

Aug. 8, 1950

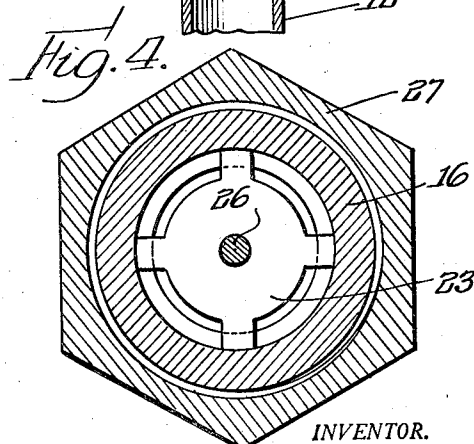
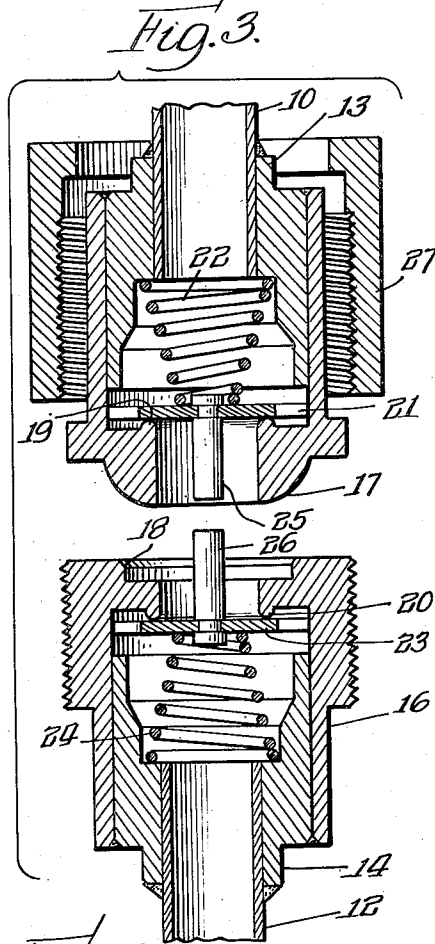
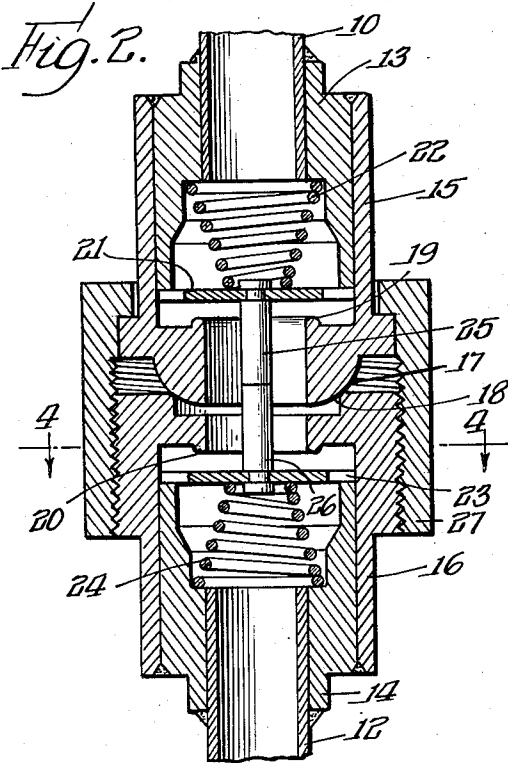
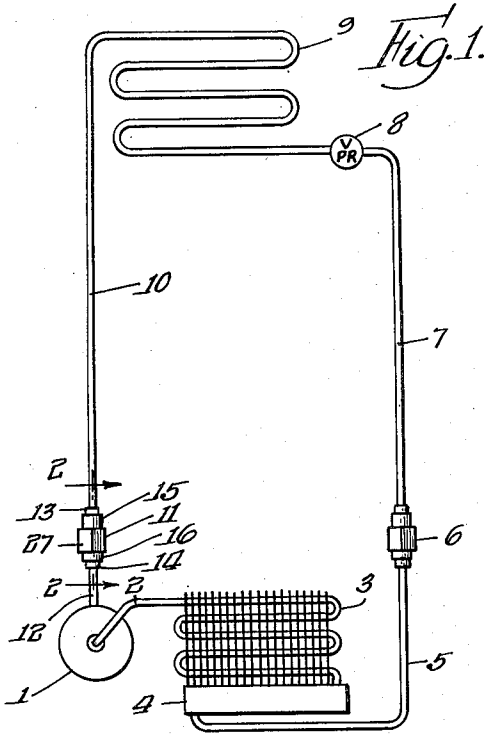
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2,518,299

