

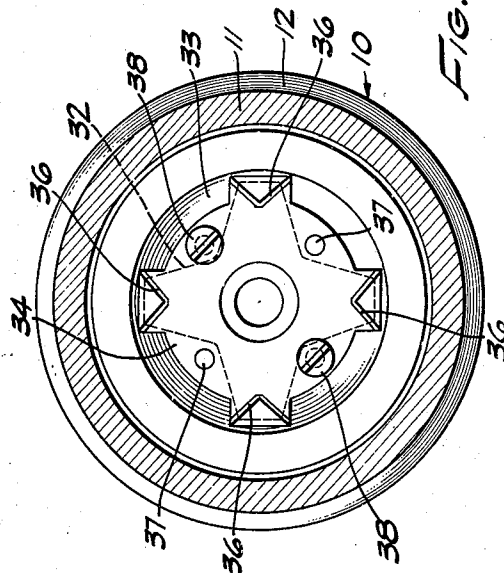
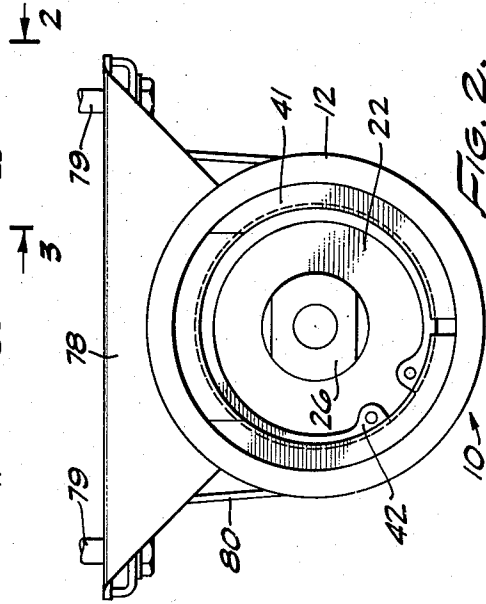
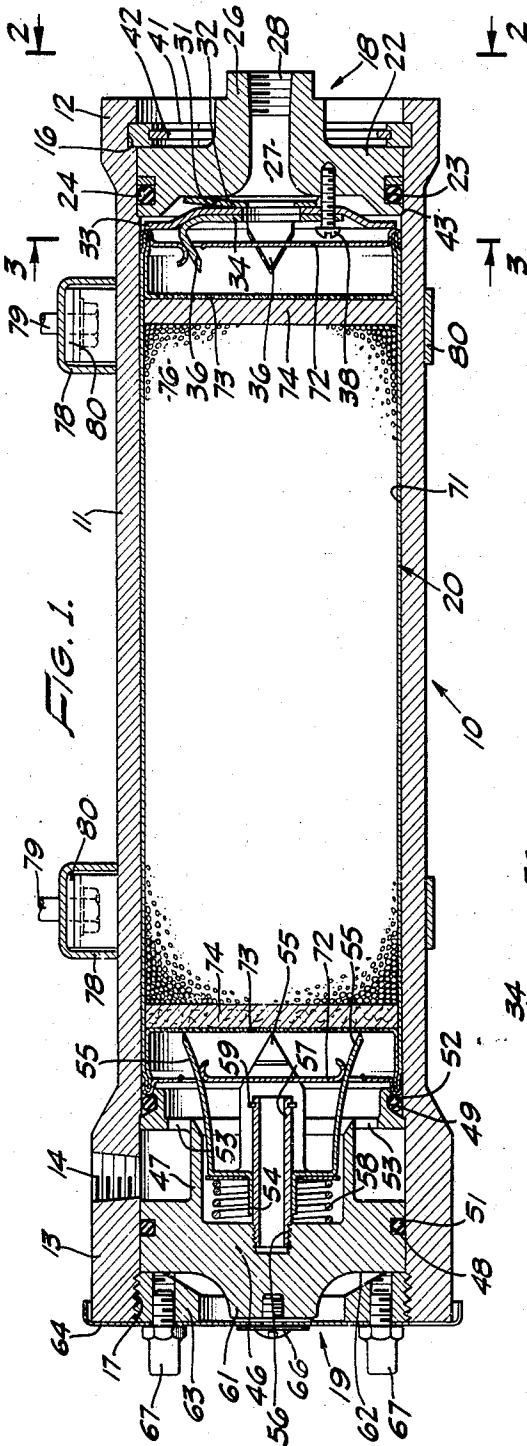
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DESICCATOR UNIT

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DESICCATOR UNIT

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The present invention relates to desiccator units in general and particularly to a desiccator unit constructed and designed to be incorporated into a fluid system operating under pressure of many thousand pounds. More specifically the invention comprises a desiccator unit in which a replaceable hygroscopic cartridge is removably positioned within a high pressure resistant casing provided with means by which fluid-conducting openings are formed in the opposite ends of the cartridge to open it to the flow of fluid through the casing.

