G. H. WALKER.

APPARATUS FOR TREATING GASES WITH LIQUIDS.

APPLICATION FILED MAY 31, 1916.

1,353,685.

Patented Sept. 21, 1920.

3 SHEETS—SHEET 1.

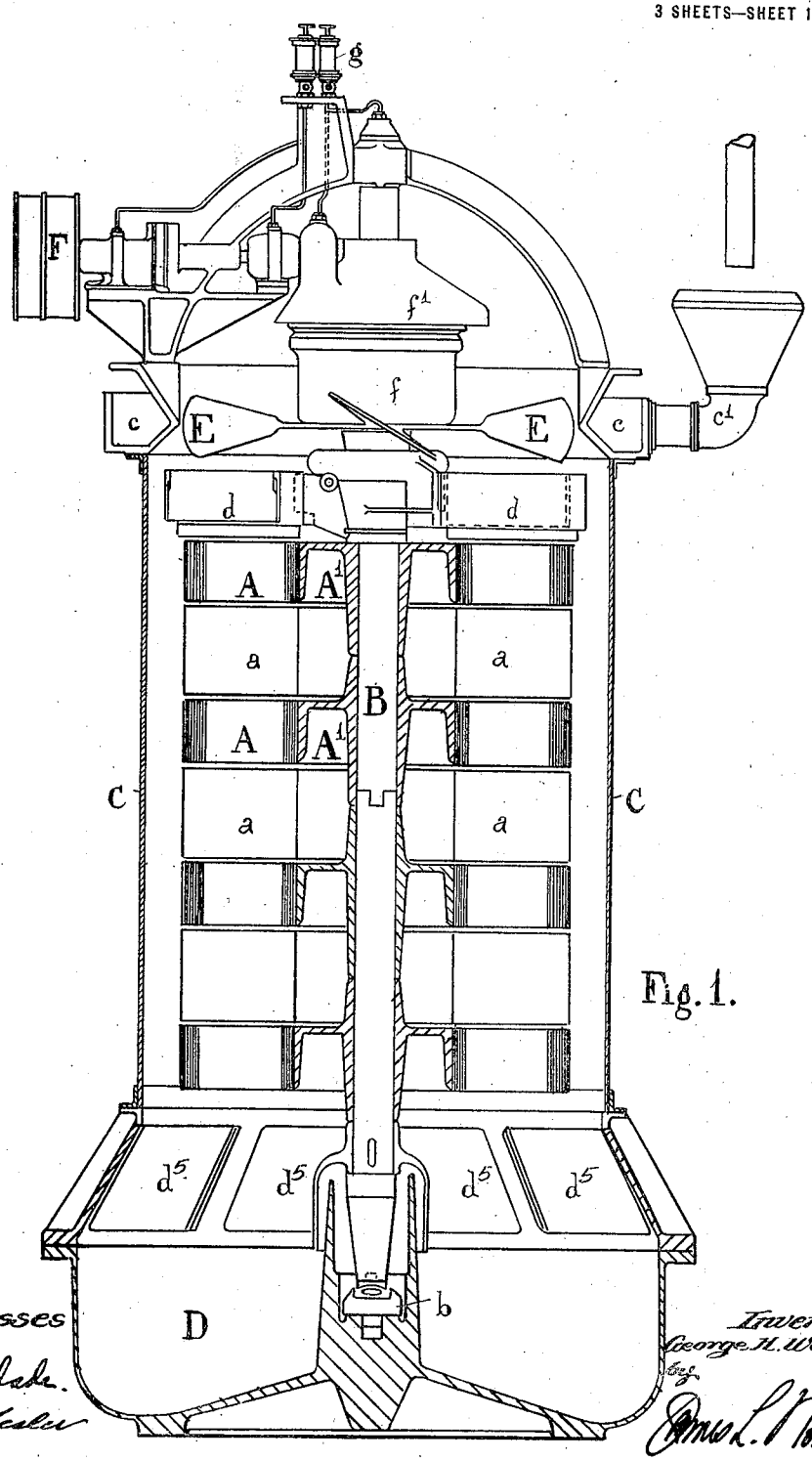


Fig. 1.

