May 4, 1937. R. S. BEGG 2,079,100

DEHYDRATOR FOR AIR BRAKE SYSTEMS

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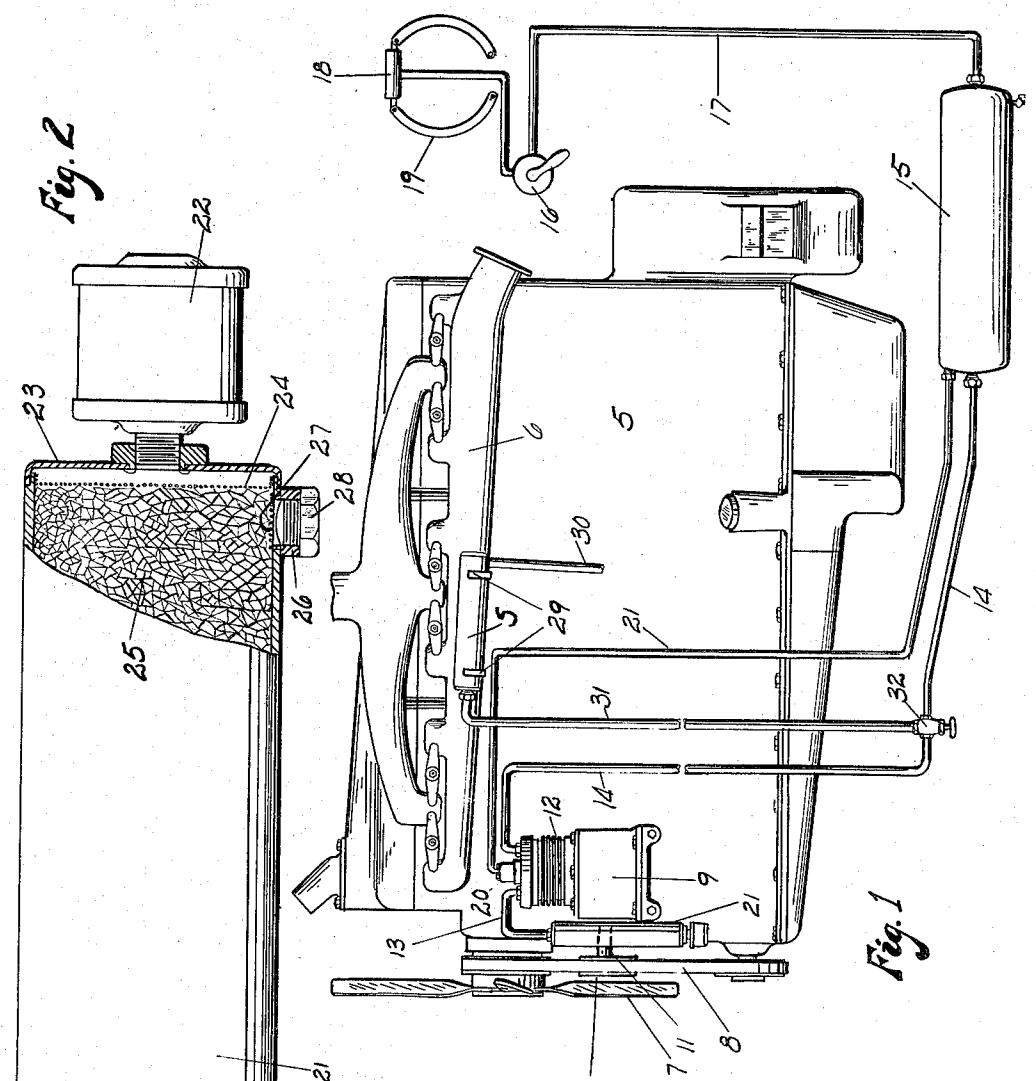

Fig. 1

Fig. 2

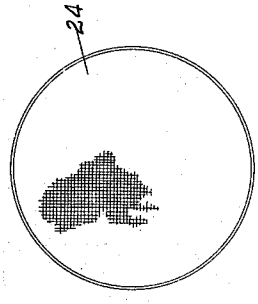

Fig. 3

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DEHYDRATOR FOR AIR BRAKE SYSTEMS

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3 Claims. (Cl. 303—1)

