

- [54] COMBINATION AIR DRYING AND
CLEANING APPARATUS
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62/317
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- [58] Field of Search 62/93, 272, 85, 317, 150

[56] **References Cited**

UNITED STATES PATENTS			
1,091,215	3/1914	Hall	62/93
1,909,227	5/1933	Shadle	62/272
2,375,069	5/1945	Bennett.....	62/317
2,715,945	8/1955	Hankison	62/317
2,867,988	1/1959	Brandt	62/93

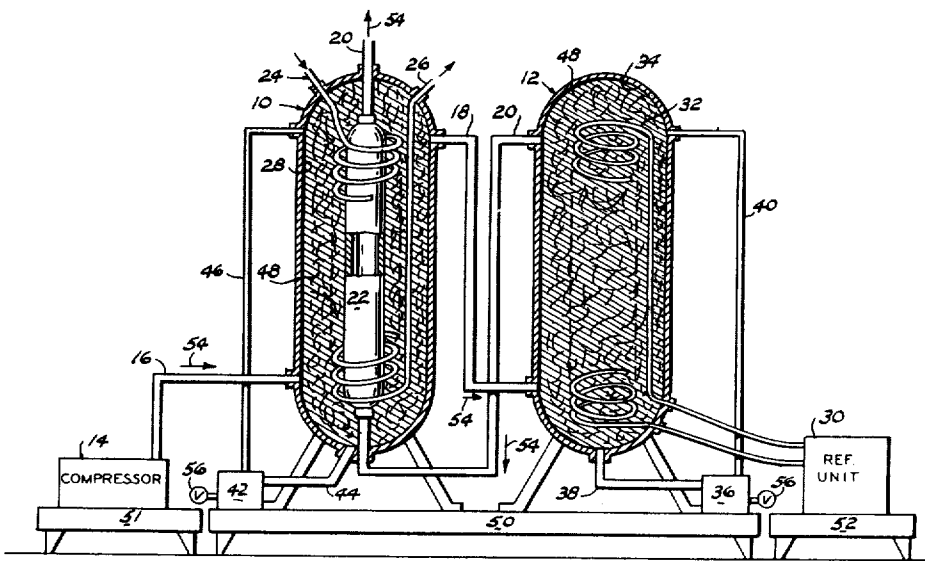
FOREIGN PATENTS OR APPLICATIONS			
642,948	6/1962	Canada	62/93

