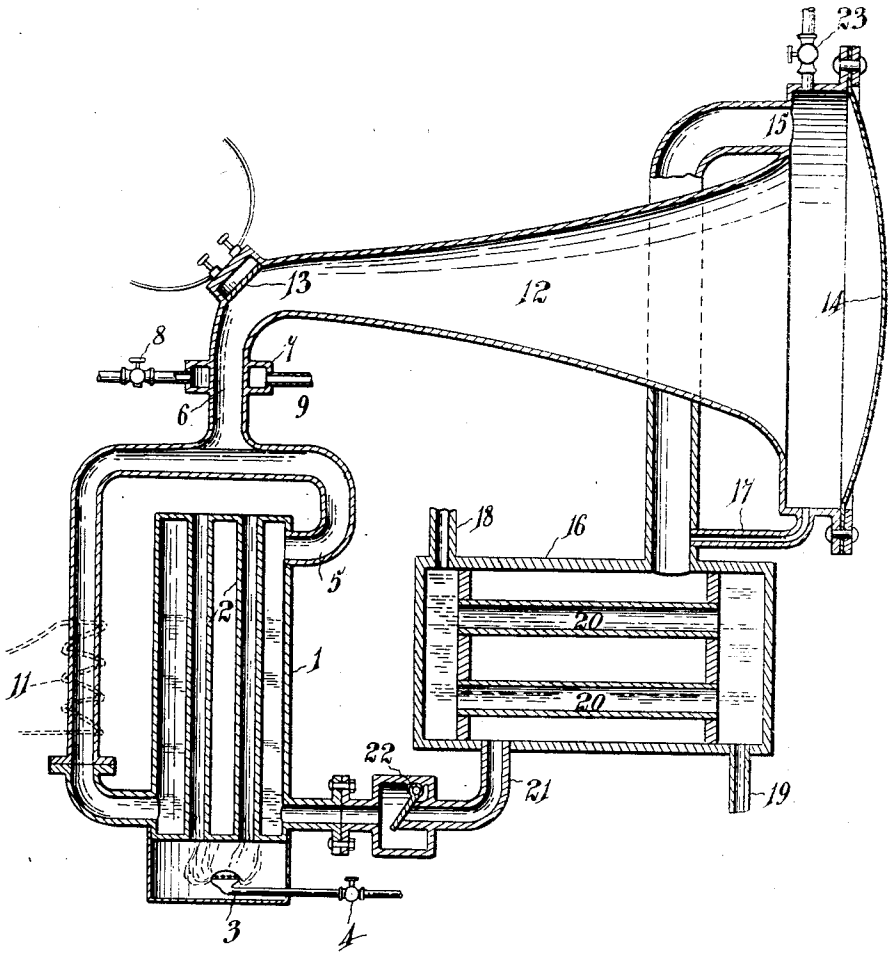
Oct. 8, 1929. P. A. ROBBINS 1,730,530

ACOUSTIC TRANSFORMER

Filed Nov. 30, 1928



Inventor

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ATTY.

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ACOUSTIC TRANSFORMER

Application filed November 30, 1928. Serial No. 322,897.

This invention relates to improvements in certain apparatus for which a patent was granted to me June 5, 1928, the number of the said patent being 1,672,472.

In the above patent I showed an acoustic transformer which consists of an expansion chamber through which a stream of dense gaseous medium is caused to flow and expand as it flows, the said gaseous medium passing in contact with a small vibrating diaphragm from which sound waves are emitted, the said sound waves being propagated along the flowing stream of gaseous medium to a second diaphragm larger than the first and the gaseous medium being returned through a closed circuit to a compressor and then back to the said expansion chamber.

In my previous invention the gaseous medium when entering the expansion chamber may be wet with a mist of particles condensed from the gaseous medium. My present invention relates to a means for expanding some liquid such as water or mercury into a gas, charging the said gas with a mist of condensation, expanding the mist and the particles of condensation, condensing the expanded gas back into its liquid form, such as water or mercury, and returning the condensed liquid back to the point where it will again be expanded into a gaseous condition and returned to the expansion chamber all in a closed cycle.

In the accompanying drawing which is a diagrammatical vertical section, 1 is a boiler with flues 2 through which pass hot gases from the heater 3. Any kind of a heater will do but I show a gas burner controlled by a valve 4. Liquid surrounds the flues and is boiled into a gas or vapor which discharges through the orifice 5 to the throat 6 of the expansion chamber 12. An electric heater 11 may be used for evaporating the liquid instead of the gas heated boiler, the heat being supplied by the electric resistance coil 11.

