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RECEIVER DRYER

5 This invention relates to a receiver dryer,
and, more particularly, to a sealing structure of the
receiver dryer, suitable for use in an automobile air
conditioning apparatus.

10 A receiver dryer for an automobile air
conditioning apparatus is generally disposed between
a condenser and a decompression device of the
apparatus and includes a housing with a cylindrical
body and a header portion provided with fluid inlet
and outlet couplings. The header portion is normally
15 welded onto the cylindrical body and integrally
formed with the fluid inlet and outlet couplings.
Sealing is thus easily accomplished. However, since
the fluid inlet and outlet couplings are integrally
formed with the header portion the direction in which
20 spigots of the couplings extend relatively to one
another is fixed, and pipework of the associated
refrigeration circuit has to be fitted accordingly.
The receiver dryer of an automobile air conditioning
apparatus is normally located in the engine
25 compartment of the automobile and a fixed pipe
arrangement in the small space available is
inconvenient. For example, the refrigerant pipe has
to be bent several times for connection between the
condenser or decompression device and the receiver
30 dryer. Thus, pressure loss occurs in the
refrigeration circuit and a large length of pipe is
needed.

One solution to resolve the above disadvantage
is to arrange for the fluid inlet and outlet
35 couplings to be rotatably attached on the header
portion to enable free determination of their angular
orientation. However, sealing of the mutually

rotatable parts of the couplings then becomes a problem.

It is a primary object of this invention to provide a receiver dryer for a refrigeration circuit wherein placement of the couplings is freely and simply adjustable, and a secondary object to provide secure but simple sealing between the mutually rotatable parts.

In accordance with the invention, in a receiver dryer for a refrigeration circuit, the receiver dryer including a cylindrical container, fluid inlet and outlet couplings disposed on the cylindrical container for interconnecting the interior of the container and an associated refrigeration circuit, and an induction tube extending down within the container and connected to the outlet coupling; the outlet coupling comprises a connector fixed on the container and formed with a first fluid duct, and a port element rotatable about the connector and formed with a second fluid duct connected with the first duct, an inner end portion of the connector being received in an upper flanged portion of the induction tube, and the engaging portions of the tube and connector being sealed by a sealing mechanism.

An example of a receiver dryer constructed in accordance with the invention is illustrated in the accompanying drawings, in which:-

Figure 1 is plan;

Figure 2 is a side elevation, partly in section; and,

Figure 3 is enlarged sectional view of the fluid outlet coupling.

Figures 1 and 2 show a receiver dryer suitable for use in an automobile air conditioning apparatus and including a cylindrical container body with an upper opening and a header portion 12, which is disposed on the upper opening of the

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cylindrical body 11 and is welded to the cylindrical body 11.

5 The header portion 12 comprises a cover plate 121 with a central opening, and fluid inlet and outlet couplings 122 and 123 fixed on the central opening. A hollow support element 21 of the coupling 123, which is U-shaped in cross-section and provided with central screw threaded hole 211, is welded or brazed onto the edge of the central opening of the
10 cover plate 121. An edge ring portion 212 is formed on the outer end surface of the support element 21 concentric with the hole 211. The inlet coupling 122 is screwed onto the outer peripheral surface of the support element 21 to interconnect the interior of
15 the cylindrical body 11 and an associated refrigeration circuit through the support element 21. An induction tube 13 extends vertically down within the cylindrical body 11 and extends into the interior space of the support element 21. The
20 induction tube 13 is supported on the inner surface of the support element 21 through a fastening element 14. A filter member 15, which includes desicant 151 between perforate plates 152 and 153 is fastened on the lower portion of the induction tube 13 by a push
25 nut 154.

