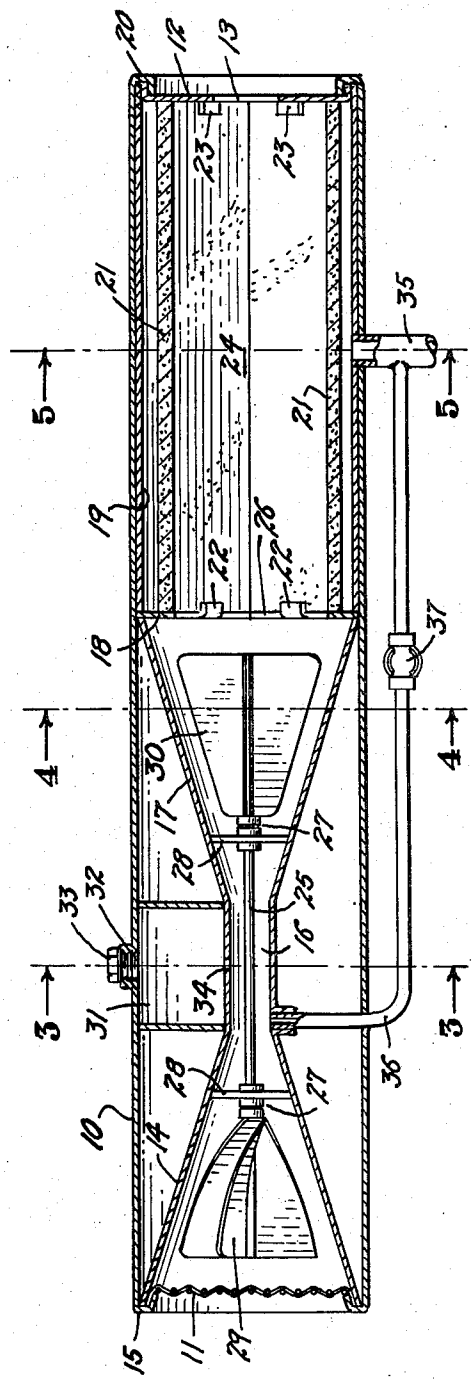
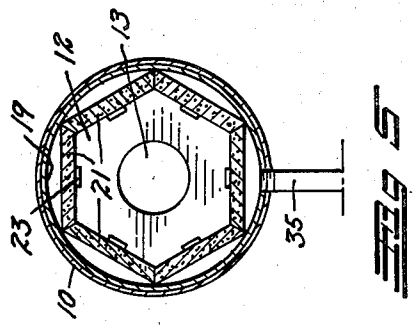
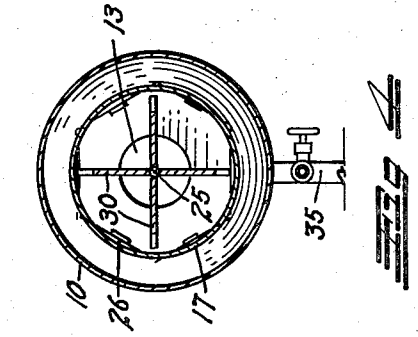
Jan. 17, 1961 L. J. GOLDSMITH 2,968,360

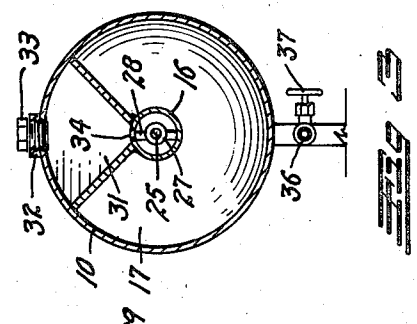
DEVICES FOR REMOVING MOISTURE FROM THE FLOW OF GASES

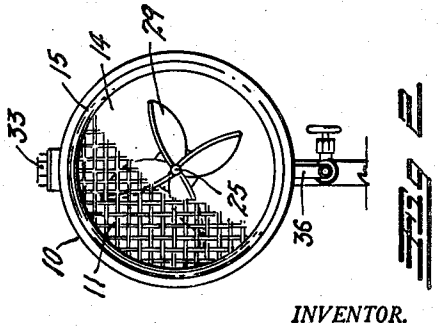
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DEVICES FOR REMOVING MOISTURE FROM THE FLOW OF GASES

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6 Claims. (Cl. 183—36)

This invention relates to a dehydrating device for removing moisture from flowing gases and more particularly to a device for removing water from the atmosphere. It has many uses, such as dehumdifying air in refrigeration and air conditioning systems. But one of the principal objects is to provide a device of this character which can be readily mounted on an automotive vehicle and which will be actuated by the movement of the vehicle to recover water from the atmosphere for any desired use.