COUPLING AND SERVICING ASSEMBLY

Filed June 16, 1945

2 Sheets-Sheet 1



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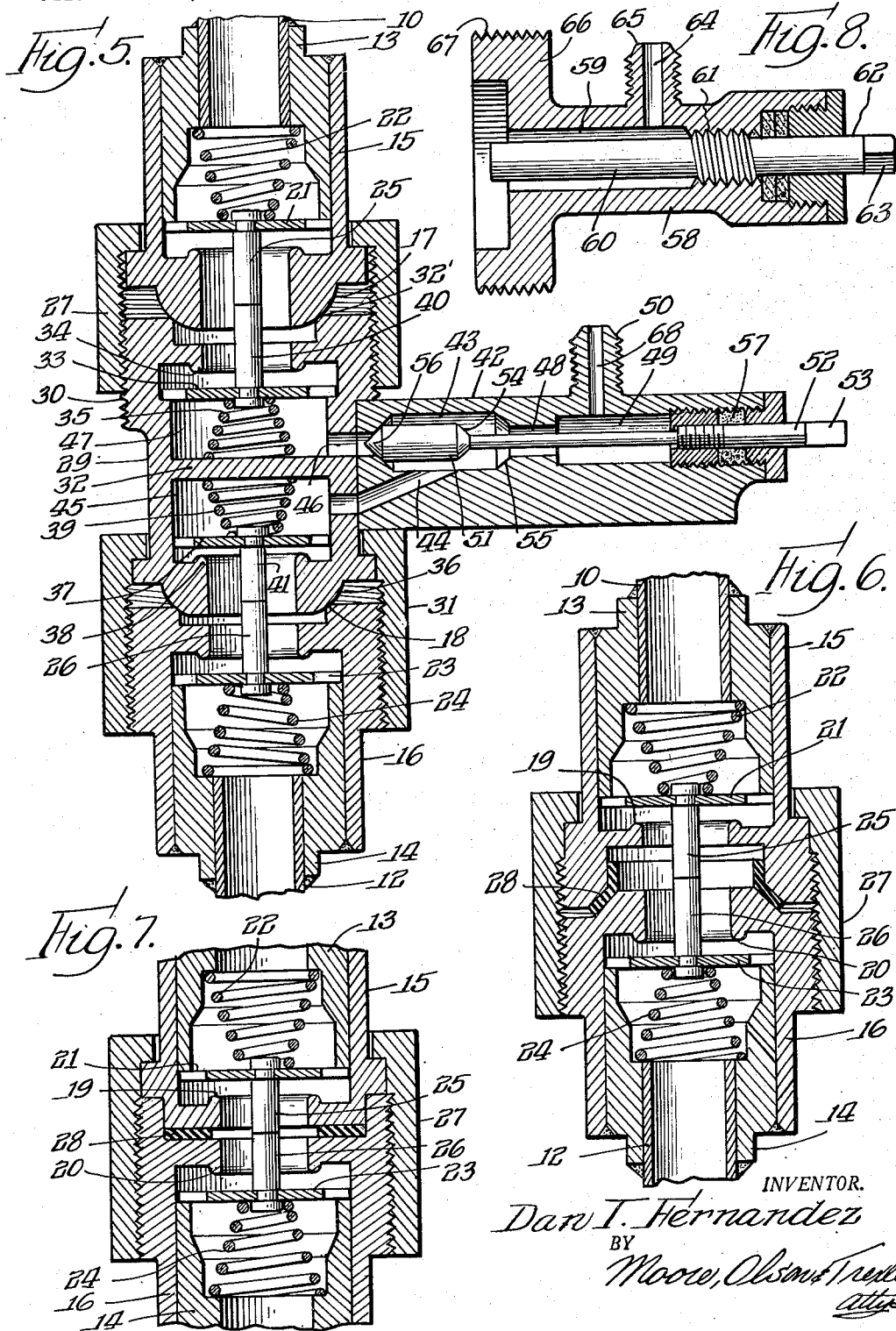
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UNITED STATES PATENT OFFICE