This invention relates to new and useful improvements in air dehydrators and an important object of the invention is to provide means for extracting moisture from atmospheric air which is drawn into an air or vacuum brake system to preclude the possibility of subsequent frosting and condensation of moist vapors in the system and which would, if not extracted, be fatal to the operation of the system in freezing climate due to such freezing and frosting around the valves and other movable parts of the system rendering such valves or parts inoperative with consequent failure of the operation of the system.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the accompanying drawing forming a part of the application and wherein like numerals are employed to designate like parts throughout the several views,

Fig. 1 is a side elevation of an internal combustion engine for motor vehicles illustrating a part of a compressed air brake mechanism associated therewith and the invention applied thereto,

Fig. 2 is an enlarged side elevation of the present preferred form of dehydrator with parts thereof broken away to illustrate certain details, and

Fig. 3 is an elevation of the strainers employed in the two ends of the dehydrator.

While the dehydrator has been illustrated in an air brake system, it will be understood that it is also useful in vacuum brake systems which in actuality are low pressure air brake systems.

Referring now more particularly to the drawing for a more detailed explanation of the invention, the numeral 5 designates an internal combustion engine having an exhaust gas manifold 6 as associated therewith and the usual cooling fan 7 rotated by a belt 8 from the crank or cam shaft. An air compressor 9 of the reciprocatory type is mounted in any suitable manner to be driven by the crankshaft; the drive being here shown as taken from the belt 8 by a pulley 10 fixed to the end of compressor crankshaft 11. The compressor of course, possesses the usual cylinder 12 in which is reciprocated the customary piston for compressing air. The head of the cylinder is as usual provided with inlet and outlet ports and valves, the former having an inverted U-shaped air intake pipe 13 and the latter a pipe connection 14 with a compressed air reservoir 15. This reservoir is connected in the usual way in a compressed air brake system to an operator's control valve 16 by a pipe 17 and the compressed air is directed from the reservoir to a brake cylinder 18 for operating the brake shoes 19 by its valve 16 which also exhausts the air upon operation of the valve in the opposite direction. The position of the inlet valve of the air compressor is controlled by the usual governor mechanism 20 connected, by a pipe 21 to the main reservoir 15 so that when the desired air pressure is created in the reservoir, the inlet valve will be held open by the governor 20 whereby the compressor is caused to idle so far as the compression of air is concerned by the air being sucked into the inlet port on the downstroke of the compressor piston and then idly back out through the same upon the upstroke.

An air cleaner is usually associated with the inlet side of the compressor 9 to screen out extraneous material from the atmospheric air sucked into the compressor to be subsequently compressed on the upstroke of the compressor piston and forced through the pipe 14 into the reservoir 15. However, these air filters do not exclude moisture from the atmospheric air drawn into the system with the result that during the operation of the air brake system, moist vapors are condensed by the compression and expansion of the air and changing temperatures of pipes, tanks, etc., in service. After each day's run, busses and trucks equipped with air brake systems must be drained of this water of condensation and during warm weather is not a source of much trouble. However, in colder weather the condensation is forced by air pressure through the system and into contact with valves and operative parts of the system and freezes around these movable parts, especially on the seats and bodies of valves so as to prevent the proper performance thereof, frequently resulting in total failure of the system.

In order to overcome these serious objections, a dehydrator is associated with the inlet pipe 13 of the compressor or the air inlets of a vacuum system and in the present illustration it is shown composed of a cylindrical container 21 illustrated more clearly in Fig. 2. The upper end of this container detachably connects with the inlet pipe 13 and the lower end is provided with an air cleaner 22 filled with crinkly hair or other filtering medium to exclude extraneous matter from the atmospheric air which is being drawn into the system. The two ends of the container or cartridge are provided with removable closures 23 and the openings therethrough are screened by disc shaped wire mesh screens 24 which not only serve as baffles for causing a uniform flow of air through the cartridge or container but also prevent the accidental escape of an absorption medium or material 25 enclosed in the casing. The side of the casing 21 adjacent the air filter end is provided with an outlet nipple 26 having a screen 27 over the same and this nipple is closed by a plug 28 when the cartridge or casing 21 is being used for dehydrating purposes.