Another object of the invention is to provide a device which will be valuable in the reduction of "smog." In certain parts of the United States, the control of atmospheric smog has become a great problem. It is believed that the smog is at least in part caused by the moisture laden exhaust gases of motor vehicles and from industrial plants employing internal combustion engines. The exhaust gases consist largely of water vapor with the remaining components of the gases in solution therein. Therefore, removal of the vapor would result in a great reduction of the contaminating elements of the exhaust fumes.

A further object of this invention is to provide a simple economical and highly efficient device which can be installed in the exhaust system of an automotive engine or similar industrial engine and which will operate to remove, or at least greatly reduce, the percentage of moisture in these exhaust gases.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a longitudinal medial section through the improved dehydrating device;

Fig. 2 is a front view thereof with an intake screen employed therein, partially broken away to show the interior construction;

Figs. 3, 4 and 5 are cross sections therethrough taken on the lines 3—3, 4—4, and 5—5, respectively, Fig. 1.

The invention employs an elongated housing consisting of a metallic barrel or cylinder **10** closed at its forward extremity by means of a circular grid or screen **11** and closed at its rear extremity by means of a circular orifice plate **12** having a central air discharge orifice **13**. An air intake funnel **14** is positioned immediately back of the screen **11** to receive the air passing therethrough. The screen **11** and the intake funnel **14** are held in place by an inwardly rolled forward extremity **15** on the cylinder **10**. The rear reduced extremity of the intake funnel **14** discharges into an axially positioned, compression tube **16** of reduced diameter which in turn discharges into the apex or reduced diameter portion of a rearwardly flaring expansion funnel **17**.

A circular partition plate **18** is positioned against the large diameter rear extremity of the expansion funnel **17** and is held in place thereagainst by means of a cylindrical liner **19** which extends to the rear extremity of the cylinder **10** and which, when the device is assembled, is locked in place with the orifice plate **12** by means of an inwardly extending roll **20** in the cylinder **10**.

A plurality of elongated absorption plates **21** extends between the orifice plate **12** and the partition plate **18**. As illustrated, there are six of these porous plates arranged in a hexagonal shape within the liner **19** and behind a hexagonal opening **26** of corresponding size in the partition plate **18** to form an elongated hexagonal absorption chamber **24**. Retaining ears **22** are preferably formed about the hexagonal opening **26** and similar retaining ears **23** are formed on the inside face of the orifice plate **12** to assist in retaining the absorption plates **21** in place.

A propeller shaft **25** extends axially through the compression tube **16** and is rotatably supported therein in suitable anti-friction thrust bearings **27** carried in cross arms **28** in the respective funnels **14** and **17**. A bladed propeller **29**, having substantially triangular elongated curvated blades, is mounted on the forward extremity of the propeller shaft **25**. A straight bladed impeller **30** is similarly mounted on the rear extremity of the propeller shaft **25**. The propeller **29** and the impeller **30** are shaped to substantially conform to the internal shape of the funnels **14** and **17**.

The absorption plates **21** may be formed from any suitable extremely fine grained porous material. Thin strips of sandstone, such as the Colorado sandstones of the Dakota or Lyons formations, have been found to be highly satisfactory as they have a very effective capillary attraction for moisture.

The cylinder **10** can be mounted in any desired manner depending upon the use to which the device is to be put. For exhaust gas dehumidifying, it would be connected in series with the tail pipe of the engine. For the recovery of water from the atmosphere, the cylinder would be supported in suitable conventional band or clamps on the exterior of the vehicle with the screen **11** facing in the direction of travel.

As the vehicle is driven forward, the impact of the air upon the propeller **29** will impart a high velocity rotation to the propeller shaft **25**. The air entering the intake funnel **14** will be compressed as it approaches the reduced extremity thereof and this compressed air will be given a cyclonic whirl as it leaves the blades of the propeller and enters the compression tube **16**.