2,518,299

COUPLING AND SERVICING ASSEMBLY

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Application June 16, 1945, Serial No. 599,792

5 Claims. (Cl. 62-115)

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My invention relates to a refrigerating system, and more particularly to a refrigerating system provided with novel coupling and servicing means and to the novel coupling and servicing means themselves.

In refrigerating systems of the compression and expansion type, the system generally comprises two essential parts, namely, the high pressure side and the low pressure side. The high pressure side comprises the compressor, the condenser, and usually a receiver. The low pressure side includes a pressure reducing valve and a refrigeration coil. The controls for the system are attached to the high pressure side and it is this side which requires service. Heretofore refrigerating systems have been provided with valve blocks and other costly and expensive arrangements for purging the system of air, replacing lost refrigerant, testing the compressor, checking the head pressure, and checking the pressure in the low pressure side for adjusting the expansion valve.

The expensive system of attachments and valves usually provided is seldom used except when servicing the system. Furthermore, their presence enables persons not skilled in the art to tamper with the system, resulting in the loss of the charge of refrigerant, improper operation of the system, or damage to the unit. In refrigerating systems, especially those employed in low-temperature refrigeration, losses are frequently caused the manufacturer, due to the loss of quantities of frozen meat, payments for damaged food, and the cost of the refrigerant fluid.

One object of my invention is to provide a refrigerating system in which the high pressure side of the system may be disconnected from the low pressure side in a simple and convenient manner without undue loss of refrigerant while maintaining both sides under pressure.

Another object of my invention is to provide a system whereby the high pressure side may be removed from the system and shipped as a sub-unit for servicing, and on its return reconnected in a fully charged condition without the use of service valves.

Another object of my invention is to provide a system which cannot be readily tampered with by unauthorized persons.

Another object of my invention is to provide a system which can be serviced from the field in a simple and expeditious manner.

Other and further objects of my invention will be apparent from the following description:

In general, my invention contemplates a re-

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frigerating system provided with unions enabling the high pressure side to be uncoupled from the low pressure side, which unions are formed with integral check valves. The arrangement is such that when coupled the check valves automatically unseat, and when uncoupled the check valves automatically perform their function, sealing of the ends of the uncoupled tubing. A servicing fitting is provided for coupling between the uncoupled portions of the connections enabling a plurality of servicing functions to be performed in a simple, convenient, and expedient manner.

Referring now to the accompanying drawings which form part of the instant specifications and in which like reference numerals are used to indicate like parts in the various views:

Fig. 1 is a diagrammatic view of a refrigerating system showing one embodiment of my invention.

Fig. 2 is a sectional view of a union used in my invention taken along the line 2-2 of Fig. 1, but shown on an enlarged scale, with the check valves in open position.

Fig. 3 is a sectional view of the union shown in Fig. 2, showing the check valves in seated position.

Fig. 4 is a sectional view taken on the line 4-4 of Fig. 2.

Fig. 5 is a sectional view showing my servicing connection assembled in the union.

Fig. 6 is a view similar to Fig. 2, showing a modified construction.

Fig. 7 is a view similar to Fig. 2, showing still another construction capable of carrying out my invention.

Fig. 8 is a sectional view of a simplified type of service connection.

More particularly referring now to the drawings:

A compressor 1 driven by any suitable means is adapted to compress refrigerant fluid for discharge through pipe 2, through the condenser 3 in which heat is removed from the hot compressed refrigerant fluid. The compressed cold refrigerant fluid is discharged to a receiver 4 from which it flows through pipe 5 through a special union shown generally by the reference numeral 6, through pipe 7, through expansion valve 8, through the refrigerant coil 9, thence through pipe 10, through a second union shown generally by the reference numeral 11, through pipe 12 to the suction side of the compressor 1. When a refrigerant unit is at rest there is a tendency for the pressure in the system to equalize due to the fact that compressor valves sometimes leak slightly so that with the passage of time the

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pressure in the system becomes equalized. When the system is running, the region between the discharge valves of the compressor and the expansion valve 8 is under the same high pressure, while the region between the expansion valve 8 and the intake valves to the compressor is under the same low pressure.

