

Dec. 27, 1955

D. R. SQUIER

2,728,407

DEHYDRATING APPARATUS

Filed April 9, 1952

Fig. 1.

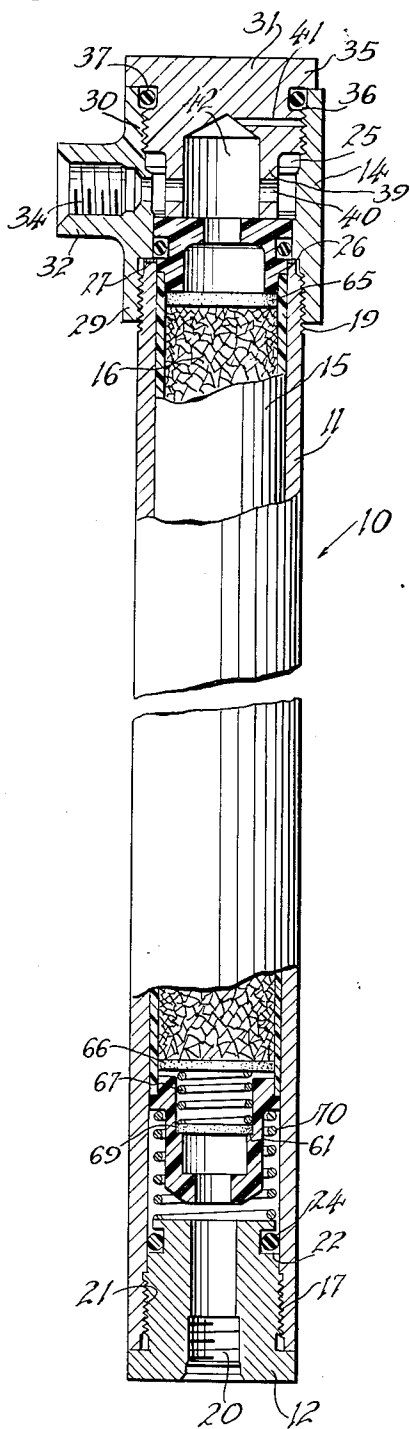
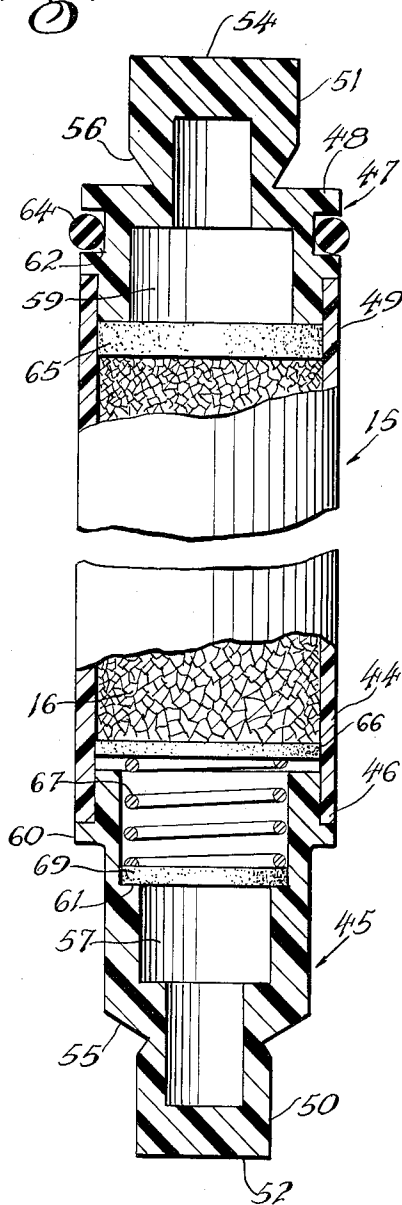


Fig. 2.



INVENTOR.
Donald R. Squier
BY
J. William Carson
ATTORNEY

1

2,728,407

DEHYDRATING APPARATUS

Donald R. Squier, Pompton Plains, N. J., assignor to
Specialties Development Corporation, Belleville, N. J.,
a corporation of New Jersey

Application April 9, 1952, Serial No. 281,420

5 Claims. (Cl. 183—4.8)

The present invention relates to fluid treating apparatus, and, more particularly, to apparatus for removing moisture from compressed gas, which utilizes a replaceable cartridge containing a dehydrating material.

