

[54] **VEHICLE GAS DRYER PURGING
SYSTEM AND METHOD**

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[56] **References Cited**

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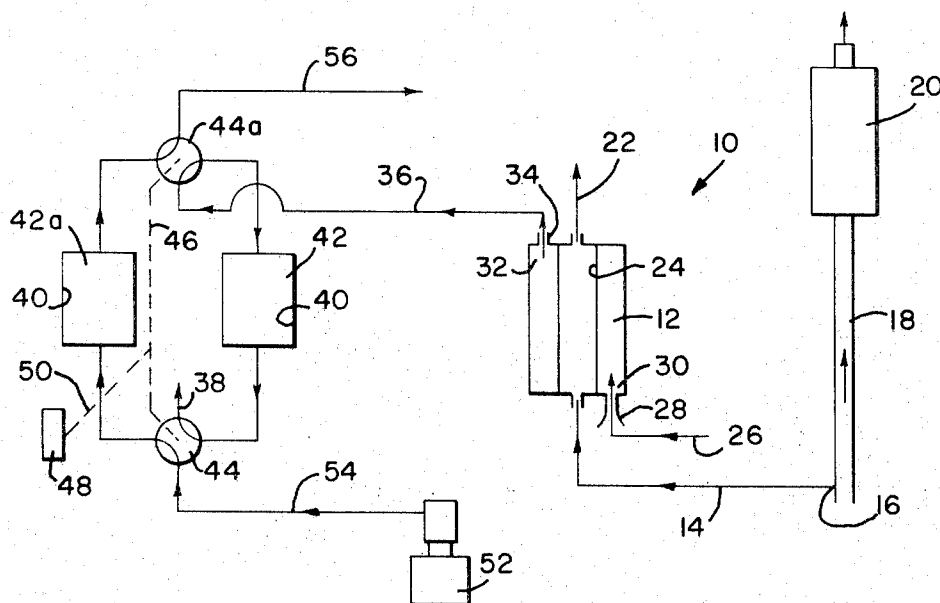
