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AIR CONDITIONER

Filed Dec. 13, 1957

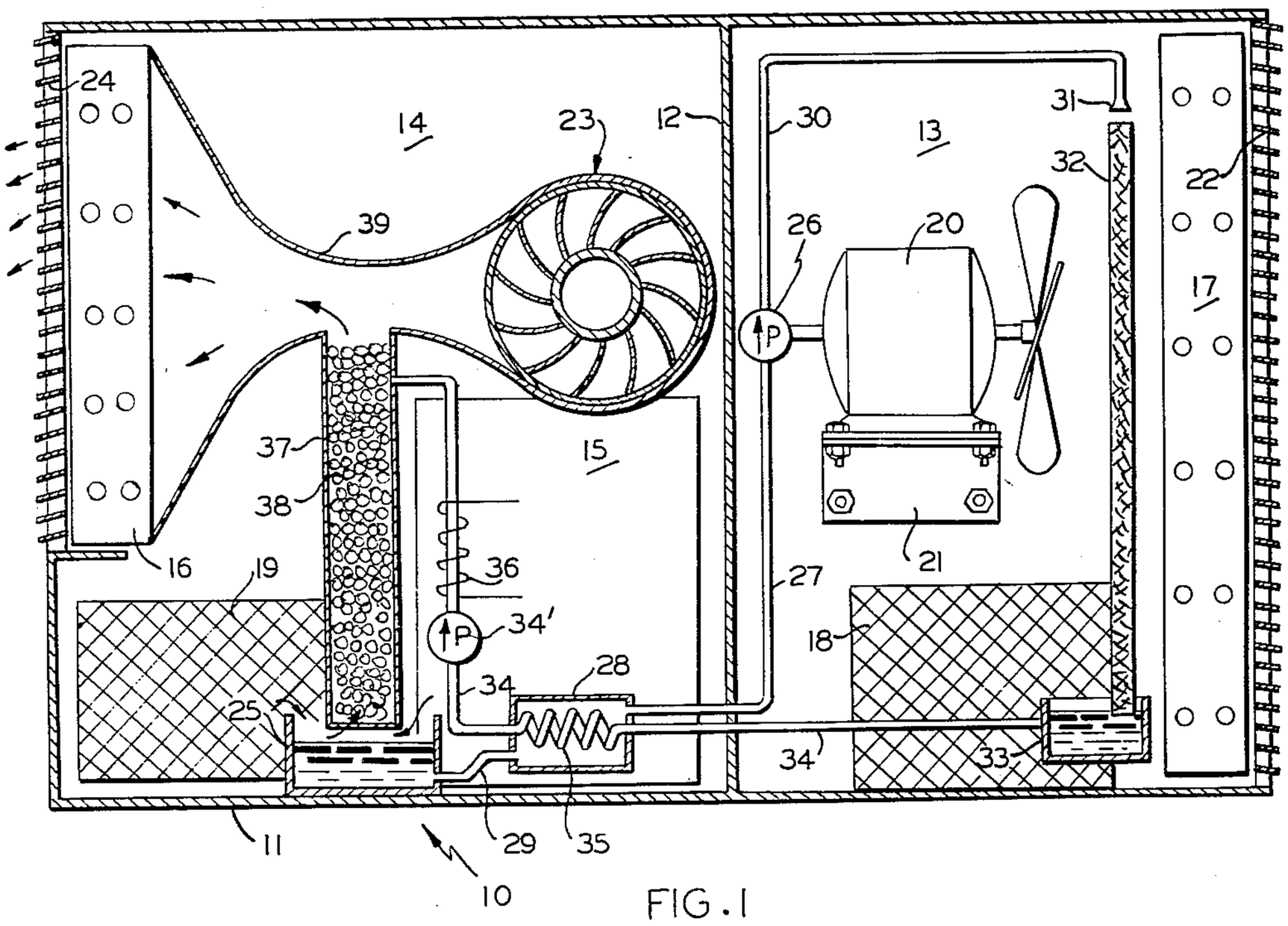

FIG. 1

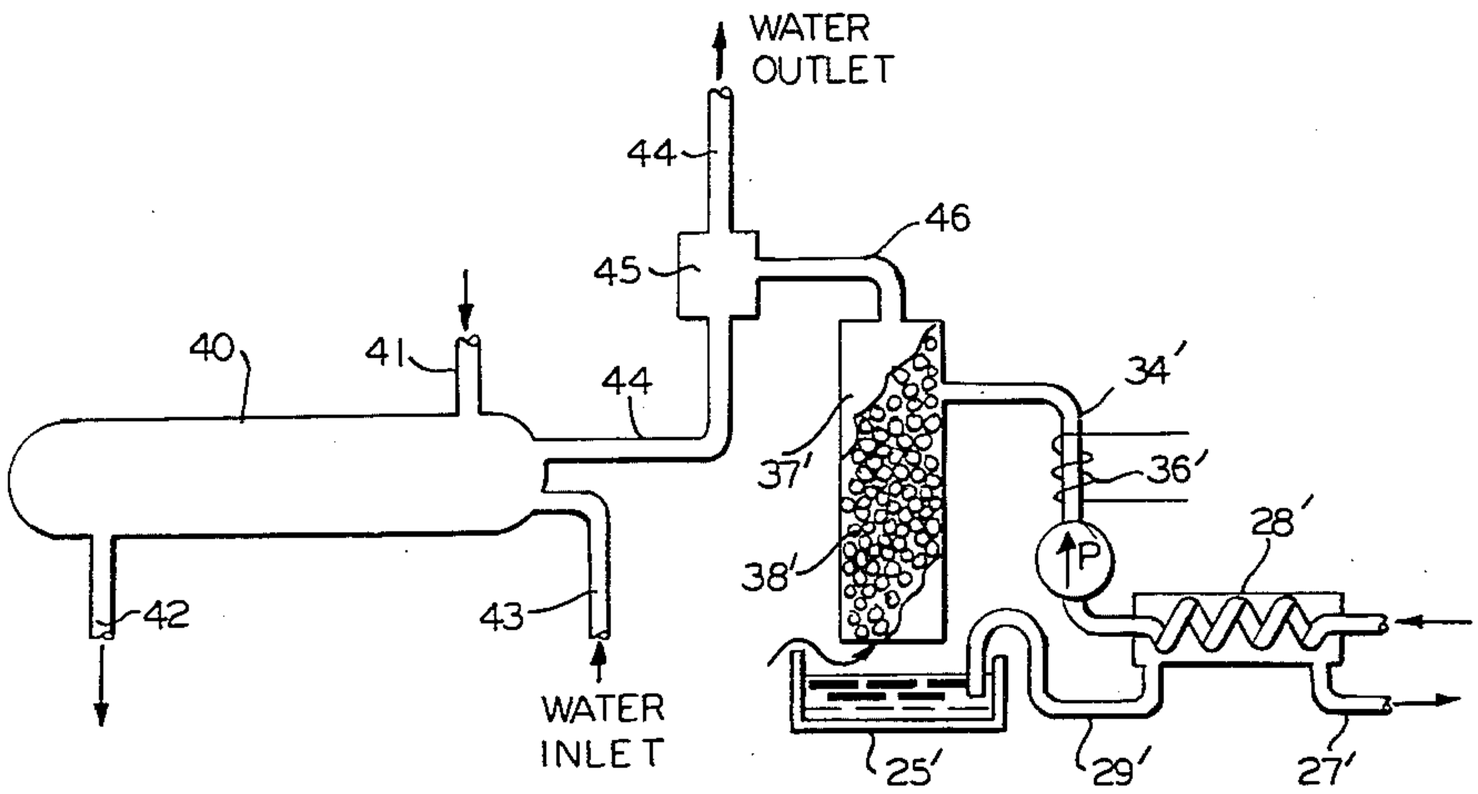

FIG. 2

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AIR CONDITIONER

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8 Claims. (Cl. 62—271)

This invention relates to air conditioning and more particularly to apparatus for cooling and deodorizing air.

In the co-pending application of William L. McGrath, Serial No. 649,154, filed March 28, 1957, there is disclosed a method and apparatus for removing odors from contaminated air by passing this air through triethylene glycol which absorbs the odors. The triethylene glycol containing the odors is then desorbed by heating. If desired, the heated triethylene glycol may also be scrubbed with clean air to aid desorption. The desorbed triethylene glycol is then again brought into contact with contaminated air and the foregoing cycle is repeated.

The present invention incorporates the principles of the above-described invention into an air conditioning unit which also provides cooling.

It is the object of the present invention to provide an air conditioner which continuously provides cooled deodorized air.