In many operations it is desirable that a gas under pressure be free from moisture or a foreign undesirable gas or substance. The removal of moisture may be viewed as typical and in this disclosure will be discussed. For this purpose a unit known as a desiccator unit is placed in the line of gas flow to remove from the gas stream the moisture or foreign gas. At times the host gas may be under high pressure ranging, for example, from one to twenty thousand pounds per square inch or more. The desiccant unit must be able to operate under these conditions. Because a desiccant becomes exhausted after a period of operate use, it must be replaced. It is important that it remain sealed until actually placed in use in order that it may have maximum effectiveness and life. The desiccator unit constructed in accordance with the present invention is capable of functioning under extremely high pressures and is so constructed that the desiccant cartridge is inserted in its sealed condition into the unit casing and thereafter opened for the first time.

Referring now to the drawing in which a preferred embodiment of the present invention is illustrated:

Figure 1 is a longitudinal section through a desiccator unit constructed in accordance with the present invention;

Figure 2 is an end view looking in the direction of the arrows upon the line 2—2 of Figure 1; and

Figure 3 is a transverse section upon the line 3—3 of Figure 1.

Referring again to the drawing, a desiccator unit constructed in accordance with the present invention is indicated generally by the reference character 10 and is seen to comprise an elongated metal body 11, preferably cylindrical, sufficiently strong as to withstand high internal fluid pressures. Body 11 is of increased wall thickness at its opposite ends 12 and 13, the latter being formed with a transverse threaded port opening 14 adapted to seat the threaded end of a pipe forming a part of the fluid conduit system. End 12 is interiorly grooved at 16 a short distance from its extremity while end 13 is interiorly threaded at 17. End 12 of the body 11 is closed by a permanently positioned end closure member indicated generally by the reference character 18, while opposite end 13 is closed by a removable closure member indicated generally by the reference character 19. Closure members 18 and 19 define the ends of a chamber in casing 11 in which is positioned the desiccant cartridge indicated generally by the reference character 20.

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Referring now in particular to end closure 18, that member is seen to comprise a wall-like body 22 circumferentially grooved at 23 to seat an O-ring sealing unit 24 and formed centrally upon its exterior face with an axially projecting nipple 26 which is interiorly threaded at 28 in order to seat threadedly, and in sealed fluid-tight relationship, a fluid-conducting conduit. Body 22, including nipple 26, is centrally bored at 27, the bore being threaded at its end at 28 in order to seat the threaded end of a connecting pipe in the fluid conduit system. The wall body 22 closely seats within the interior of the main body 11, the O-ring sealing unit 24 providing a fluid-tight seal therebetween.

Upon its inner face, the body 22 is centrally recessed at 31 and seats a slightly cupped multi-legged spring washer 32. Abutting the outer face of spring washer 32 is a slightly cupped flange element 33 which carries upon its inner face a plate 34 formed at spaced points around its periphery with forwardly projecting pointed teeth 36. Plate 34 is secured to flange element 33 as by means of rivets 37 and the two members, forming a cartridge-perforating means or perforator, are retained relative to the body 22 by screws 38.

Closure member 18 is prevented from longitudinal displacement from the end 12 of the body 11 by retaining means comprising a split ring 41 expanded in place in the groove 16 by an inner wire spring 42. It is, additionally, held against movement into body 11 by the abutment of body 22 with internal shoulder 43 on casing body 11.

Removable closure member 19 closing the end 13 of casing 11 comprises a body 46 formed with an encircling channel 47, with a relatively narrow circumferential groove 48, and at its inner end with an open-sided groove forming an O-ring seat 49.

Sealing O-rings are positioned in the circumferential grooves 48 and 49, as shown in Figure 1, the first-mentioned O-ring being indicated by the reference character 51 and the second by the reference character 52. As is seen in Figure 1, with closure 19 seated in body 11 the radial port 14 opens into the circumferential channel 47 and the internal ports 53 connect the latter to the chamber formed between the closure members 18 and 19.

As is seen most clearly in Figure 1, body 46 of closure member 19 is counterbored on its inner face and is centrally threaded at 56 to seat fixedly an inwardly projecting post 57. A perforator member is carried by post 57 and comprises a central cylindrical sleeve 54, which seats slidingly upon post 57 and a plurality of inwardly projecting curved prongs or teeth members 55 pointed at their forward ends. A coil spring 58 encircles post 57 within the counterbore of body 46, contacts the body and exerts a force against the perforator urging the latter inwardly. A lock ring 59 near the end of the post 57 prevents displacement of the perforator.

Upon its exterior face, body 46 of closure member 19 is formed with a flat-ended projecting nipple 61, which projects centrally from a surrounding end surface 62. Abutting the end surface 62 is a retaining ring 63 exteriorly threaded and seated in threaded engagement with the threads 17 of body 11 with its outer face lying in substantially the same plane as the end of nipple 61. A flat cover or cap 64 abuts the end of nipple 61 and is retained thereon by means of a small set screw 66, the periphery of the cover 64 being flanged and telescoping for a short distance the end 13 of body 11.