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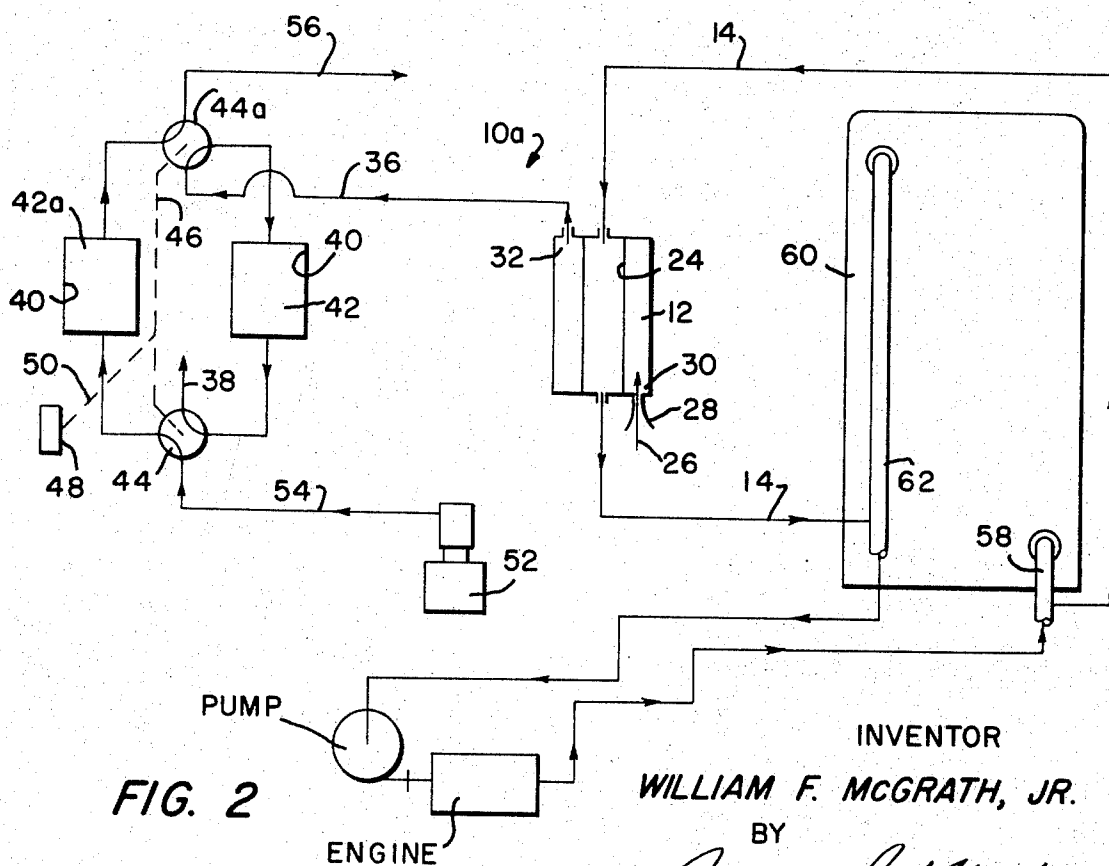
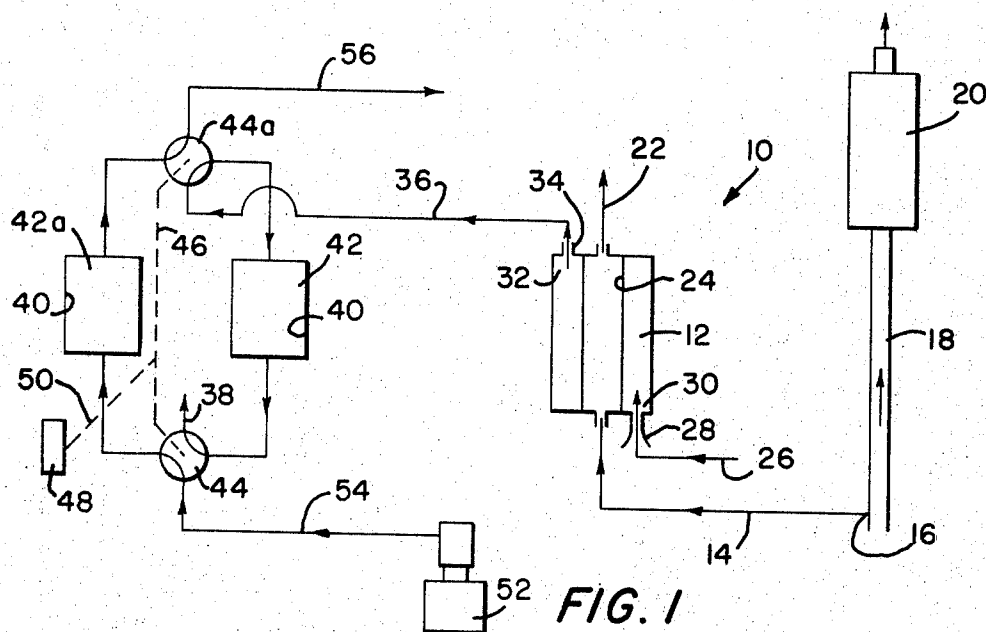
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[57] **ABSTRACT**

