

(No Model.)

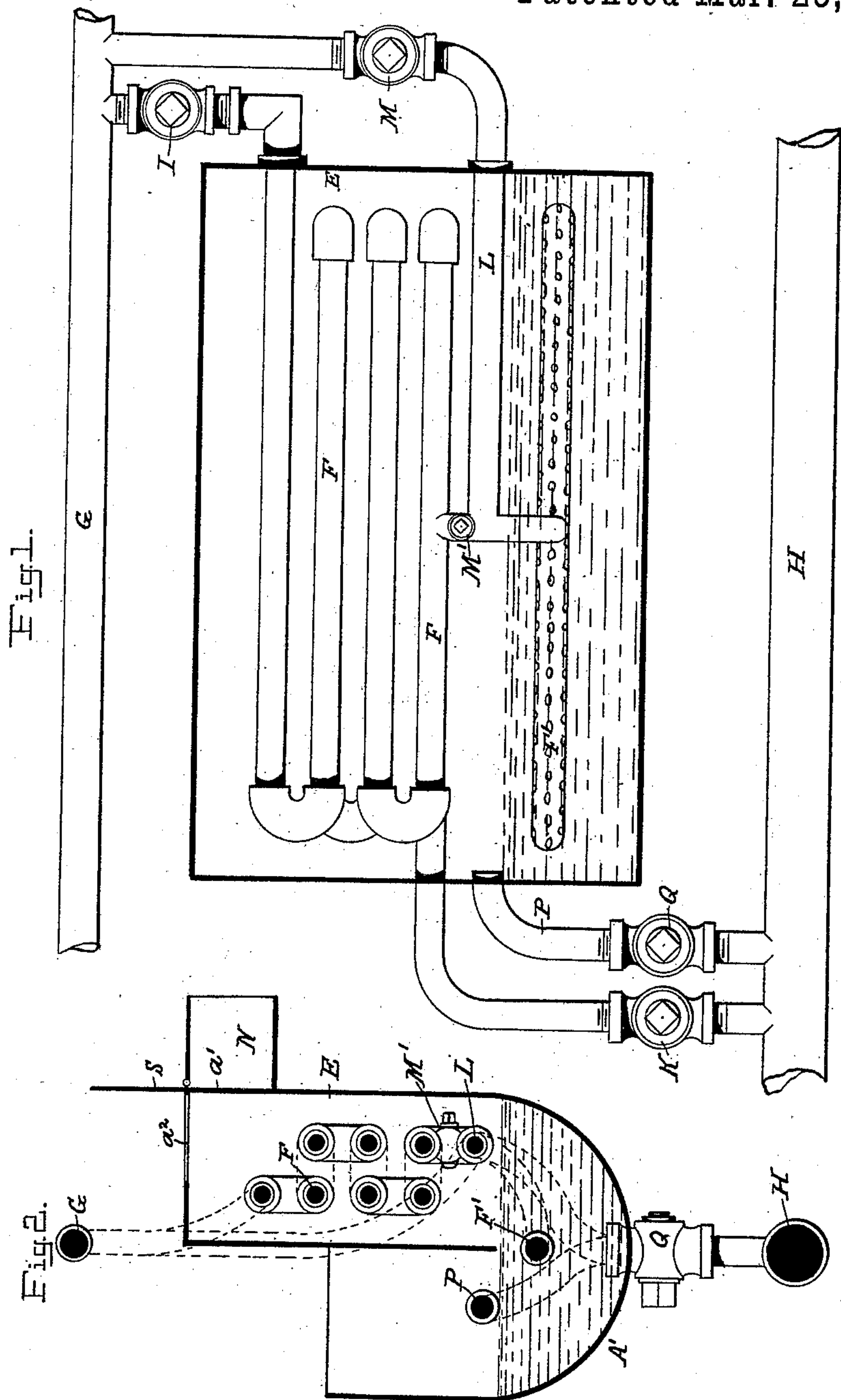
2 Sheets—Sheet 1.

R. LOFTHOUSE.

APPARATUS FOR MOISTENING, DRYING, WARMING, OR COOLING AIR.