Let us assume for purposes of illustration that it is desired to service the high pressure side for major repairs. The unions 6 and 11 are broken, and the high pressure assembly comprising the compressor 1, the condenser 3, the receiver 4, and the pipe 5 are disconnected and shipped to the factory or servicing point for repairs.

Referring now to Fig. 2, it will be seen that the pipe 10 is secured in any suitable manner to a body member 13. Similarly, the pipe 12 is secured to a body member 14, in a gas-tight and permanent manner by any means known to the art. A member 15 is secured to the body member 13 in any suitable manner to form a substantially permanent gas-proof joint. Similarly, a housing 16 is secured to the body member 14. The member 15 is formed with a valve portion 17, while the housing 16 is formed with a valve seat 18 against which the valve 17 is adapted to seal. An annular valve seat 19 is formed on the housing 15, while a similar annular valve seat 20 is formed on the body member 16. Housed within the space formed by member 13 and housing 15 is a valve 21 normally urged to seating position on valve seat 19 by spring 22. Housed in the space between housing 16 and body member 14 is a valve 23 normally urged to seating position on valve seat 20 by spring 24. The valve 21 is formed with an extension 25, while valve 23 is formed with an extension 26. A coupling nut 27 is adapted to seat valve 17 on valve seat 18 as can readily be seen by reference to Fig. 2. In this position, check valve extensions 25 and 26 are in abutting position and the extension lengths are such that valves 21 and 23 are held in unseated position. It will be obvious of course that only one of the valves 21 and 23 need be provided with an extension if desired, so long as the unseating function is performed. However, for ease of manufacture and interchangeability of parts, I prefer to make valves 21 and 23 of identical construction.

The sealing of the refrigerant fluid conduit without relying on the coupling nut 27 by means of the valve 17 and the valve seat 18 may be performed in any other suitable manner such as by gaskets or other sealing means. This is shown in Figs. 6 and 7, in which the body member 15 and the body member 16 are adapted to clamp a sealing ring 28 between them when the coupling nut 27 is tightened.

It will be seen that by means of the construction described, the high pressure side of the refrigerating system may be readily disconnected from the low pressure side of the system without the danger of loss of the refrigerant fluid or the admission of air into the system.

With the special unions of my invention in disconnected position, I may assemble a special test fitting shown in assembled position in Fig. 5 between the separated ports of the union. The test connection comprises a body member 29 having an upper portion provided with threads 30 adapted to receive the threaded portion of the coupling nut 27. A second coupling nut 31 is provided for coupling the test fitting to the body member 16. The test fitting is provided with a central partition 32 dividing it into two