Further referring to Figure 3, the outlet coupling 123 comprises a connector, formed by the support element 21 and by a connector element 22, which is provided with a central duct 221, and a port
30 element 23 rotatably fitted on the connector element 22. One end opening of the duct 221 is covered by a sight glass 17 for use in confirming the flow of refrigerant, and other end opening faces the interior space of the support element 21. The connector
35 element 22 has a screw threaded portion 222 and an annular depression 223 at its inner end portion. The connector element 22 is supported on the support element 21 by screwing the screw threaded portion 222

of the connector element 22 into the screw threaded hole 211 of the support element 21. The inner terminal end of the connector element 22, which extends into the interior space of the support element 21 and includes the annular depression 223, is inserted into an upper flanged portion 13A of the induction tube 13. An O-ring 16 is disposed in the annular depression 223 to secure sealing between the outer surface of the connector element 22 and the induction tube 13. Also the connector element 22 is provided with a collar portion 224 and a shoulder 225 between the collar portion 224 and a body portion 226 thereof. The shoulder 225 is formed by a part spherically shaped surface having a radius "r".

The port element 23 comprises a ring shaped body portion 231 with a cavity 231a and a hollow spigot portion 232 extending radially from the outer peripheral surface of the body portion 231 with a duct 233 in the spigot portion 232. One end opening of the duct 233 faces the interior of the cavity 231a and communicates with the duct 221 in the connector element 22 through a hole 226a in the body portion 226. A bevelled portion 234 is formed around one end opening of the cavity 231a to form a contact surface to cooperate with the part spherically shaped shoulder 225. The surface of the edge ring 212 and that of the shoulder 225 should be hardened by a suitable hardness surface treatment or appropriate quenching. Also, the port element 23 is formed of slightly softer material than that of the connector element 22, for example aluminium alloy. Furthermore, a fusible plug 18 is disposed on the peripheral wall of the support element 21. A further aperture (not shown) may be formed on the peripheral wall of the support element 21 to fit a pressure switch 19.

In this construction of fluid outlet coupling,

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the body portion 231 of the port element 23 is clamped between the connector element 22 and the support element 21, so that the part spherically shaped shoulder 225 and the edge ring 212 engage upon opposite side surfaces of the body portion 231 of the port element by screwing the connector element 22 into the support element 21. The sealing between the support element 21 and the port element 23, and also between the connector element 22 and the port element 23 are thus secured by clamping engagement with the edge ring and shoulder, after the relative angular positions of the fluid inlet and outlet couplings have been adjusted. Also, the sealing between the outlet coupling and the induction tube is secured by the O-ring between the induction tube and the connector element of the outlet coupling.

The fluid outlet coupling is thus freely adjustable in direction, whilst a simple sealing structure secures the sealing between the parts of the coupling. Also, the sealing between the induction tube and the outlet coupling is accomplished by the O-ring disposed on the coupling. Therefore, the sealing structure for the induction tube is easily maintained while the angular position of the spigot portion 232 is changed,. Thus the receiver dryer can readily be adapted for conveniently fitting to pipework of an associated refrigeration circuit.

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CLAIMS

1. A receiver dryer for a refrigeration circuit, the receiver dryer including a cylindrical container, fluid inlet and outlet couplings disposed on the cylindrical container for interconnecting the interior of the container and an associated refrigeration circuit, and an induction tube extending down within the container and connected to the outlet coupling; wherein the outlet coupling comprises a connector fixed on the container and formed with a first fluid duct, and a port element rotatable about the connector and formed with a second fluid duct connected with the first duct, an inner end portion of the connector being received in an upper flanged portion of the induction tube, and the engaging portions of the tube and connector being sealed by a sealing mechanism.
2. A receiver dryer according to claim 1, wherein the connector has two opposed spaced annular surfaces which contact and seal against opposite side surfaces of the port element around the axis of rotation, the opposed surfaces being one a part spherically shaped portion and the other an edge ring.
3. A receiver dryer according to claim 1 or claim 2, wherein the sealing mechanism is an O-ring disposed in an annular groove in the inner end portion of the connector.
4. A receiver dryer according to any one of the preceding claims, wherein the connector comprises a connector element providing the inner end portion and the first duct end and fixed to a hollow support element, which is secured to the container; and the



inlet coupling is stationarily fixed to the support element.

5. A receiver dryer for a refrigeration circuit,
5 substantially as described with reference to the
accompanying drawings.

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