No. 424,320.

Patented Mar. 25, 1890.



WITNESSES:

George Baumann.
John Revell

INVENTOR

Robert Lofthouse

BY

Horison and Horison
his ATTORNEYS

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Fig. 3.

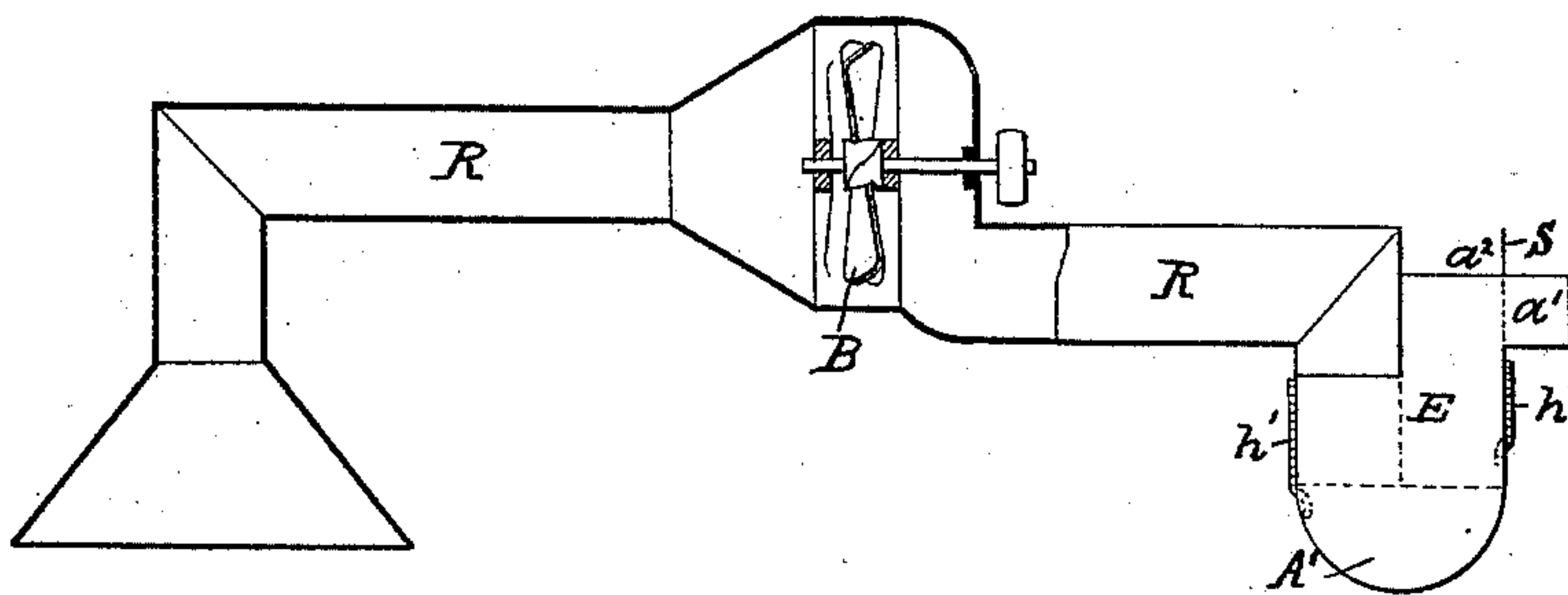


Fig. 4.