The present invention relates to an air conditioner for desorbing and cooling contaminated air comprising a refrigeration system including an evaporator and condenser, means for storing an odor absorbing medium, a contact member, means for bringing said odor absorbing medium from said storing means into contact with said contact member, means for passing said contaminated air through said contact member and said evaporator, means for passing condenser cooling air over said condenser, means for passing a portion of said condenser cooling air through said odor absorbing medium containing odors desorbed from said air to desorb said medium, and means for returning said desorbed odor absorbing medium to said storing means. The present invention will be more fully understood when the following portions of the specification are read in conjunction with the accompanying drawings wherein:

Figure 1 is a view in cross section of an air conditioner of the present invention; and

Figure 2 is a modification which depicts how a water cooled condenser may be utilized to practice the present invention.

In Figure 1 there is shown an air conditioner **10** having a casing **11** which is divided by partition **12** into an evaporator chamber **13** and a condenser chamber **14**. The refrigeration system includes a compressor **15** and a condenser **16**, both of which are mounted in chamber **14**, and an evaporator **17**, which is mounted in chamber **13**. The refrigerant conduits, which link the foregoing elements, and the expansion member have been omitted from the drawing for the sake of clarity. However, it is to be understood that the refrigeration circuit may be of any type which is conventional in the art.

Forming a part of casing **11** are grille **18** and grille **19** which permit air to be cooled and condenser cooling air to be induced into chambers **13** and **14**, respectively. An evaporator fan **20** is mounted on a bracket **21**, which is suitably affixed to the wall of casing **11**. Fan **20** induces the air to be cooled through grille **18** and causes it to pass in contact with evaporator **17** and then through

louvers **22** into the area to be conditioned. A centrifugal fan **23** is provided in chamber **14** for inducing condenser cooling air through grille **19** into chamber **14** and then through condenser **16** and louvers **24**. Fan **23** may be driven by a suitable mechanical linkage (not shown) which is associated with the motor of fan **20**, or a separate driving motor (not shown) may be provided.

In addition to providing cooling with the above described structure, the air conditioner of the present invention also de-odorizes contaminated air. To this end a sump **25** is provided which contains triethylene glycol, diethylene glycol, or any other suitable odor absorbing medium which can operate in the same manner as the foregoing substances. A pump **26**, which is adapted to be driven by the motor of fan **20**, is placed in conduit **27** which communicates with heat exchanger **28**, which in turn communicates by means of conduit **29** with sump **25**. Pump **26** will therefore cause triethylene glycol to pass into conduit **30** to be discharged from spray **31**. Located under spray **31** is a contact member **32** through which the triethylene glycol is adapted to seep. Contact member **32** may be fabricated of wire mesh, expanded metal, metal excelsior, or any other suitable type of material which will provide a relatively large amount of surface area for the triethylene glycol while permitting air to flow therethrough. The passing of contaminated air in contact with contact member **32** having the triethylene glycol thereon causes this air to be de-odorized because the triethylene glycol absorbs the odors from the air. The air then passes through evaporator **17** where it is cooled prior to its discharge through louvers **22** into the area to be conditioned.

The contaminated triethylene glycol is received in sump **33** as it leaves contact member **32**. A conduit **34** having heat exchange coil **35** therein (which is located in heat exchanger **28**) permits the contaminated triethylene glycol to be passed to an area where it is desorbed. A pump **34'** in conduit **34** causes the contaminated triethylene glycol to flow through the latter. A heating coil **36**, which is wound about conduit **34** heats the contaminated triethylene glycol prior to its discharge from conduit **34** into a column **37** which is packed with a suitable filler substance **38**, such as ceramic tower packing or a loose packing of stainless steel wire which will provide a large contact area for the triethylene glycol without causing an objectionably high pressure drop of the air which is caused to pass through the column in the manner described hereafter.

A venturi section **39** is coupled between the outlet of fan **23** and condenser **16**. As fan **23** operates, the flow of air through venturi **39** will cause air to be induced upwardly through column **37** which has one end thereof in communication with the neck of the venturi. The triethylene glycol which flows downwardly over filler **38** (and which has been heated by heating element **36** to drive off the odors therein) is further desorbed by coming into contact with relatively clean air which passes upwardly through column **37**. The desorbed triethylene glycol drops from column **37** into sump **25** and the foregoing cycle is then repeated.

As stated above, the amount of desorption depends upon both the amount of heat and the amount of scrubbing which are provided. Heat exchanger **28** tends to increase the efficiency of both the odor absorption from the air and the desorption of the triethylene glycol because it cools the clean triethylene glycol passing to the contact member **32** while it tends to heat the contaminated triethylene glycol passing to column **37**, it being understood that the cool triethylene glycol will tend to absorb odors from contaminated air whereas the heated triethylene glycol will tend to give off its odors.