A system and method for purging gas dryers, such as compressed air dryers, for use with a vehicle in which the gas is used for the vehicle's systems, such as the air brake system. The invention heat exchanges the exhaust gases of the vehicle with the input ambient air to heat the latter, and reactivates or purges drying towers with the purge gas product resulting therefrom.

7 Claims, 2 Drawing Figures





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VEHICLE GAS DRYER PURGING SYSTEM AND METHOD

This invention pertains to gas dryer purging systems and methods and in particular to a gas dryer purging system and a method for use with a vehicle having a source of heated fluid.

Most of the known gas dryer purging systems and methods require the specific provisioning therefor of extraneous heat sources, for the regeneration or reactivation of desiccant drying beds, or whatever moisture extracting means are used. This extra provisioning adds to the cost of the system's fabrication and use, and introduces another functional element which is subject to malfunctioning and failure.

A novel gas dryer system, which is the subject of a co-pending application, Ser. No. 771,112, filed 28 Aug., 1968, now U.S. Pat. No. 3,568,406 for a Desiccant Air Dryer, by Wesley M. Dynes, teaches the use of a portion of the very product gas for purging and regenerating a hydrated desiccant bed, and the reclamation of the purging portion thereafter. Thus, the product gas "portion" serves as the heat source; there obtains no need to use electric heaters, steam, or the like for the regeneration. However, this teaching sets forth the use of desiccant bed-implanted piping, for the conduct of the gas portion therethrough and, as disclosed, the product gas purging portion adds heat to the overall gas product in the final drying pass.

Vehicles use gas, such as compressed air, for on-vehicle systems, such as air brakes, and these systems are subject to failure due to the presence of moisture in the gas supply. Now then, vehicles have sources of heated fluid, such being the engine exhaust, coolant and lubricant systems, which can be deployed, novelly, to dry the gas.

The only prior art teaching known, which makes any use of an engine exhaust system with absorbent chambers, is that set forth in U.S. Patent No. 2,071,868, issued Feb. 23, 1937, to Kurt Von Lude, for "Recovery of Moisture for Use on Lighter-Than-Air Aircraft." The Von Lude teaching, however, is of moisture recovery, and not of gas dryer moisture purging.

Accordingly, it is an object of this invention to teach a vehicle gas dryer purging system and method which requires no extraneous heat source for regeneration or reactivation of moisture-extracting means used therewith. It is an object of this invention to teach a vehicle gas dryer purging system and method which uses an on-vehicle source of heated fluid for the purging of moisture from moisture-extracting means of the system.

It is another object of this invention to teach a gas dryer purging system, for use with a vehicle having a source of heated fluid, which comprises first means for extracting moisture from gas and second means for conducting heated fluid through the extracting means to purge the moisture therefrom, the system including fluid piping means which interconnects the source with the second means and has means for supplying heated fluid to the second means.

It is still another object of this invention to teach a method for purging gas dryer systems having moisture-extracting means, for use with vehicles having a source of heated fluid, which comprises the steps of connecting fluid piping means between said source and said ex-

tracting means, and conducting heated fluid through said extracting means, via said piping means, for purging of moisture therefrom.

It is a feature of this invention to heat exchange the exhaust gases of the vehicle with input ambient air to heat the latter, and reactivate or purge moisture-asturated drying towers with the resulting purge gas product.

Further objects and features of this invention will become more apparent by reference to the following description taken in conjunction with the accompanying figures in which:

FIG. 1 is a schematic of a preferred embodiment of a gas dryer system, according to the invention, in which the vehicle exhaust system provides the source of heated fluid; and

FIG. 2 is a schematic of an alternate embodiment of a system, according to the invention, in which the vehicle coolant system provides the source of heat.

As shown in FIG. 1, the vehicle gas dryer purging system 10 comprises heat exchanger 12 which is connected by way of gas line 14, at one end 16 thereof, to an exhaust pipe assembly 18. The assembly comprises an exhaust gas pipe and a muffler 20. The other end 22 of gas line 14 opens upon the atmosphere, and an intermediate portion 24 thereof is defined by a passageway within the heat exchanger 12. A minor portion of the exhaust gases are thus tapped off from assembly 18, for heat exchange thereof with an ambient air input. The latter, after acquiring heat in the exchanger 12, is used to purge moisture from a hydrated desiccant drying tower, to reactivate the tower.

The heat exchanger 12 comprises a housing in which ambient air is diffused; ambient air is admitted into the housing, by ram effect with movement of the vehicle, via pathway 26, by means of a funnel 28 which is fixed to a first aperture 30 formed in the housing of the exchanger. A second aperture 32 is formed in the housing of the exchanger 12 in the opposite side from whence the ambient air is admitted and throughconnects with an end 34 of purge fluid line 36. The other end 38 thereof opens onto the atmosphere. An intermediate portion of line 36 is defined by the walls 40 of one of two desiccant drying towers 42 and 42a. End 38 of line 36 is connected through a two-position valve 44 which is operative to switch the purge gas from drying tower 42, which is here shown to be on the purging/reactivating cycle, to drying tower 42a, which is here shown to be in the product-gas drying cycle.