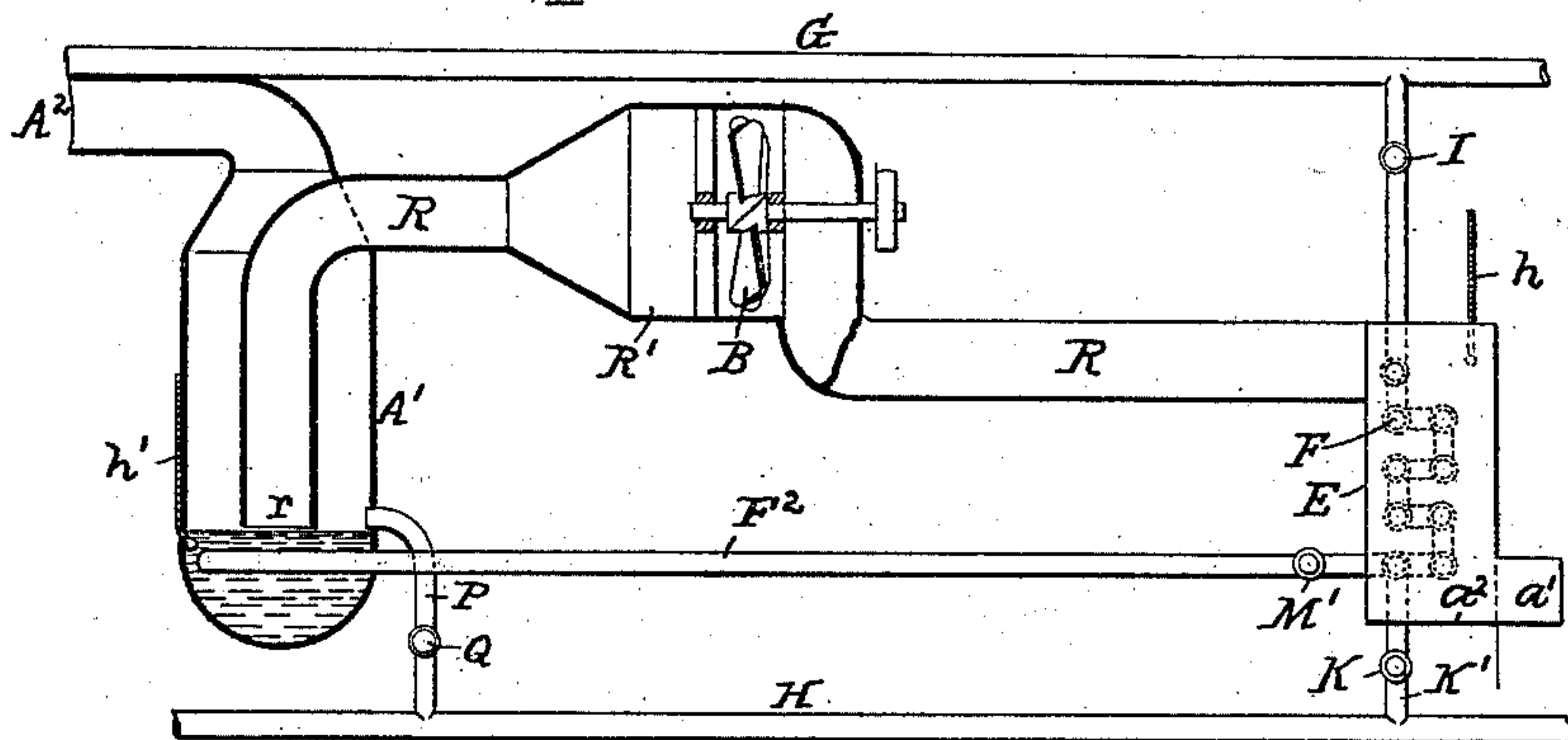