Various means of dehydrating or drying compressed gas in closed systems have been employed heretofore, and, while cartridge type driers are known in the art, there are certain disadvantages which have been associated with them thus far. For example, the installation or replacement of a cartridge in such a system formerly required considerable disturbance of the gas line connections. Then, too, there was no way of determining whether or not the cartridge needed replacement. Also, such cartridges usually were so constructed that the dehydrating material was exposed to or ineffectively sealed from the atmosphere before use of the cartridges, thereby decreasing their useful life and efficiency after installation.

Accordingly, an object of the present invention is to provide improved gas dehydrating apparatus which is economical and simple to manufacture, is light in weight, is compact in arrangement and is readily installed in a compressed gas system.

Another object is to provide such gas dehydrating apparatus wherein a gas dehydrating cartridge is utilized which is adapted to be removed and replaced without disturbing gas line connections.

Another object is to provide such a cartridge having seamless moisture-proof seals which may be readily removed when desired to prepare the cartridge for use.

Another object is to provide such a cartridge which is constructed of relatively light, thin material but which is adapted for use in relatively high pressure gas lines.

A further object is to provide such a cartridge which is constructed for visually indicating the need for replacement thereof in a reliable manner.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawing, forming a part of the specification wherein:

Fig. 1 is a fragmentary longitudinal cross-sectional view of apparatus in accordance with the present invention illustrating the same as assembled when in use.

Fig. 2 is an enlarged fragmentary view of a gas dehydrating cartridge, partly in elevation and partly in section, illustrating the same prior to being installed as shown in Fig. 1.

Referring to the drawing in detail, there is shown a gas dehydrating apparatus in accordance with the present invention which generally comprises a cartridge casing 10 including a tubular housing 11, an inlet fitting 12 at one end of the housing and an outlet fitting 14 at the other end of the housing; and an elongated cartridge 15

2

positioned in the housing between the fittings and containing a mass of dehydrating material 16.

The housing 11 is in the form of an elongated tube having an internally threaded inlet end 17 and an externally threaded outlet end 19 to which the fittings 12 and 14 are threadedly secured, respectively, but it will be understood that these parts may be secured in any suitable manner or that the fittings may be integral with the housing.

The inlet fitting 12, as shown, is in the form of a plug having a bore or passageway 20 extending therethrough to which an inlet conduit (not shown) is adapted to be connected, an externally threaded section 21 cooperating with the threaded end 17 of the housing 11, and an annular recess 22 adjacent its inner end in which is seated a sealing ring 24.

The outlet fitting 14 is generally tubular, and has a bore 25 extending therethrough. This bore is formed with a shoulder 26 adjacent its lower end for positioning a soft metal washer 27 against the upper end of the housing 11, a threaded section 29 below the shoulder 26 cooperating with the threaded end 19 of the housing 11, and a threaded section 30 in the upper portion thereof for removably securing a plug or closure 31 about to be described. The outlet fitting 14 further has a laterally extending stud or nipple 32 formed with a passageway 34 communicating with the bore 25 and adapted for connection of an outlet conduit (not shown) thereto.

The plug 31 has a flange 35 for engaging the upper end of the fitting 14, an annular recess 36 in which is seated a sealing ring 37, and a hollow depending sleeve or skirt 39 of reduced diameter formed with one or more radial apertures 40. The plug 31 is also provided with a radial passageway 41 extending from the hollow sleeve 39 to the periphery of the plug at a point below the ring 37. The sleeve 39 and the bore 25 are so constructed and arranged as to provide an annular passageway 42 within the fitting 14 which establishes communication between the radial apertures 40 and the lateral passageway 34 regardless of the orientation of the radial apertures.

Referring more particularly to Fig. 2, the cartridge 15 shown therein comprises an elongated tubular cylindrical body portion 44 having a relatively thin wall and having an outer diameter slightly smaller than the inner diameter of housing 11, a closure 45 sealing the lower or inlet end 46 of the body portion, and a closure 47 sealing the upper or outlet end 49 of the body portion. The body portion 44 may be formed of a transparent plastic resin compound, such as acetate butyrate, but, if desired, may be formed of metal or other suitable material. The closures 45 and 47 may be formed of similar material, and are secured to the body portion 44 in any conventional manner as by heat sealing or cementing.