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general portions which I will designate for purposes of convenience an upper portion and a lower portion. The upper portion terminates in a valve seat 32' similar to the valve seat 18 on which the valve 17 of the housing 15 is adapted to seat. Housed within the upper portion is a check valve 33 adapted to seat on valve seat 34 under the influence of spring 35. Similarly, the lower portion of the body member 29 is provided with a valve 36 similar to the valve 17 adapted to seat on valve seat 18 of the body member 16 under the influence of the coupling nut 31. Housed within the lower portion of the body member 29 is a check valve 37 adapted to seat on valve seat 38 under the influence of spring 39. The valve 33 is provided with a valve extension 40, while the valve 37 is provided with a valve extension 41. In assembled position as shown in Fig. 5, valve extension 40 is adapted to abut valve extension 25 to hold check valves 21 and 33 in open position. Similarly, valve extension 41 is adapted to abut valve extension 26 to hold valves 37 and 23 in open position. The body member 29 is formed with an extension 42. The extension 42 is provided with an internal manifold 43 having ports 44 communicating with the lower chamber 45 beneath partition 32 and port 46 communicating with the upper chamber 47 formed above partition 32. A port 48 communicates with a chamber 49 similarly formed within the extension 42. A nipple 50 has a duct 68 communicating with the chamber 42. Housed within the manifold 43 is a double acting valve 51 operated through valve stem 52 through squared portion 53 by means of a wrench valve handle or in any other suitable manner. The valve 51 has a valve portion 54 adapted to seat on valve seat 55 to seal off the manifold 43 from the chamber 49. The valve 51 is provided with a valve portion 56 adapted to seal off the port 46 as shown in Fig. 5. A suitable sealing means 57 is provided for the valve stem 52. It will be seen that with the valve 51 in mid-position, the pipe 10 is in communication with pipe 12 through the port 46, manifold 43, and port 44. There is also a communication with the chamber 49 and the nipple duct 68 through duct 48. When the valve 51 is moved to the right so that valve portion 54 seats on seat 55, pipes 10 and 12 are in communication but the chamber 49 and its communicating nipple are sealed off from the system. With the valve in the position shown in the drawing, the low pressure side is sealed, while the high pressure side is in communication with the nipple 50. The arrangement is extremely flexible and as will be hereinafter more fully pointed out, I am able to perform many servicing and testing functions in a simple, convenient, and expeditious manner.

Fig. 8 shows a simplified connection which may be used with an auxiliary coupling nut similar to nut 27 (not shown), if it be desired to perform an individual servicing function. For example, when the high pressure side is disconnected and shipped to the factory, the refrigerant fluid may be unloaded quite simply by means of the fitting shown in Fig. 8. Referring now to Fig. 8, I provide a fitting comprising a body member 58 provided with a chamber 59 into which a stem 60 extends. The stem is provided with threaded portion 61 and an operating extension 62 provided with a squared portion 63 through which the stem 60 may be operated. The chamber 59 is in communication with the exterior through duct 64 formed in a nipple 65 to which various instrumentalities may be connected.

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The enlarged portion 66 is provided with threads 67 for coaction with a nut similar to nut 27. When the auxiliary fitting is screwed onto the end of an uncoupled portion of the union, the extension 60 may be operated to unseat the check valve associated therewith so as to place the system in communication with the chamber 59.

In operation the connections are normally in the position shown in Fig. 2 and the refrigerating system operates normally. Let us assume, for purposes of illustration, that it is desired to service the unit in the field. The connections 6 and 11 are broken and a pair of fittings such as shown in Fig. 5 are assembled, care being taken to have valve portion 54 seated on seat 55. A gauge may be screwed to the nipple 50 and the valve 51 moved to the mid-position. In this manner, the pressure in the high side of the system can be read at the point of connection 6. Similarly, the pressure in the low side can be read at the point of connection 11.

Again let us assume the system has been drained of refrigerant fluid for the purpose of making a repair, and it is now desired to dehydrate the condenser coil. Valves 51 are moved to position closing ports 46. A supply of hot air for dehydrating is attached to one of the nipples 50 and air may be forced through the high pressure side, dehydrating the condenser coil 3. If it be desired to dehydrate both sides of the system, the valves 51 may be moved to mid-position and the hot air blown to one or the other of the nipples 50. After dehydration the system is evacuated with the valve 50 either in mid-position or with the valve portion 55 seated. After evacuation, valve 51 may be moved to the right, seating valve portion 54 on seat 55. The evacuating connection to nipple 50 may be broken and a charging connection fitted. Valve 51 may then be moved to mid-position and the system charged with refrigerant fluid. After charging, valve portion 54 may be again seated on seat 55 and the charging connection removed and a gauge attached to the nipple 50 so that the system pressure may be checked with the valves in mid-position. To remove the gauge, the valve 54 is seated on valve seat 55 sealing off the system. The gauge may then be removed.

If it be desired to test the compressor, valve 51 may be moved to the left so that valve portion 56 is seated. A gauge having been previously fitted to nipple 50, the compressor is run and the head pressure noted. Leaks in the high pressure side may be quickly detected with valve 56 in closed position.

It will be obvious to those skilled in the art that all of the servicing functions can be performed in the field in a simple and expeditious manner.