Witnesses
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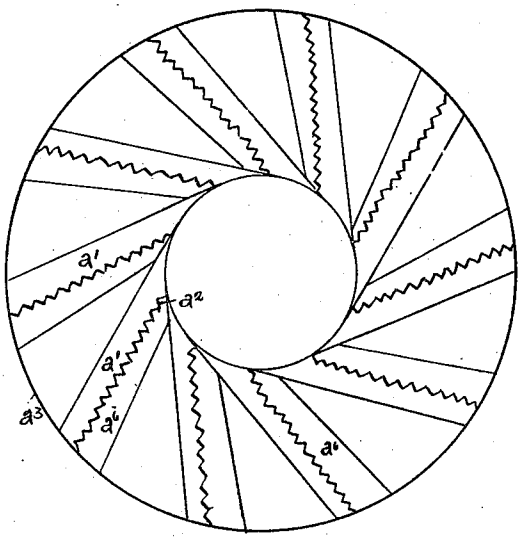


Fig. 2.

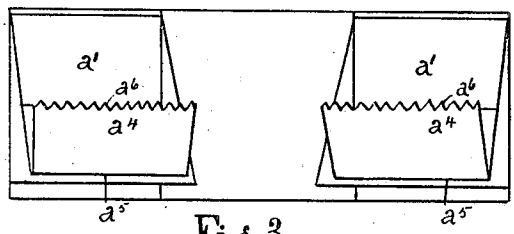


Fig. 3.

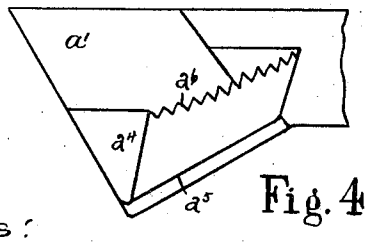


Fig. 4.

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3 SHEETS—SHEET 3.

FIG. 5

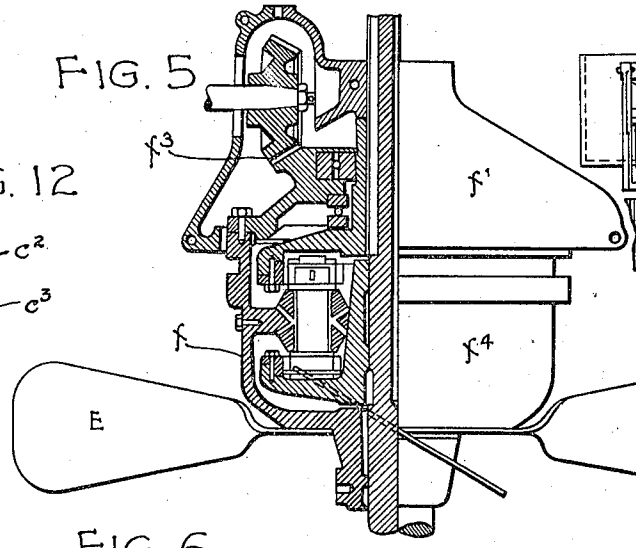
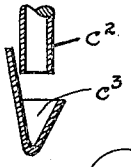


FIG. 12



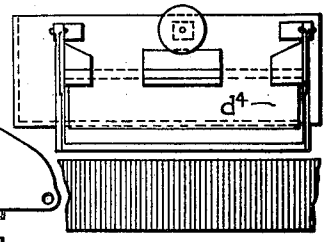
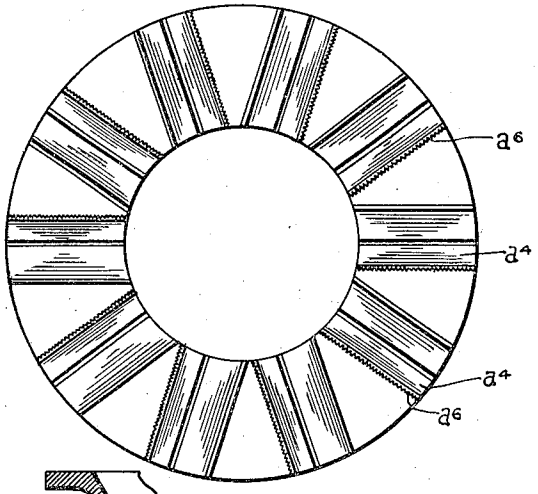
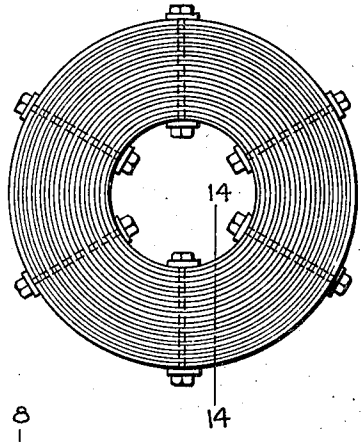