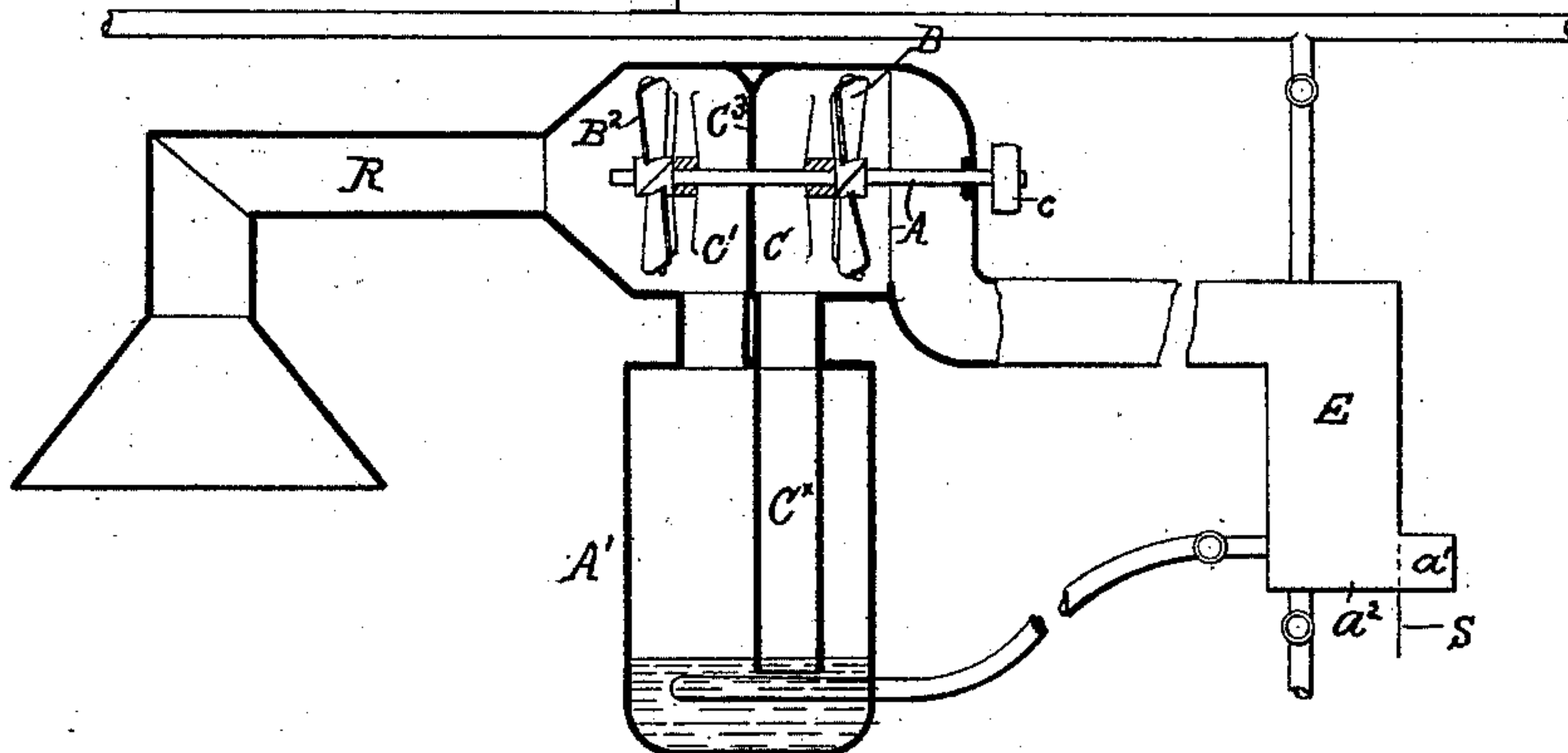