It will be seen that I have accomplished the objects of my invention. I provided a simple and inexpensive means enabling the high pressure side of the refrigerating system to be disconnected from the low pressure side without undue loss of refrigerant fluid.

I provided a system which can be serviced in the field without danger of losing the charge of refrigerant. By eliminating the valve blocks, all danger of unauthorized persons tampering with the system is eliminated, thus obviating either the loss of the charge of refrigerant fluid or damage to the unit with the ensuing loss of the frozen foods under refrigeration.

The cost of my system is lower due to the lower cost of my connectors as compared with the customary service valves and their fittings.

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The high pressure side of a system can be separated from the low pressure side without loss of refrigerant, thus reducing the cost of service by enabling the high pressure side alone to be returned to the factory. This has the additional advantage of reducing shipping costs and the costs of labor in removing the balance of the system from the cabinet.

It will be obvious to those skilled in the art that I have provided a system that can be serviced in the field and processed in the factory without the air of permanently attached service valves.

A system has been provided whereby a person not skilled in the art may disconnect the high side from the low side, return the high side to the factory for repairs, and reconnect the two parts of the system ready for normal operation.

A still more flexible system could be provided by placing an additional union in the system shown in Fig. 1, therefore as the number of unions and their location in the system depends on the design of the refrigerating system, the flexibility desired, and the method employed to control the flow of liquid to the evaporator, I do not desire to limit myself to number or location of unions.

It will be obvious to those skilled in the art that various changes may be made in the particular embodiment of the invention shown and described without departing from the spirit of my invention. This is contemplated by the appended claims. It is therefore to be understood that changes may be made in details within the scope of the claims.

Having thus described my invention, what I claim is:

1. A coupling and servicing assembly adapted to be interposed in a refrigerating system between the condensing coil and the refrigerating coil, including in combination a first body member formed with a duct, a second body member formed with a duct, an intermediate body member having a pair of chambers, coupling means for coupling said first body member to said intermediate body member, means for sealing said first body member against the intermediate body member, means for coupling said second body member to the intermediate body member, means for sealing said second body member to said intermediate body member, means providing communication between said intermediate body member and the exterior of the coupling and servicing assembly, a valve for sealing said communication, check valves disposed respectively in said first and second body members and in the chambers of said intermediate body member, and means for holding said respective check valves in unseated position when said assembly is in coupled position.

2. A coupling and servicing assembly as in claim 1, in which said means providing communication with the exterior of the coupling and servicing assembly is formed with two ports, one of said ports communicating with one of said chambers of said intermediate body member, and the other of said ports communicating with the other of said chambers of said intermediate body member.

3. A coupling and servicing assembly as in claim 1, in which said means providing communication with the exterior of the coupling and servicing assembly is formed with two ports, one of said ports communicating with one of said chambers of said intermediate body member, and

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the other of said ports communicating with the other of said chambers of said intermediate body member, said communication sealing valve being formed with two valve portions and means for seating one of said valve portions to seal one of said ports, and the other of said valve portions adapted to seal the means providing communication with the exterior of the coupling and servicing assembly from said exterior.

4. A refrigerating system including in combination, a refrigeration coil, a condensing coil, a compressor, ducts interconnecting said refrigeration coil and condensing coil, said condensing coil and said compressor, and said refrigeration coil and said compressor, and a plurality of unions inserted in said ducts, each of said unions including means tending constantly to close its respective ducts and operable when said union is broken to seal said portions of the refrigerating system, and servicing mechanism having means interposed between and attached to the members of a union when broken for unsealing said sealing means while said mechanism is operably connected thereto.

5. A coupling and servicing assembly for a refrigerating system including in combination a first body member formed with a duct, a second body member formed with a duct, an intermediate body member having a pair of chambers formed therein, coupling means for coupling said first body member to one of said chambers, means for coupling said second body member to the

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other of said chambers, means providing communication between the chambers in said intermediate body member and the exterior of the coupling and servicing assembly, a valve for sealing said communication, check valves disposed respectively in said first and second body members and in the chambers of said intermediate body member, and means for holding said check valves in unseated position when said assembly is in the coupled position.

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