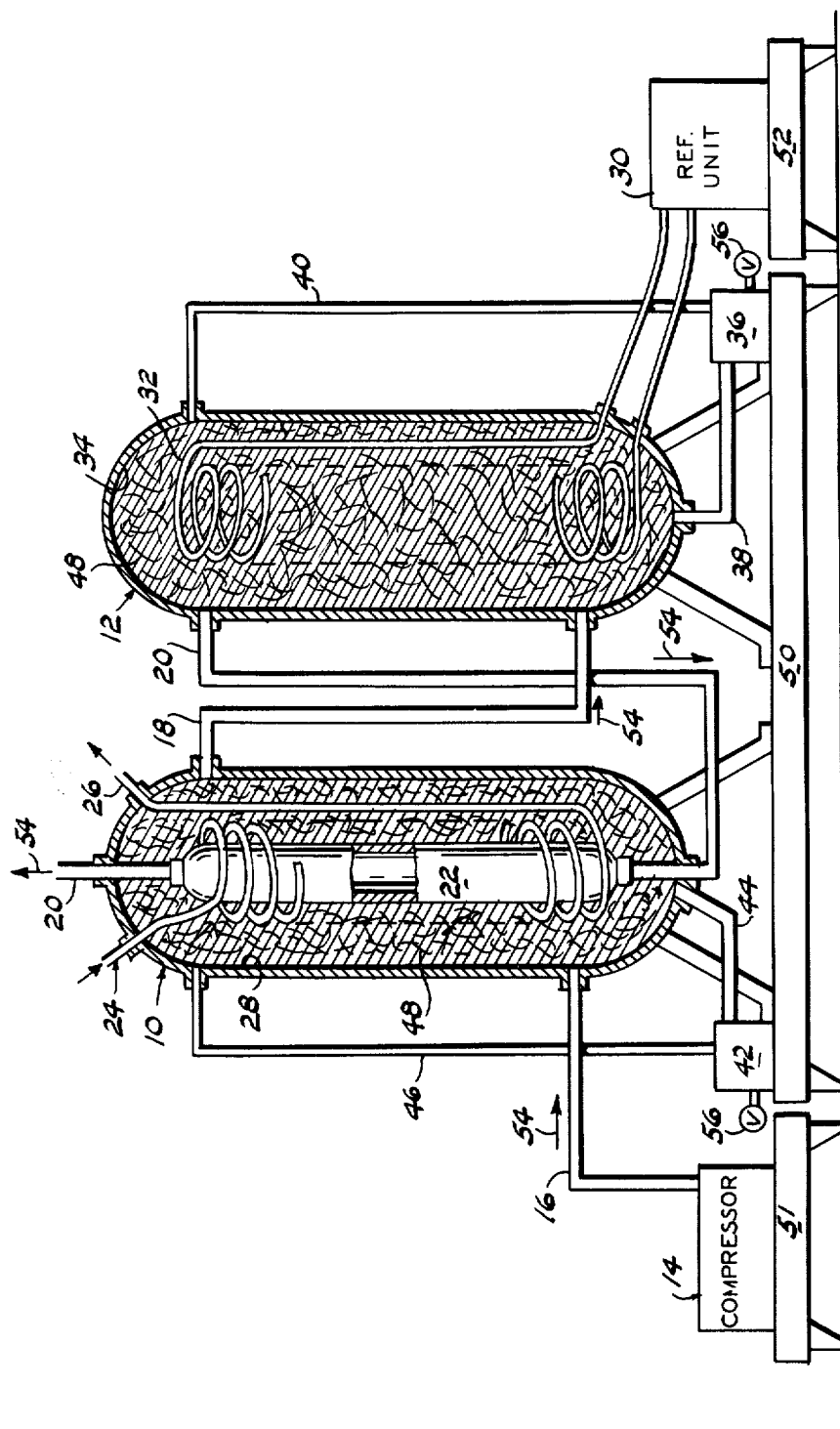
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[57] **ABSTRACT**

First and second containers respectively forming a precooling chamber and a refrigerated chamber are interconnected by tubing and form a passageway for compressed air. The precooling chamber contains a coil circulating a liquid of known temperature. The refrigerated chamber contains the coils of a refrigeration unit for lowering the temperature of the air passing therethrough. The downstream end portion of the tubing, interconnecting the containers, communicates with a cylinder axially disposed within the precooling chamber to absorb the heat of compressed air in its initial pass through the precooling chamber. Both containers contain fibrous material for filtering the air passing therethrough.

4 Claims, 1 Drawing Figure





COMBINATION AIR DRYING AND CLEANING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention.

The present invention relates to cleaning and dehumidifying compressed air and more particularly to an apparatus comprising a precooling chamber connected with a refrigerated chamber which utilizes the temperature of the chilled air passing from the refrigerated chamber for reducing the temperature in the precooling chamber.

As is well known ambient air contains moisture which, when compressed, still retains the moisture. Many machines or instruments presently in use require that the air be free of both moisture and other contaminants or solid particles, such as dust. Much of the air drying equipment now in use employ desiccants which sometimes break down and enter the air stream as fine dust.

This invention provides an apparatus for cleaning the air and dehumidifying it by utilizing a precooling chamber and a refrigerating unit to reduce the temperature of the compressed air to the dew point and recirculating the cleaned and dried air through the precooling chamber in the path of incoming air for absorbing heat from the incoming air.

SUMMARY OF THE INVENTION

A first elongated container forms a precooling chamber having an inlet for compressed air and an outlet connected by tubing with a second elongated container forming a refrigerated chamber with its outlet connected by tubing to a cylinder axially disposed within the precooling chamber thus forming an air passageway with the air passing in series through the precooling and refrigerated chamber with the downstream end portion of the passageway disposed within the precooling chamber. The precooling chamber is provided with a tubular coil circulating a fluid of known temperature therethrough, such as water, in heat exchange fashion with the compressed air initially entering the precooling chamber. A sealed refrigerating unit has the refrigerant coils thereof helically disposed within the refrigerated chamber for reducing the temperature of the compressed air to or below the dew point. The chilled air, leaving the refrigerated chamber, absorbs heat by conduction when passing through the precooling chamber. Metallic or synthetic fibrous material, contained by both containers, filters the condensed air in a screening fashion and forms a conductor for temperature transfer of the compressed air passing there-through.