Two or more screw members 67 extend through the cover 64 and seat threadedly in the ring 63 and provide means by which the latter may be rotated by a suitable wrench or other tool in order to advance the ring 63

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into the body 11 and so force the closure member body 46 inwardly.

The cartridge unit 20 which is positioned in the casing 11 and in the chamber formed between the closure members 18 and 19 is preferably a sheet metal member of a cross section conforming closely to the interior cross section of the body 11. It is adapted to be positioned therein by being advanced through the end 13 with the closure member 19 removed. Unit 20 comprises a longitudinally extending exterior sheet-metal wall 71 closed at its opposite ends by sheet-metal walls 72 positioned slightly within the length of the body 71. Spaced inwardly from the end walls 72 are perforated walls 73 which are spaced inwardly from end walls 72 and which form the desiccant-containing chamber. A suitable body 74 of gas-permeable closely-packed material such as fiber-glass is positioned inside each perforated wall 73 and serves to prevent the desiccant 76, which may be granular, from filtering through the apertures in the wall 73. One end of the unit 20 preferably abuts the flange plate 33 while the opposite end seats in sealing contact with the O-ring 52 carried by closure member 19. When so positioned between closure members 18 and 19, with the latter retained in place as illustrated, and as previously described, the length of the body of the desiccant cylinder or cartridge 20 is such that the teeth 36 and 55, respectively, of the perforating units of the respective end closures 18 and 19 have penetrated the end walls 72 at the opposite ends of the cartridge and, because the individual teeth of the perforators are sloped, have torn openings through which gas can flow.

The desiccant unit constructed in accordance with the present invention is adapted to be mounted as desired. In the form illustrated, suitable brackets 78 are supported by posts 79 and carry straps 80 which encircle the body 11 in supporting relationship.

The installation of a desiccant cartridge 20 in the unit constructed in accordance with the present invention is a simple operation. A suitable tool capable of engaging the projecting ends of screws 67 is used and the ring 63 is rotated, the set screw 66 first being loosened, if desired, to permit this rotation without the turning of the body 46 at closure 19. If the body 46 of member 19 is not too tightly wedged in the end 13, it can be drawn outwardly as the ring 63 is retracted, but in the event it is frozen in place the set screw 66 is removed and the ring 63 and cover 64 first removed, following which the body 46 can be pulled from the casing 11 as by first threading a bolt into the threaded seat formerly occupied by the set screw 66 and then exerting a withdrawal force upon the bolt. Upon the removal of closure 19, the unit 20 is slid from the open end of body 11.

A fresh unit 20 with sealed ends can then be inserted and advanced into body 11 until its forward end wall 72 contacts the ends of the teeth 36. The body 46 of closure member 19 is then re-positioned, the contact of the ends of teeth 55 serving to compress the spring 58 somewhat. The retaining ring 63 is then seated and rotated, forcing the closure body 46 inwardly and the cartridge longitudinally of the cylinder body 11. The sharpened teeth 36 and 55 penetrate the opposite end walls 72

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in the manner illustrated in Figure 1. The retaining ring 63 forming a part of the closure member 19 is tightened to its end position, the set screw 66 is tightened, and the unit is ready for use. The flow of fluid through the unit is between the port 27 in the closure member 18, through the desiccant cartridge 20, through the ports 53 into the channel 47, and then through the port 14.

While the particular apparatus herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A high-pressure desiccator unit adapted for use in a gas line operating under thousands of pounds pressure and arranged to be serviced quickly in the field without special tools, said unit comprising a thick-walled cylinder with a central bore of uniform diameter adapted to house a normally sealed desiccant cartridge easily punctured as an incident of assembly to said unit, removable sealing plugs closing the opposite ends of said cylinder including an infrequently removed first plug and a quickly removable second plug, said first plug having a snug sliding fit with the wall of said bore and an O-ring filled groove in its peripheral side wall cooperating with said bore wall to provide a readily-separable high-pressure seal with said bore wall, the outer end of said bore having an annular groove of rectangular cross-section opening radially inward immediately adjacent the exterior radial face of said first plug, a keeper ring of high shear strength formed in a plurality of segments adapted for assembly into said groove with the inner rim thereof overlapping the outer rim of said first plug, and a readily removable spring keeper for holding the segments of said keeper ring assembled within said groove.

2. A high-pressure desiccator unit as defined in claim 1 wherein said first plug has an outwardly extending boss centrally thereof provided with a threaded passage opening into the interior of said cylinder, the exterior surfaces of said boss being spaced radially inwardly of said keeper ring segments and of said keeper spring and providing a minimum of interference with the assembly and disassembly of said keeper ring components.

3. A high-pressure desiccator unit as defined in claim 1 wherein said removable closure plugs both carry sharp-pronged punch means on their interior walls operable to puncture the end walls of a desiccator cartridge as said second plug is pressed axially to its fully assembled position, and means resiliently biasing each of said sharp-pronged means into vibration-proof seating engagement with the opposite ends of said cartridge.

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