Closures 45 and 47 are each provided with a removable tubular extension 50 and 51, respectively, which each have an outer end wall 52 and 54, respectively, or are provided with other removable closure means. As shown herein, the extensions 50 and 51 are each formed with a circumferentially extending weakened zone, such as a V-shaped groove 55 and 56, respectively, adjacent the body of the closures 45 and 47 which facilitate breaking off the extensions 50 and 51 to provide an inlet and an outlet for the cartridge. The closure 45 is provided with a bore 57 which extends longitudinally from the inner end of the closure to a point beyond the break-off groove 55 and into the extension 50, while the closure 47 is provided with a generally similar bore 59 which extends longitudinally from the inner end of closure 47 to a point beyond the break-off groove 56 and into extension 51.

The closure 45 is further provided with an external flange 60, a shoulder 61 in the bore 57 thereof, the pur-

pose of which is about to be described, and the closure 47 is further provided with an external annular groove 62 for seating a sealing ring 64.

The cartridge 15, as so far described, is adapted to contain the dehydrating material 16 and seal the same against absorption of moisture prior to the removal of the extensions 50 and 51. This material may be silica gel or any other suitable dehydrating agent.

Preferably, the dehydrating material 16 is confined within the body portion 44 of the cartridge 15 by a porous filter disc 65 seated against the inward or lower end of the closure 47 and a similar disc 66 which is slidably positioned in the body portion adjacent the lower end thereof and is urged upwardly by a cylindrical spring 67 or the like having its lower end seated on another porous filter disc 69 which in turn is seated on the shoulder 61 of the closure 45. This spring 67 causes the filter disc 66 to bear against the drying material 16 to maintain the same as a compact mass and thereby compensate for shrinkage thereof due to vibration or other causes. The filter discs are constructed in a manner to permit the free flow of compressed gas therethrough without an appreciable drop in the pressure thereof while confining the dehydrating material to prevent the same from getting into the compressed gas system or contaminating the gas.

The apparatus just described is adapted for installation in a compressed air system, by way of example, but it will be understood that the present invention is not intended to be restricted in its application to compressed air systems. At whatever point in the system it is desired to install the apparatus, the casing 10 is assembled in the line by securing an inlet conduit (not shown) to the bore 20 of the fitting 12, and securing an outlet conduit (not shown) to the passageway 34 of the fitting 14, in any suitable manner, so that compressed air to be dried will enter through the bore 20 and leave through the passageway 34. The plug 31 is removed from the outlet fitting 14 and a cylindrical spring 70 or the like is seated on the upper or inner end of the inlet fitting 12.

The cartridge 15 is then prepared for use by removing the extensions 50 and 51 to provide the inlet and the outlet therefor, and the cartridge is inserted through the open bore 25 of the outlet fitting 14 and is positioned in the casing 10, as shown in Fig. 1, with the closure 45 surrounded by the spring 70 and the flange 60 thereof engaged by the spring 70 to bias the cartridge upwardly. The housing 11 and the cartridge 15 are preferably so dimensioned that the cartridge may not be completely inserted into the housing unless the break-off tips or tubular extensions 50 and 51 are first removed. This obviates the possibility of inserting a sealed cartridge into the casing.

The plug 31 is next applied, and as it is threaded into the bore 25, the sleeve 39 thereof engages the upper end wall 48 of the closure 47 to effect slight compression of the spring 70, while maintaining a space or chamber about the closure 45 into which compressed air entering the inlet fitting bore 57 will flow. A small portion of this air will flow around the closure 45 and the tubular body portion 44 but will be sealed in the casing 10 by the ring 64, thereby establishing an external pressure on the body portion 44. The remainder of the air will pass through the cartridge 15 whereby any moisture contained in the air is removed by the dehydrating material 16. The dried air leaving the cartridge 15 enters the hollow depending sleeve 39 of the plug 31, passes through the apertures 40, into the annular passageway 42 within the outlet fitting 47 and through the lateral passageway 34 into the gas line (not shown).

By reason of the fact that the tubular body 44 is surrounded on its outside by compressed air at substantially the same pressure as the air which passes through it, the possibility of rupturing the tubular body is obviated.

In order to inspect the cartridge 15, it is simply necessary to isolate the apparatus in the system, as by suitably

located valves, and to remove the plug 31 and the cartridge 15 whereby determination of the necessity for replacement may be accomplished rapidly and accurately. As soon as the pressure sealing contact between flange 35 of plug 31, resilient sealing ring 37 and the sidewall of bore 25 is broken, compressed air will be dissipated audibly through radial passageway 41 so that an inspector will know when it is safe to completely remove plug 31. Then, too, in the event that the drier is not properly isolated in the system before inspection, air flowing from the radial passageway 41 will sound a continuous warning as soon as the above-mentioned pressure sealing contact is broken.