The principal object of this invention is to provide an apparatus for cleaning and dehumidifying compressed air which conserves energy by recirculating chilled air through the path of incoming air to be chilled.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE is a vertical cross sectional view, partially in elevation, of the apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Like characters of reference designate like parts in those figures of the drawings in which they occur.

In the drawings:

The reference numerals 10 and 12, respectively, indicate upright first and second casings or containers. Moisture laden air is introduced under pressure into the depending end portion of the casing 10 by a compressor 14, or other source, by a tube 16. Tubing 18 connects the upper end portion of the first container 10 to the depending end portion of the second container 12. Other tubing 20 is connected to the upper end portion of the second container 12 and extends coaxially through the first container 10. An elongated cylinder 22, of less length and smaller diameter than the casing 10, is coaxially disposed therein and interposed in the other tubing 20. The tube 16, first and second chambers 10 and 12, tubing 18 and 20 and cylinder 22 thus form an air passageway for compressed air to be cleaned and dried. An elongated length of coiled tubing 24 projects into the first container 10 and is helically wound loosely around the cylinder 22 and projects at its downstream end portion 26 through the first container wall. The purpose of the coiled tubing 24 is to circulate a stream of fluid of known temperature, such as water, thus forming a compressed air precooling chamber 28 within the first container 10.

A closed system refrigerating unit 30 has its coils 32 helically wound and longitudinally extending coaxially within the container 12 thus forming a refrigerated chamber 34 for reducing the temperature of compressed air therein to a temperature not greater than 35° F. so that moisture contained by the air will precipitate and drain out of the chamber 34 into a drain trap 36 connected to the lowermost end of the container 12 by tubing 38 and a pressure equalizing tube 40 connected to the other end portion of the container 12.

A second drain trap 42 is similarly connected with the precooling chamber 28 by a drain tube 44 and pressure equalizing tube 46. Both chambers 28 and 34 are filled, around the components therein, with fibrous material 48 formed from metallic or synthetic material and commonly known as "wool". The purpose of the fibrous material is to form a strainer for collecting solid particles entrained in the air and to form a conductor and assist in reducing the temperature of the compressed air by minimizing convection currents.

The chambers, compressor and refrigerating unit are preferably mounted on separate table-like stands 50, 51 and 52 so that additional units may be added thereto in a compound manner as may be necessary to clean and dry a given volume of air.

OPERATION

The operation of the device seems obvious in that compressed air flows through the air passageway, in the direction indicated by the arrows 54, which is initially precoolled in the precooling chamber 28 by water circulated through the coiled tubing 24. Its temperature is reduced to the dew point in the refrigerated chamber 34 by the refrigerant coils 32, and absorbs heat from air initially entering the precooling chamber through the walls of the cylinder 22. Thus some of the energy necessary to reduce the temperature of the compressed air in the refrigerated chamber 34 is utilized before the chilled air leaves the air passageway downstream outlet from the precooling chamber to a reservoir or equipment being operated, not shown.

Obviously the invention is susceptible to changes or alterations without defeating its practicability, therefore, I do not wish to be confined to the preferred em-

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bodiment shown in the drawings and described herein.

I claim:

1. An apparatus for dehumidifying compressed air, comprising:

a source of compressed air;

a first elongated container forming a precooling chamber and air passageway for the flow of compressed air;

first heat exchange means including a coil extending through said container and circulating a fluid of known temperature within said first container;

a second elongated container forming a continuation of the air passageway;

second heat exchange means including a closed refrigerating unit having a refrigerant containing coil disposed within said second container; and,

piping means forming a part of the air passageway and connecting said containers with each other and

with the source of compressor air,

the downstream end portion of said piping means extending coaxially through said first container.

2. The apparatus according to claim 1 in which said first heat exchange means further includes:

a third container interposed in the downstream end portion of said piping means and coaxially disposed within said first container.

3. The apparatus according to claim 2 and further including:

fibrous material contained by said first and second containers for removing impurities in suspension within the air passageway.

4. The apparatus according to claim 3 and further including:

moisture draining means communicating with said first and second containers, respectively.

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