Valve linkage 46 couples together, for common operation, valves 44 and 44a and linkage 46 is further connected to a valve switching means 48 by means of switching linkage 50. Valve switching means 48 can comprise any known control means; in this disclosure the means is presented as a timer, operative from the ignition system of the vehicle (by means not shown), to switch the input to (and output from) the towers at optimum times.

The rest of the components shown comprise a gas compressor 52 to which is coupled a product-gas output line 54; line 54 is conducted through valve 44 to the product-gas drying tower, this being shown as tower 42a. From tower 42a the dried compressed gas is conducted by way of product-gas supply line 56 and valve 442, for use on-vehicle.

The alternate system 10a embodiment depicted in FIG. 2 is substantially similar to that shown in FIG. 1, except that it operates from the vehicle coolant system. Line 14 effects a shunted connection with a heated coolant return line 58 which is coupled into the radiator 60. Line 14 taps off a minor portion of the heated coolant, for heat exchange purposes, and returns same to the system via line 62.

According to the teaching of my invention, a heated fluid from the vehicle, which may be derived from the exhaust system, coolant system, or from the lubrication system, is used to heat exchange with an input supply of ambient air, and the latter is subsequently used to purge and reactivate a hydrated desiccant-type drying tower. Therefore, there is no requirement to provide extraneous heating elements for the reactivation of the drying towers and, by this simple, novel system, and inventive method, the compressed gas supply for the vehicle freed of moisture.

While I have described my invention in connection with specific embodiments thereof, it is to be clearly understood that this is done only by way of example and not as a limitation to the scope of my invention as set forth in the objects thereof and in the accompanying claims.

I claim:

1. A gas dryer purging system, for use with vehicles having a source of heated fluid, comprising:
 - a heat exchanger;
 - first means for conducting heated fluid from said source through said exchanger;
 - means for extracting moisture from gas; and
 - second means, operative only in response to vehicular movement of said system relative to the ambient air for conducting ambient air as a purge fluid by ram effect, sequentially, through said heat exchanger, for effecting a heat exchange relationship between said purge fluid and said heated fluid, and through said extracting means, for purging moisture therefrom; wherein
- said heat exchanger has first and second, spaced-

apart apertures formed therein for the admittance of ambient air therethrough; and

said second means comprises a purge fluid line throughconnecting one of said first and second aperture with said moisture-extracting means, and a funnel-type-device throughconnected with the other of said first and second apertures for acquiring ambient air and conducting same therethrough into said heat exchanger.

2. A system, according to claim 1, wherein: said source comprises an exhaust pipe assembly.

3. A system, according to claim 1, wherein: said source comprises a heated-coolant line.

4. A system, according to claim 2, wherein: said first means comprises piping throughconnected at one end thereof with said exhaust pipe assembly, opening at the other end thereof onto the atmosphere, and having an intermediate portion thereof defined by said heat exchanger.

5. A method for purging gas dryer systems having moisture-extracting means, for use with a vehicle having a source of heated fluid, comprising the steps of:

- moving the vehicle relative to the ambient air effectively to produce ambient air pressure and velocity having a ram effect capability;
- heat-exchanging the ram effective ambient air with fluid from said source; and
- conducting the heat-exchanged ambient air through said means for purging of moisture therefrom.

6. A method, according to claim 5, wherein the heat-exchanging step comprises:

- conducting a portion of fluid from said source into heat-exchange relationship with said ambient air; and
- discharging said portion into the atmosphere.

7. A method, according to claim 5, wherein the heat-exchanging step comprises:

- conducting a portion of fluid from said source into heat-exchange relationship with said ambient air; and
- returning said portion to said source.

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