FIG. 10

FIG. 6

FIG. 13





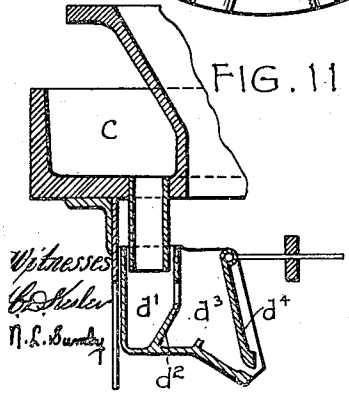
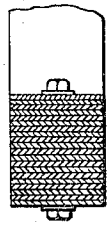


FIG. 11

FIG. 14.



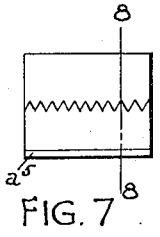


FIG. 7

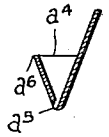


FIG. 8

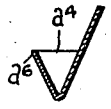


FIG. 9

INVENTOR

George H. Walker

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UNITED STATES PATENT OFFICE.

GEORGE HENRY WALKER, OF WORCESTER, ENGLAND, ASSIGNOR TO HEENAN & FROUDE, LIMITED, OF MANCHESTER, ENGLAND.

APPARATUS FOR TREATING GASES WITH LIQUIDS.

1,353,685. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed May 31, 1916. Serial No. 100,959.

To all whom it may concern:

Be it known that I, GEORGE HENRY WALKER, a British subject, residing at Worcester, county of Worcester, England, have invented certain new and useful Improvements in Apparatus for Treating Gases with Liquids, of which the following is a specification.

This invention relates to improvements in apparatus for cooling or heating water or for cooling, heating or humidifying air or otherwise treating gases with liquids in which a drum or series of drums, each comprising a number of convolutions of sheet metal or other material wound in concentric, spiral or other form presents a series of wet surfaces to air or other vapor.

The present invention consists in mounting a drum or series of drums on a vertical shaft rotated by suitable gearing and causing the water or other liquid supplied thereto to be poured or sprayed thereon so that it will impinge on the drums as they rotate and spread over the convolutions thereof.

The invention will be described with reference to the accompanying drawing.

Figure 1 is a vertical section through the apparatus which is built up of a series of drums, A.

Figs. 2, 3 and 4 are a plan, section and perspective view respectively of the guide plates *a*.

Fig. 5 is a view half in vertical section and half in elevation showing the fan or propeller for drawing air or gas through the apparatus, the gearing for driving said fan or propeller, and the hood or housing which incloses said gearing.

Fig. 6 is a view similar to Fig. 2 of a modified arrangement of guide plates.

Figs. 7 and 8 are, respectively, a view in elevation and a cross-section of one of the troughs attached to the guide plates.

Fig. 9 is a cross-section of a modified form of trough.

Fig. 10 is a detail view of one of the hinged plates at the outlets from the distributing box.

Fig. 11 is a fragmentary sectional view showing the manner in which the water or other liquid is delivered from the receiving chamber to the distributing box.

Fig. 12 is a detail view showing a modified arrangement for feeding water or other liquid direct from the receiving chamber to drums.

Figs. 13 and 14 are, respectively, a top plan view and a diametrical sectional view of one of the convoluted drums.