From the foregoing description, it will be seen that the present invention provides an improved cartridge type gas drier of simple and economical construction utilizing a cartridge which is readily inspected and replaced without disturbing gas line connections and which is sealed against moisture until ready for installation.

While the present invention has been described herein as a gas dehydrator or drier, it will be readily appreciated that the disclosed apparatus is adapted for other uses, such as odorizing or deodorizing gaseous fluids.

As various changes may be made in form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

I claim:

1. A cartridge casing of the class described comprising a tubular housing, an inlet fitting at one end of said housing, an outlet fitting at the other end of said housing, one of said fittings having a bore in coaxial alignment with said housing and a lateral passageway communicating with the bore thereof and said last mentioned fitting, and a removably secured closure including means for sealing said bore, said closure having a tubular sleeve of smaller outer diameter than the diameter of said bore provided with a plurality of apertures for establishing communication between the interior of said tubular sleeve and said lateral passageway, and said closure having a passageway extending from the interior of said tubular sleeve to the exterior of said closure at a point inwardly of said sealing means.

2. A cartridge of the class described comprising an elongated tubular body, a closure at each end of said tubular body for sealing the same, each of said closures having a tubular extension formed with an end wall and with a weakened circumferentially extending zone spaced inwardly of said end wall, one of said closures having an end wall adjacent said weakened zone of its tubular extension and an annular recess adjacent said last mentioned end wall, the other of said closures having an annular flange spaced inwardly of its tubular extension, and a sealing ring in said recess.

3. In combination, a tubular housing, an inlet fitting at one end of said housing, an outlet fitting at the other end of said housing, said inlet fitting having a longitudinal passageway therethrough coaxial with said housing, and a cartridge in said housing having a tubular body positioned between said fittings through which fluid medium under pressure is adapted to pass, means for forming a seal between said outlet fitting and the end of the cartridge adjacent thereto, the other end of said cartridge and said housing being so dimensioned to permit fluid medium under pressure entering said inlet fitting to pass between the inner wall of said housing and the outer wall of said cartridge body whereby said cartridge body is subjected to substantially equal internal and external pressure, said outlet fitting having a bore in coaxial alignment with said housing to facilitate insertion and removal of said cartridge therethrough and having closure means removably secured thereto for sealing said bore, said closure means having a tubular sleeve of smaller outside diameter than the diameter of said bore formed with aperture means, and spring

5

means supported by said inlet fitting for urging said cartridge in a direction to cause said first mentioned cartridge end to engage said tubular sleeve, said outlet fitting having a lateral passageway communicating with the bore thereof whereby communication is established between said cartridge and said lateral passageway through said tubular sleeve, said aperture means and said bore.

4. Apparatus according to claim 3 wherein said cartridge has removable closure means at each end thereof and is adapted to be positioned in said housing between said fittings, each of said closure means having an integral tubular extension formed with an end wall and with a circumferentially extending generally V-shaped groove spaced inwardly of said end wall, said housing, fittings and closure means being so dimensioned whereby said cartridge cannot be positioned in said housing without removal of said closure means.

5. A cartridge of the class described comprising an elongated tubular body for containing dehydrating material, a closure at each end of said tubular body for sealing the same and each closure having means adapted to provide a passageway therethrough, one of said closures having an end wall and an annular recess adjacent said end wall, the other of said closures having an annular flange surrounding it, a sealing ring in said recess, one of

6

said closures having shoulder means facing the interior of said body, a filter element within said body and seated on said shoulder means, a filter element within said body adjacent said other closure, and means for urging said last mentioned filter element towards said first mentioned filter element to confine the material therebetween.

References Cited in the file of this patent

UNITED STATES PATENTS

843,494	Rosenberg	Feb. 5, 1907
1,337,020	Milker	Apr. 13, 1920
2,225,990	Henry	Dec. 24, 1940
2,323,160	Stecher et al.	June 29, 1943
2,465,163	Lockwood	Mar. 22, 1949
2,479,581	Masci	Aug. 23, 1949
2,507,028	Lockwood	May 9, 1950
2,521,060	Hallinan	Sept. 5, 1950
2,526,782	Thorpe	Oct. 24, 1950
2,556,292	Newcum	June 12, 1951
2,593,132	Gannon	Apr. 15, 1952

FOREIGN PATENTS

16,643	Austria	June 25, 1904
--------	---------	---------------