The adsorption medium 25 found in actual

practice to be extraordinarily effective for excluding moist vapors from the commercial brake systems is a hard glassy material with the appearance of clear quartz sand and known as silica gel. This material is pure silicon dioxide and is chemically inert toward practically all substances. It is made by treating sodium silicate with an acid to form a colloidal solution which sets as a gelatinous mass and this when washed, purified and dried becomes a silica sponge which is granulated to a size of from 8 to 20 mesh. It has the property of adsorbing large quantities of vapors or liquids because its internal volume is approximately 50% of its total volume and will adsorb or take up water vapor to the extent of 40% of its own weight while appearing perfectly dry and with no increase in volume. It is said that one cubic inch of this material has an internal surface of over one acre so that its adsorption qualities can well be appreciated. For the herein proposed use, the containers 21 are made to hold approximately five pounds of the material, amply sufficient to dehydrate all of the atmospheric air drawn into a compressor such as used in truck or bus operation for one entire day. However, the herein proposed system employs the use of two such containers or cartridges for each installation so that they are interchangeable whereby when one is being used in the system, the other is being reactivated by the application of heat to the silicon dioxide which causes liberation of moisture and impurities to be again ready for use.

For the purpose of reactivating the interchangeable containers containing the saturated silicon dioxide, brackets 29 are associated with the exhaust manifold 6 of the internal combustion engine. This spare container is indicated by the letter S and the brackets 29 are arranged so that this container is supported against the exhaust manifold in downwardly inclined relation with the plug 28 lowermost so that a drain pipe 30 may, if desired, be inserted in the opening from which the plug 28 has been removed. The air filter 22 may also be removed from the container being reactivated, if desired and the other end of the container which was connected to the inlet pipe 13, is connected to a pipe 31 which communicates with the compressed air pipe 14 through a manually operated valve 32 which can be manipulated to entirely cut off the branch 31 or to temporarily open this branch to a controlled flow of warm compressed air coming from the compressor 12 so that this air will flow through the silicon dioxide from one end of the container S to the other to reactivate the material while its companion cartridge or container 21 is in use absorbing moisture from the atmospheric air being sucked into the compressor. While the pipe 13 is shown as being threaded into one end of the container 21, this connection may be of a quick detachable type so that the container can be rapidly slipped on and off of the end of the pipe, as in the case of the connection between pipe 31 and the spare cartridge or cylinder being reactivated. This latter container S obviously receives heat from the exhaust manifold 6 as well as occasional blasts of warm air from pipe 31 whenever the valve 32 is opened to rapidly reactivate the silicon dioxide to be promptly ready for interchangeability with the container 21 installed in the system as soon as the dehydrating medium therein becomes saturated with moisture. Of course, other absorption and dehydrating mediums than the one herein specifically described, may be employed and it is to be understood that various changes in the illustrated device may be made as will fall within the scope of the appended claims without departing from the essence of the invention. Other minerals such as calcium chloride may be used as the dehydrating or adsorption medium.

I claim:

1. The combination with a motor vehicle having brakes and an internal combustion engine having an exhaust gas manifold, an air compressor operated by the engine and having inlet and outlet valves, a reservoir, an expansion chamber to operate said brakes and a valve to control the passage of compressed air to said chamber, of a pair of interchangeable containers having a body of silicon dioxide therein, one of said containers being detachably connected to the inlet of said compressor and through which atmospheric air is drawn into the compressor to dehydrate the air and preclude the presence of moisture in the system while the other container is mounted to receive heat from the exhaust manifold to reactivate the silicon dioxide therein whereby the containers can be interchanged when the medium in the first named container approaches its saturation point.

2. The combination with a motor vehicle having brakes and an internal combustion engine having an exhaust gas manifold, an air compressor operated by the engine and having inlet and outlet ports, a reservoir connected by piping to the outlet port, an expansion chamber to operate said brakes and a valve to control the passage of compressed air to said chamber; of a pair of interchangeable containers having a body of silicon dioxide therein, one of said containers being detachably connected to the inlet port of said compressor and through which atmospheric air is drawn into the same to dehydrate the air and exclude the presence of moisture in the system, the other container being mounted to receive heat from the exhaust manifold and having valved connection with the pipe from the outlet port to the reservoir whereby the silicon dioxide in said other container is reactivated whereby the containers can be interchanged when the medium in the first named container approached its saturation point.

3. The combination with a vehicle provided with an internal combustion engine having an exhaust manifold, an air compressor operated by said engine, a brake system having a valve to control the flow of compressed air to the vehicle brakes, of a pair of interchangeable containers having an adsorption material therein, one of said containers being detachably connected in the brake system to dehydrate the air prior to its passage through the control valve to the brakes, the other container being bodily disconnected from said brake system and mounted alongside said exhaust manifold to receive heat therefrom due to its proximity thereto to reactivate the adsorption medium therein, whereby the containers can be interchanged when the medium in the first named container approaches its saturation point.

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