May 13, 1941. C. L. HUNSICKER 2,241,600

MEANS FOR REMOVAL OF VAPOR FROM GASES

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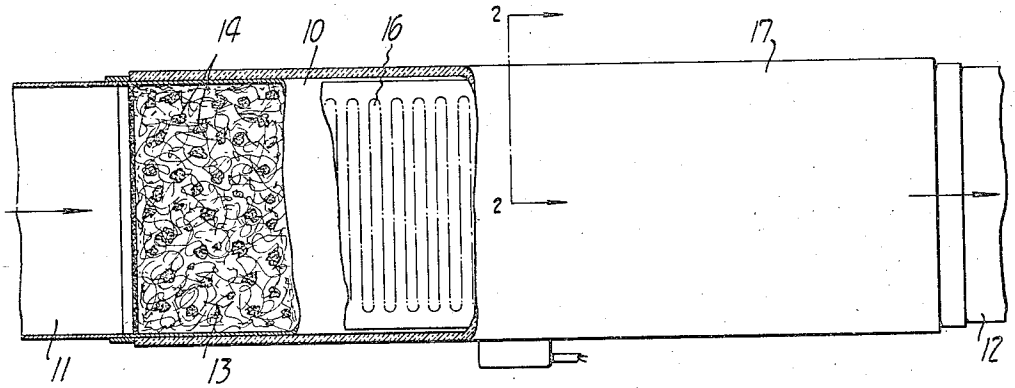
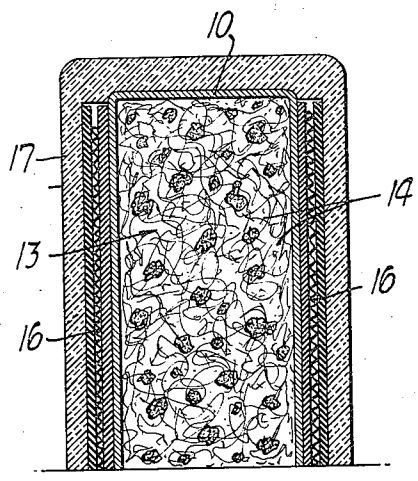


FIG. 1

FIG. 2



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MEANS FOR REMOVAL OF VAPOR FROM GASES

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5 Claims. (Cl. 252—194)

This invention relates generally to apparatus and methods for the treatment of gaseous mediums, and is particularly applicable for the removal of water vapor from gases.

It is an object of the invention to provide apparatus of the above character which will afford utmost effective contact between gases and a chemical absorbing medium.

More particularly it is an object of the invention to afford means for effective contact between a stream of gas and a moisture absorbing chemical like calcium chloride, whereby a maximum amount of moisture can be absorbed by apparatus of a given size.

Another object of the invention is to afford apparatus or means of the above character which will readily adapt itself to repeated re-cycling operations without material deterioration.

Additional objects of the invention will appear from the following description in which the preferred embodiment of the invention has been set forth in detail in conjunction with the accompanying drawing.

Fig. 1 is a side elevational view, partly in cross-section, illustrating apparatus incorporating the present invention.

Fig. 2 is a cross-sectional detail taken along the line 2—2 of Fig. 1.

The apparatus illustrated in the drawing consists of a conduit 10 which can be of any convenient contour, and which is adapted to convey a stream of gas to be treated. In Fig. 1, one end of this conduit is shown coupled to a pipe or conduit 11, for inflow of gas, while the other end is connected to the outflow or discharge conduit 12. The space within conduit 10 is occupied by a mass 13 of uncompacted filamentary wool. A wool made of non-corrodible metal can be used to advantage, as for example a wool of stainless steel. Also I can employ so-called glass wool, made of threads or filaments of spun glass. Whatever is the character of the filamentary wool employed, it should be such that gas may flow through the wool without undue flow resistance.