In Figure 2 it is shown how the present invention may

be applied to a water cooled air conditioner. The primed numerals in this figure depict the same elements of structure which correspond to the unprimed numerals in Figure 1. Figure 2 differs from Figure 1 in that a shell and tube condenser **40** is provided for condensing the refrigerant which enters through conduit **41** and leaves through conduit **42**. Water is provided for condenser **40** by means of water inlet **43**, which is coupled to a suitable water source (not shown). The water leaves condenser **40** through tube **44** which has an aspirator **45** therein. The aspirator is coupled to column **37'** by means of conduit **46**. It can readily be seen that as water flows through conduit **44**, aspirator **45** will be operative to cause air to flow upwardly through packing **38'** in column **37'** as the contaminated triethylene glycol passes downwardly from conduit **34'** over this packing.

It can thus be seen that I have provided an air conditioner which will both cool and de-odorize air. While I have disclosed preferred embodiment of my invention, I desire it to be understood that it may be otherwise embodied within the scope of the following claims.

I claim:

1. An air conditioner for desorbing and cooling contaminated air comprising a refrigeration system including an evaporator and condenser, an odor absorbing medium, means for storing the odor absorbing medium, a contact member, means for bringing said odor absorbing medium from said storing means into contact with said contact member, means for passing said contaminated air through said contact member and said evaporator, said odor absorbing medium absorbing odors from said air by contact therewith at said contact member, means returning the contaminated odor absorbing medium from said contact member to said storing means, means for passing condenser cooling air over said condenser, means for passing a portion of said condenser cooling air prior to its passage over the condenser through said odor absorbing medium containing odors absorbed from said air to desorb said medium, and means for returning said desorbed odor absorbing medium to said storing means.

2. An air conditioner as set forth in claim 1 including means for heating said odor absorbing medium prior to passing said condenser cooling air therethrough.

3. An air conditioner for desorbing and cooling contaminated air comprising a refrigeration system including an evaporator and condenser, an odor absorbing medium, means for storing the odor absorbing medium, a contact member, means for bringing said odor absorbing medium from said storing means into contact with said contact member, means for passing said contaminated air through said contact member and said evaporator, said odor absorbing medium absorbing odors from said air by contact therewith at said contact member, means returning the contaminated odor absorbing medium from said contact member to said storing means, means for cooling the condenser, means coupled to said condenser cooling means for causing air to flow through said odor absorbing medium containing odors absorbed from said air to desorb said medium, and means for returning said desorbed odor absorbing medium to said storing means.

4. An air conditioner for desorbing and cooling contaminated air comprising a refrigeration system including an evaporator and condenser, means for storing an odor absorbing medium, a contact member, means for bringing said odor absorbing medium from said storing means into contact with said contact member, means for passing said contaminated air through said contact member and said evaporator, means for passing condenser cooling air over said condenser comprising a fan having a venturi section for causing said condenser cooling air to pass to said condenser, means for passing a portion of said condenser cooling air through said odor absorbing medium containing odors absorbed from said air to desorb said medium comprising a column affixed to said venturi whereby air flow through said venturi induces air through said column, means for passing said odor absorbing medium containing absorbed odors into said column whereby said air passing through said column scrubs said medium, and means for returning said desorbed odor absorbing medium to said storing means.

5. An air conditioner as set forth in claim 4 including means to heat said odor absorbing medium to desorb odors therefrom.

6. An air conditioner for desorbing and cooling contaminated air comprising a refrigeration system including an evaporator and condenser, means for storing an odor absorbing medium, a contact member, means for bringing said odor absorbing medium from said storing means into contact with said contact member, means for passing said contaminated air through said contact member and said evaporator, means for cooling the condenser, an aspirator coupled to said condenser cooling means for causing air to flow through said odor absorbing medium containing odors absorbed from said air to desorb said medium, and means for returning said desorbed odor absorbing medium to said storing means.

7. An air conditioner as set forth in claim 1 wherein said odor absorbing medium supplied to said contact means is in heat exchange relationship with the odor absorbing medium returned from said contact member thereby preheating the odor absorbing medium supplied to the desorption means to facilitate desorption thereof and cooling the odor absorbing medium supplied to the contact member to facilitate removal of odors from the contaminated area.

8. An air conditioner as set forth in claim 3 wherein said odor absorbing medium supplied to said contact means is in heat exchange relationship with the odor absorbing medium returned from said contact member thereby preheating the odor absorbing medium supplied to the desorption means to facilitate desorption thereof and cooling the odor absorbing medium supplied to the contact member to facilitate removal of odors from the contaminated area.

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