Upon discharging from the compression tube, the air will expand in the expansion funnel **17** to impart a molecular separation therein to assist in releasing the water vapor therefrom and the impeller **30** will drive this expanded air forcibly outward in a whirling spiral stream against the flat inner surfaces of the hexagonal absorption chamber **24** to create a pneumatic pressure against the surfaces. The pressure against these surfaces which will force the water vapor particles against the surfaces and into the absorption plates **21** where they will be capillarily attracted. The restricted discharge orifice **13** also assists in maintaining a pneumatic pressure on the absorption plates **21** to still further assist in forcing the moisture particles into absorbent contact therewith. The pneumatic pressure in the absorption chamber **24** gradually forces the absorbed water through the plates **21** into the interior of the cylinder liner **19** where it will collect and discharge through any suitable drain pipe **35**.

It has been found desirable in exceedingly dry locations to prime the porous plates **21** with moisture in order to initiate the capillary attraction therein. This may be accomplished in many ways. For instance, the surfaces could be moistened by introducing water through the discharge orifice **13** prior to use. As illustrated, it is ac-

complished by mounting a water cup **31** on the compression tube **16** in a position to align below a filling nipple **32** on the cylinder **10**. The nipple is closed by means of a suitable threaded plug **33** and the cup **31** is provided with a bleed opening **34** which allows water to slowly enter the tube **16**, at times when the pressure therein permits, for the purpose of priming or moistening the absorption plates **21**.

The absorption plates can be maintained, moistened when necessary by means of a return water tube **36** communicating between the drain pipe **35** and the compression tube **16**. The flow through the return water tube can be controlled by means of a suitable valve **37** so after the desired priming action has been attained, the return water can be cut off.

The screen **11**, of course, prevents the entrance of damaging debris to the mechanism. In the form illustrated, the propeller shaft **25** is rotated by the incoming air. It is conceivable that if required, the shaft could be power driven in any suitable manner to give the required velocity to the impeller **30**.

While a specific form of the improvement has been described and illustrated herein, it is to be understood that the same may be varied within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

1. A device for removing moisture from moving gases comprising: an elongated housing open at both extremities; an intake funnel within the forward extremity of said housing having a larger extremity directed forwardly to receive the gases entering said housing and a smaller extremity directed rearwardly to axially compress the gases; an elongated cylindrical compression tube corresponding in diameter to said smaller extremity axially positioned in said housing and sealed to said smaller extremity and arranged to direct the compressed gases axially rearward in said housing; an expansion funnel positioned within said housing and having a small extremity connected and sealed to the rear extremity of said compression tube to receive the compressed gases therefrom and a large extremity directed rearwardly to allow expansion of said gases; an elongated absorption chamber within the rear extremity of said housing sealed to and receiving the expanded gases from the larger extremity of said expansion funnel; and a porous wall surrounding said absorption chamber within the confines of the wall of said housing, said intake funnel, said compression tube, said expansion

funnel and said absorption chamber being axially aligned within said housing.

2. A device for removing moisture as described in claim 1 in which the porous wall consists of elongated flat plates of porous material positioned edge to edge about said absorption chamber to form a porous wall of non-circular cross section within the circular cross section of the rear portion of said housing.

3. A device for removing moisture as described in claim 1 having an impeller shaft; means for rotatably supporting said propeller shaft axially within said compression tube; a curve-bladed, conical, air-driven propeller mounted on said shaft within said intake funnel; and a flat-bladed, conical, shaft-driven air impeller mounted on said shaft within said expansion funnel so that incoming air will cause said propeller to rotate said shaft to cause said impeller to throw air radially outward against said porous wall.

4. A device for removing moisture as described in claim 1 having a partition plate separating said absorption chamber from said expansion funnel and acting to prevent the gases from flowing between said porous wall and the wall of said housing, said partition plate having a medial gas passage substantially corresponding in size and shape to the non-circular cross section of said area of said absorption chamber.

5. A device for removing moisture as described in claim 1 having an orifice plate partially closing the rear extremity of said housing to create back-pressure in said absorption chamber to force moisture through said porous wall.

6. A device for removing moisture as described in claim 5 in which the elongated flat plates of porous material contact both the partition plate and the orifice plate to seal said absorption chamber from the separation between the porous walls and the wall of said housing.

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