Fig. 5.



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UNITED STATES PATENT OFFICE.

ROBERT LOFTHOUSE, OF MANCHESTER, COUNTY OF LANCASTER, ENGLAND.

APPARATUS FOR MOISTENING, DRYING, WARMING, OR COOLING AIR.

SPECIFICATION forming part of Letters Patent No. 424,320, dated March 25, 1890.

Application filed June 5, 1889. Serial No. 313,211. (No model.) Patented in England May 18, 1888, No. 7,361, and in France November 17, 1888, No. 194,167.

To all whom it may concern:

Be it known that I, ROBERT LOFTHOUSE, a subject of the Queen of Great Britain and Ireland, and a resident of Manchester, county of Lancaster, England, have invented certain Improvements in Apparatus for Moistening, Drying, Warming, or Cooling Air, of which the following is a specification.

The object of my invention is to provide efficient means for warming, cooling, drying, or humidifying and distributing air.

In the accompanying drawings, Figure 1 is a longitudinal section of an apparatus constructed according to my invention. Fig. 2 is a section of the same. Figs. 3 and 4 are views of apparatus provided with a single propelling-fan, and Fig. 5 is an arrangement provided with two fans.

This apparatus consists of a box E, Figs. 1 and 2, containing a coil of pipes F, connected at one end with a steam-supply pipe G and at the opposite end with an exhaust-pipe H. The upper end of this coil is provided with a cock or valve I, Fig. 1, for cutting off when desired the communication between the coil F and the steam-supply pipe G. Another cock or valve K is provided at the lower end of the coil F for cutting off when required the communication between the said coil and the exhaust-pipe H. The lower portion F' of the coil F is preferably of copper, and is connected by a branch pipe L, Figs. 1 and 2, with the steam-pipe G, the said branch pipe L being provided with a cock or valve M, by means of which the communication between it and the supply-pipe G may be cut off when required. Another cock M' is provided for the purpose of closing the communication between the lower portion F' and the upper portion F of the coil. The lower end of the box E is preferably trough-shaped, as shown at A', Figs. 1 and 2, to contain water, into which the lower portion F' of the coil is inserted; or, if desired, the box E may be made to communicate with or to dip into a box or trough made separate from the box and containing water, so that air (which enters the box E through an opening N) in escaping from the box E will be caused to pass through over or in contact with the water contained in the

trough A', so as to absorb moisture therefrom. The portion F' of the coil is preferably perforated, so that the water of condensation collecting in the coil may pass through the said perforations into the trough.

In order to allow of the escape of the accumulated water in the trough, (owing to the condensation of the steam,) I provide the trough with an overflow-pipe P, which communicates with the exhaust-pipe H, the said overflow-pipe being fitted with a stop-cock Q, for the purpose of cutting off the communication when required. When the air admitted to the box E by the passage N is required to be dried before entering the building, the cocks M and M' are closed, so as to prevent steam entering the lower portion F' of the coil, the cocks I and K being opened to admit steam from the pipe G to pass through the upper part F of the coil and thence to the exhaust-pipe H, whereby the upper portion F of the coil will become heated, so that the air passing down through the box E, by coming into contact with the coil, will be heated and dried before passing from the box into the building. If the air admitted to the box E is required to be moistened only before it enters the building, the cocks I and K are closed and the cock M is opened, and the cock M' closed to allow steam to pass through the lower portion F' of the coil, which is immersed in the water, whereby the said water will be heated and vapor evolved, which will be taken up or absorbed by the air as it passes from the interior of the box E into the building, and be distributed therein in a humid condition. If the air entering the box E is required to be cooled before it enters the building, the cocks M and M' are closed and the cocks I and K opened, and cold air or cold water is forced through the coil into the exhaust-pipe H, which coil is thus cooled, so that the air passing through the box by impinging against the coil also becomes cooled before it enters the building. The air may, if desired, be allowed to enter the building direct from the box E, or I may connect to the outlet from the box E a tube or conduit R, Fig. 3, leading to the center or other desired part of the building, and I provide at any suitable part of this con-

duit one or more fans or exhausters, as shown at B, which may be constructed so as to draw the air from the box E and distribute it through the end of the conduit R into the building. I sometimes provide means whereby the air passing through the box E may be caused to enter the said box either from outside the building or from the interior of the building, as desired. For this purpose I provide the box E with two entrances a' and a^2 , one opening inside the building and the other outside the building, and fitted with a double valve, as shown at S, so arranged that the said valve may be turned on its center, so as to close either entrance, as desired, the other entrance being at the same time opened.

In Fig. 4 I have represented the openings a' a^2 for the admission of air to the box or chamber E at the bottom of the said box and the trough containing water for humidifying the air as being situated at the outlet end r of the conduit R, instead of being connected to the box or chamber E, as hereinbefore described. The conduit R enters the humidifying trough or box A' at the top and descends therein to within a short distance of or below the surface of the water, so that the air is forced by the fan B down into the water, whereby the said air is purified and humidified and passes thence from the said trough or box through an outlet A² into the building in a humid condition.

