similarly connected with the third connector means **42'** after removing the cap **70** so that vacuum applied to the second and third connector means **16** and **42'** quickly evacuates the refrigerant line when the shaft **18** is rotated to the position shown in FIG. **4** so that its camming surface **56** opens the access valve **34,** as described hereinabove.

When the device **10** is not in use, the end portion **72** of the charging hose, opposite the sleeve **44,** is normally connected with the third connector means **42'** (FIG. **2**) for ease in transporting or storing the device **10.**

Obviously the invention is susceptible to changes or alterations without defeating its practicability, therefore, I do not wish to be confined to the preferred embodiment shown in the drawings and described herein.

I claim:

1. A manifold for evacuating and charging a closed refrigerant system with fluid, said refrigerant system having a refrigerant line provided with an access fitting containing a normally closed valve which must be depressed to open, comprising:

a body having a passageway therethrough;

a first connector means connecting one end of the passageway with said access fitting;

second connector means adapted to connect one end of a charging-evacuating hose with the other end of the passageway,

said body having a transverse bore intersecting the passageway;

cam shaft means within the transverse bore; and,

plunger means interposed between said access valve and said cam shaft means within the passageway.

2. The manifold according to claim **1** in which said cam shaft means includes:

a shaft having a cam surface formed thereon within the passageway,

said shaft having a means at one end adapted to be connected with a pressure gauge and having a longitudinal bore providing communication between the passageway and the pressure gauge.

3. The manifold according to claim **2** in which said plunger means includes:

a shank portion having one end contacting the depressible valve of said access fitting and having a head at its other end portion contacting said cam surface.

4. The manifold according to claim **3** in which said body is provided with a lateral port communicating with the passageway and further including:

a third connector means adapted to connect one end of a charging-evacuating hose with the lateral port; and,

a cap normally closing said third connector means.

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