The drums A are built up of a number of convolutions of sheet metal or other material wound in concentric, spiral or other form attached to a central disk A′ keyed or otherwise mounted on a vertical shaft B the whole being inclosed in a cylindrical casing C. Between each pair of drums A guide plates *a* are provided to collect the water or liquid flowing from one drum and deliver it to the succeeding drum. These guides *a* consist of a number of plates a' radiating from central guides or supports a^2 and attached at the outer extremity to a containing ring plate a^3. Water falls from the upper drum and is caught on these guide plates, at the lower edge of which is fixed a trough a^4 having an open underside a^5. The side of this trough extends upward for a short distance and forms a weir over which any excess water not escaping through the underside is allowed to flow. The top edge a^6 of the trough over which the water flows may preferably be serrated. The guide plates may be placed vertically that is, co-axial with the shaft, as shown in Fig. 6, or they may be inclined at an angle to the vertical as shown in Figs. 2, 3 and 4. In some cases it may be desirable to construct the trough without an opening between the weir plate and the guide plate, as shown in Fig. 9, so that all the water which collects in the trough is caused to overflow over the serrations. An annular chamber *c* is formed at the top of the casing C and is supplied with water or other liquid from the pipe c'. The water or other liquid is fed by gravity from the chamber *c* into the first chambers d' of the distributing boxes *d*, from which it flows past weir plates d^2 into further chambers d^3, which discharge it past hinged plates d^4 downward into the narrow spaces between the adjacent convolutions of the top drum A.

A tank D is provided beneath the drums to receive the water or other liquid after passing over the drums, and between the tank D and the bottom drum A a space is left for the entry of the air or gas, the

gas entering through gaps d^5 in the casing. The air or gas is drawn in by a fan or propeller E mounted above the drums.

The shaft B is carried in a suitable footstep bearing b and is driven at a slow speed of rotation from the pulley F which also serves to drive the fan or propeller E at a relatively high speed. The pulley F shown by Fig. 1 is connected, as shown by Fig. 5, to a pinion contained within the stationary cover f' of a gear box f, said pinion meshing with a gear wheel secured to a rotary portion f^4 of the gear box f. The fan or propeller E is secured to and rotates with the lower rotary portion f^4 of the gear box f, and said lower rotary portion, through a sun and planet gearing contained therein, drives the vertical shaft B at a lower rate of speed than said lower rotary portion itself moves. Lubricators g are arranged at the top of the apparatus.

In operation the water or other liquid is fed into the annular chamber c concentric with the drums from which it flows by gravity into the distributing boxes d which discharge it downward into the narrow spaces between the convolutions of the top drum A. Alternatively, as shown in Fig. 12, the water or other liquid may be discharged directly by pipes, ducts or openings c^2 to a chamber or trough c^3 at the upper part of the annular chamber C. In overflowing from the trough c^3 and flowing down the spaces between the convolutions of the drums A the water or other liquid spreads itself out over the surface of the metal of the convolutions of the drum by capillary attraction and thereby presents a large cooling surface. After leaving the drum the water or other liquid falls by gravity onto the guide plates a which collect the drops and deliver them in streams onto the next drum where the process is repeated. After leaving the lowest drum the water falls into the tank D. At the same time as the water or liquid is flowing down the drums the air or gas is drawn in by the fan or propeller through the gaps d' in the bottom of the casing and up through the convolutions of the drums A coming into contact with the water or liquid, thereby extracting heat, taking up humidity or depositing certain constituents, according as the apparatus is used for cooling water, humidifying or cleansing air or gases.

What I claim as my invention and desire to protect by Letters Patent is:—

An apparatus of the class described comprising a vertical inclosing chamber, a series of superposed horizontally arranged disk-like drums revolubly mounted in the chamber and each composed of closely disposed convolutions of flat material with narrow spaces therebetween, a plurality of guide plates assembled in spaced relation between each pair of drums, means for feeding liquid downwardly to the upper drum and from the latter passing through the convolutions of the several drums and also between the guide plates, troughs at the lower edges of the guide plates, each trough having a side extending upwardly a short distance to form a weir, the top edge of each trough also being serrated, the troughs catching and holding the liquid from the guide plates and feeding it to the drums below, and means for inducing a flow of gas upwardly through the chamber and the guide plates and between the convolutions of the drums.

Dated this 15 day of May, 1916.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE HENRY WALKER.

Witnesses:

ERNEST HARKER,

DAVID C. KERR,