Interspersed throughout the mass of filamentary wool, and enmeshed within the same, are the fragments 14. These fragments are made of loose fibrous material impregnated with a salt or compound having the desired absorptive properties. I prefer in this connection to make use of asbestos or mineral wool, as the fibrous structure of this material is particularly desirable for my purpose, and because mineral wool is inert to most chemicals and gases.

For the purpose of removing moisture from gases, the compound with which the fragments are impregnated is preferably calcium chloride. As is well known, calcium chloride has the property of deliquescence and is capable of absorbing a relatively large amount of moisture. Assuming use of this salt, the mineral wool can be impregnated by soaking it in a hot concentrated solution of calcium chloride.

After being impregnated the fragments are enmeshed and distributed throughout the mass of filamentary wool by applying the fragments to the surface of the wool, after which they are worked into the filaments. This working in process can be carried out manually, by repeated spreading or distorting the filaments of the wool to cause the fragments of asbestos to penetrate into the interior of the mass. It will be evident that the amount of asbestos fragments so introduced into the filamentary wool should be insufficient to seriously block flow of gas, but should be sufficient to afford adequate surface contact with the stream of gas.

To facilitate re-cycling operations, the apparatus shown in the drawing is equipped with electrical heating means. Thus electrical heating elements 16 are shown contacting the side walls of the conduit 10, and the entire assembly is enclosed within the heat insulating covering 17.

Assuming that the impregnating chemical is calcium chloride, and that the apparatus is being used for the purpose of removing water vapor from air or like gas, the device operates as follows: A current of air containing water vapor is passed through conduit 10, and this air comes into intimate contact with the exposed surfaces of the asbestos fragments. Since the fibers of the asbestos are impregnated with calcium chloride, there is maximum surface contact with the calcium chloride, with the result that there is an effective and efficient absorption of water vapor. A relatively large amount of water may be absorbed by the calcium chloride, without occasioning any displacement of the salt with respect to the fragments of asbestos. This is attributed to the fact that even though sufficient water is absorbed by the calcium chloride to cause the salt to completely deliquesce to form a liquid, the liquid is retained by the asbestos fiber.

To re-generate the apparatus it is simply necessary to apply heat by supplying current to the heating elements 16. When heated to an elevated temperature, water vapor evaporates from the calcium chloride, and the salt is again deposited as a solid upon the asbestos fibers in such form

as to afford optimum exposed surfaces for contact with gases. This is in contrast to what occurs when relatively large masses of granular calcium chloride are permitted to absorb water to the point of liquifaction. Upon heating such a liquid to evaporate water a hard caked mass results which affords a minimum of exposed surface area.

While use of calcium chloride is preferred for absorption of moisture, other chemicals can be employed, as for example potassium hydroxide which also has the property of deliquescence.

I claim:

1. In means for the removal of vapor from gases, fragments of fibrous material carrying a vapor absorbing compound, said fragments being enmeshed in a mass of uncompacted filamentary wool.

2. In means for the removal of vapor from gases, fragments of mineral wool carrying a vapor absorbing compound, said fragments being enmeshed in a mass of uncompacted filamentary wool, the filamentary wool having non-absorbent characteristics, being of a material which is substantially inert with respect to chemical reaction with the compound.

3. In means for the removal of water vapor from gases, fragments of fibrous material carrying a moisture absorbing chemical, said fragments being enmeshed in a mass of uncompacted filamentary wool having non-absorbent characteristics.

4. In means for the removal of water vapor from gases, an uncompacted mass of non-absorbent wool adapted for disposition in a stream of gas to be treated, and fragments of mineral wool carrying a vapor absorbing compound, said fragments being enmeshed in and interspersed through said mass.

5. In means for the removal of vapor from gases, fragments of fibrous material carrying a vapor absorbing compound, said fragments being enmeshed in a mass of filamentary wool and supported by said wool in spaced apart relation, said wool being uncompacted and being free of coating and said fragments providing the only vapor absorbing medium in said mass.

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