The coil F in the box or chamber E communicates with the trough or box A' by a pipe F², fitted with a stop-cock M' to cut off the communication when required. The said coil E communicates also with the exhaust-pipe H by a pipe K', having a stop-cock K to cut off the communication when required. By opening the cocks I and M' and closing the cock K steam admitted from the pipe G to the coil F will pass through the pipe F² into the water in the trough or box A' and be condensed thereby, and the air admitted to the box or chamber E, after becoming warmed by its contact with the coil F, will be drawn by the fan or fans at R' from the chamber E and forced through the outlet r into the water in the trough or box A' and pass therefrom into the building in a warm and humid condition. If the air be required to be cooled and humidified, cold water is placed in the trough or box A' and the cock M' closed, and cold water is forced through the coil F, so that air passing through the box or chamber E will be cooled by contact with the said coil and be drawn from the box E by the fan or fans at R' and forced into the cold water contained in the trough or box A', the said air thereby being moistened before it passes from the said trough into the building, and, if desired, a spray of cold water may be injected into the trough to more thoroughly cool and moisten the air. The trough A' is provided with an overflow-pipe P (with a stop-cock Q) for conducting excess of water from the

trough or box A' into the exhaust-pipe H, as before described.

In Fig. 5 two air fans or propellers B B² are employed, the one B for drawing the air from the chamber E and forcing it into the humidifier A', and the other B² for drawing the air from the humidifier and forcing it into the apartment or building. These fans are inclosed by a casing divided by a partition c^3 , so as to form two chambers C C', one for each of the fans. From the chamber C, containing the fan B, a tube C^x descends into the water contained in the trough or box A', so that the air drawn from the heater E by the fan B is forced through this tube into the water, whereby it becomes moistened or humidified. The chamber containing the fan B² communicates with the upper end of the trough or box A', so that the fan B² will exhaust or draw the air from the said trough or box and force it out from the outer end of the conduit R in a moistened or humid condition into the apartment or building. The fans or propellers are preferably both mounted on one and the same shaft A and driven simultaneously by a strap passing over the pulley c . The arrangements of service-pipes admit of one and the same pipe being employed for either steam or water, and may be employed for spraying water in warm weather.

h h' , Figs. 3 and 4, represent thermometers fitted, respectively, to the box E and the trough A', by comparison of which the temperature of the air in the box E and of the water in the trough A' may be readily ascertained.

I do not claim as my invention a ventilating apparatus consisting of a heater, a water-tank, a steam-pipe entering the tank for producing humidity, a passage connecting the heater with and extending down inside the water-tank, so as to force hot air into the water in the tank, a passage leading from the tank to the place to be humidified, and a fan in the passage between the heater and the water-tank for exhausting or drawing hot air from the heater and forcing it into the water-tank, as that forms the subject-matter of another application filed by me, Serial No. 292,598; but

I do claim as my invention—

1. An apparatus for heating, cooling, drying, or humidifying air, consisting of a box, a water-trough, a coil of pipes in the upper part of the box for steam or refrigerating liquid, a branch pipe therefrom in the trough for introducing steam into the water, the said branch pipe being perforated, a water-supply and a discharge pipe for the trough, an overflow-pipe for the escape of the excess of water, and stop-cocks for the piping, substantially as described.

2. An apparatus for heating, cooling, drying, and humidifying air, consisting of a box containing a coil of pipe for steam or refrigerating liquid, a water-trough, a coil of pipes in the upper part of the box for steam or refrigerating liquid, a branch pipe therefrom in the trough for introducing steam into the water, the said branch pipe being perforated, a water-supply and a discharge pipe for the trough, an overflow-pipe for the escape of the excess of water, and stop-cocks for the piping, substantially as described.

erating liquid, the said box provided with an inlet, and a water-trough provided with an overflow-pipe and an outlet and containing a perforated branch pipe from the coil in the box to introduce steam into the water, in combination with a tube connecting the box and the trough, and a fan within the said tube, substantially as and for the purposes set forth.

10 3. An apparatus for heating, cooling, drying, or humidifying air, consisting of a box containing a coil of pipe for steam or a refrigerating liquid, the said box being provided with an inlet, a water-trough provided

with an overflow-pipe and an outlet and containing a perforated branch pipe from the coil in the box to introduce steam in the water-trough, and a fan within the outlet-passage from the trough, substantially as set forth. 15 20

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

ROBERT LOFTHOUSE.

Witnesses:

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