The throat 6 of the expansion chamber is provided with the annular cooling ring 7 through which flows a stream of water regulated by the valve 8. An electrically vibrated diaphragm 13 imparts vibrations to the gas in the chamber 12 and these vibrations are propagated to the large closing diaphragm 14 closing the end of the chamber 12 The vapor from the chamber 12 passes out through the orifice 15 and is conveyed by a pipe to the condenser 16. Any condensate which may form in the chamber 12 is drained away through the pipe 17 to the condenser 16.

The condenser 16 is of ordinary type in its design. Cooling water flows through the pipe 18 and tubes 20, 20 to the outlet 19. Gas from the expansion chamber enters the top of the condenser and discharges when condensed to liquid form through the pipe 21. The condensed liquid flows through the non-return valve 22 to the boiler 1 thus completing the closed circuit.

While I have shown the use of a water cooled condenser and a water cooled throat to the expansion chamber, I also contemplate the use of air cooling devices from which the heat is radiated by the use of metal fins or webs as is common practice in other arts.

In the operation of apparatus of this type there is likely to occur a collection of dry gas such as air which cannot be condensed to a liquid by the means employed, and in order to get rid of this gas I provide the valve 23 through which such gas may be discharged. When the apparatus is allowed to cool a vacuum would tend to form which might be undesirable, but by means of the valve 23 such a vacuum may be destroyed.

What I claim as my invention is:

1. The method of imparting vibrations from a vibratable diaphragm to the atmosphere or vice versa which consists in employing as the transferring medium a stream of a condensable gaseous medium contacting with the diaphragm and moving in a closed circuit, and in creating and circulating said gaseous medium by continuously vaporizing and condensing a vaporizable liquid.

2. The method of imparting vibrations from a vibratable diaphragm to the atmosphere or vice versa which consists in employing as the transferring medium a stream of a condensable gaseous medium contacting with the diaphragm and moving in a closed circuit over and past a second and larger diaphragm, and in creating and circulating said gaseous medium by continuously va-

porizing and condensing a vaporizable liquid.

3. The method of imparting vibrations from a vibratable diaphragm to the atmosphere or vice versa which consists in employing as the transferring medium a stream of a condensable gaseous medium contacting with the diaphragm and moving in a closed circuit, creating and circulating said gaseous medium by continuously vaporizing and condensing a vaporizable liquid and in effecting a slight cooling of the gaseous medium before it passes over the first diaphragm to form a mist of condensed particles in said medium.

4. An acoustic transformer comprising an expansion chamber; a vibratable diaphragm fitted in said chamber; a second diaphragm closing an opening in said chamber; a circuit for fluids communicating at opposite ends with the chamber adjacent the diaphragms; means included in the circuit adapted to vaporize a liquid; and a condenser between the vaporizing means and the end of the circuit adjacent the second diaphragm, whereby the vapor flowing through the expansion chamber is condensed for re-use.

5. An acoustic transformer comprising an expansion chamber; a vibratable diaphragm fitted in said chamber; a second diaphragm closing an opening in said chamber; a circuit for fluids communicating at opposite ends with the chamber adjacent the diaphragms; means included in the circuit adapted to vaporize a liquid; a condenser between the vaporizing means and the end of the circuit adjacent the second diaphragm, whereby the vapor flowing through the expansion chamber is condensed for re-use; and a check valve in the circuit preventing back flow of liquid from the vaporizer to the condenser.

6. An acoustic transformer comprising an expansion chamber; a vibratable diaphragm fitted in said chamber; a second diaphragm closing an opening in said chamber; a circuit for fluids communicating at opposite ends with the chamber adjacent the diaphragms; means included in the circuit adapted to vaporize a liquid; a condenser between the vaporizing means and the end of the circuit adjacent the second diaphragm, whereby the vapor flowing through the expansion chamber is condensed for re-use; and a valve controlled opening into said chamber whereby any vacuum therein may be broken or non-condensable gases vented.

7. An acoustic transformer comprising an expansion chamber; a vibratable diaphragm fitted in said chamber; a second diaphragm closing an opening in said chamber; a circuit for fluids communicating at opposite ends with the chamber adjacent the diaphragms; means included in the circuit adapted to vaporize a liquid; a condenser between the vaporizing means and the end of the circuit adjacent the second diaphragm, whereby the vapor flowing through the expansion chamber is condensed for re-use; a check valve in the circuit preventing back flow of liquid from the vaporizer to the condenser; and means for partly condensing the vapor located in the circuit between the vaporizer and the first diaphragm.

Signed at Highland Park, Ill., this 15 day of November, 1928.

PERCY A. ROBBINS.