Dec. 1, 1936. R. J. ROBERTS 2,062,728

APPARATUS FOR COOLING AND CONDITIONING AIR

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Fig. 1.

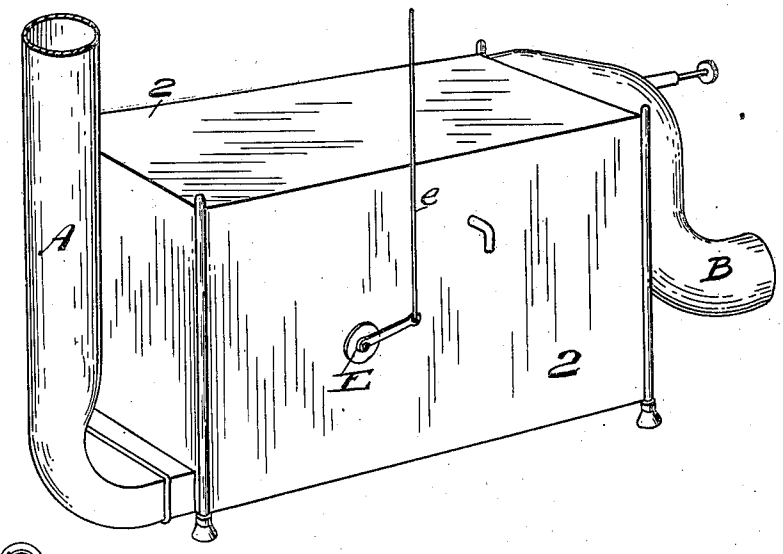


Fig. 4.

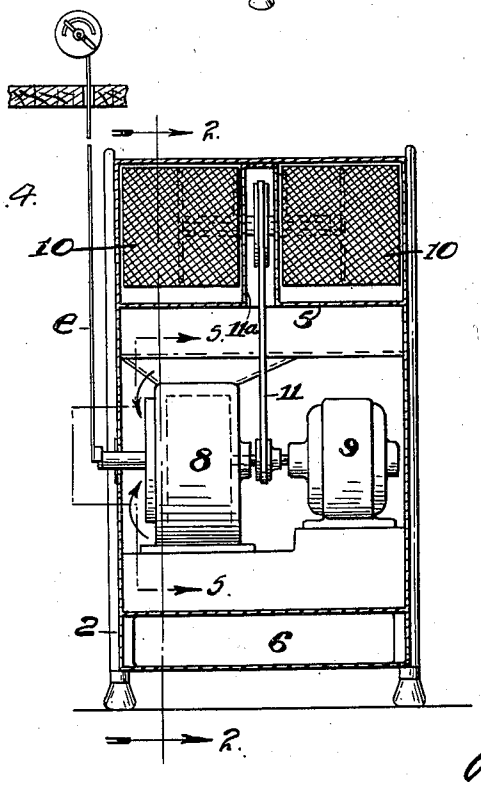
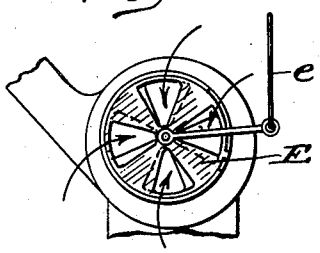


Fig. 5.



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APPARATUS FOR COOLING AND CONDITIONING AIR

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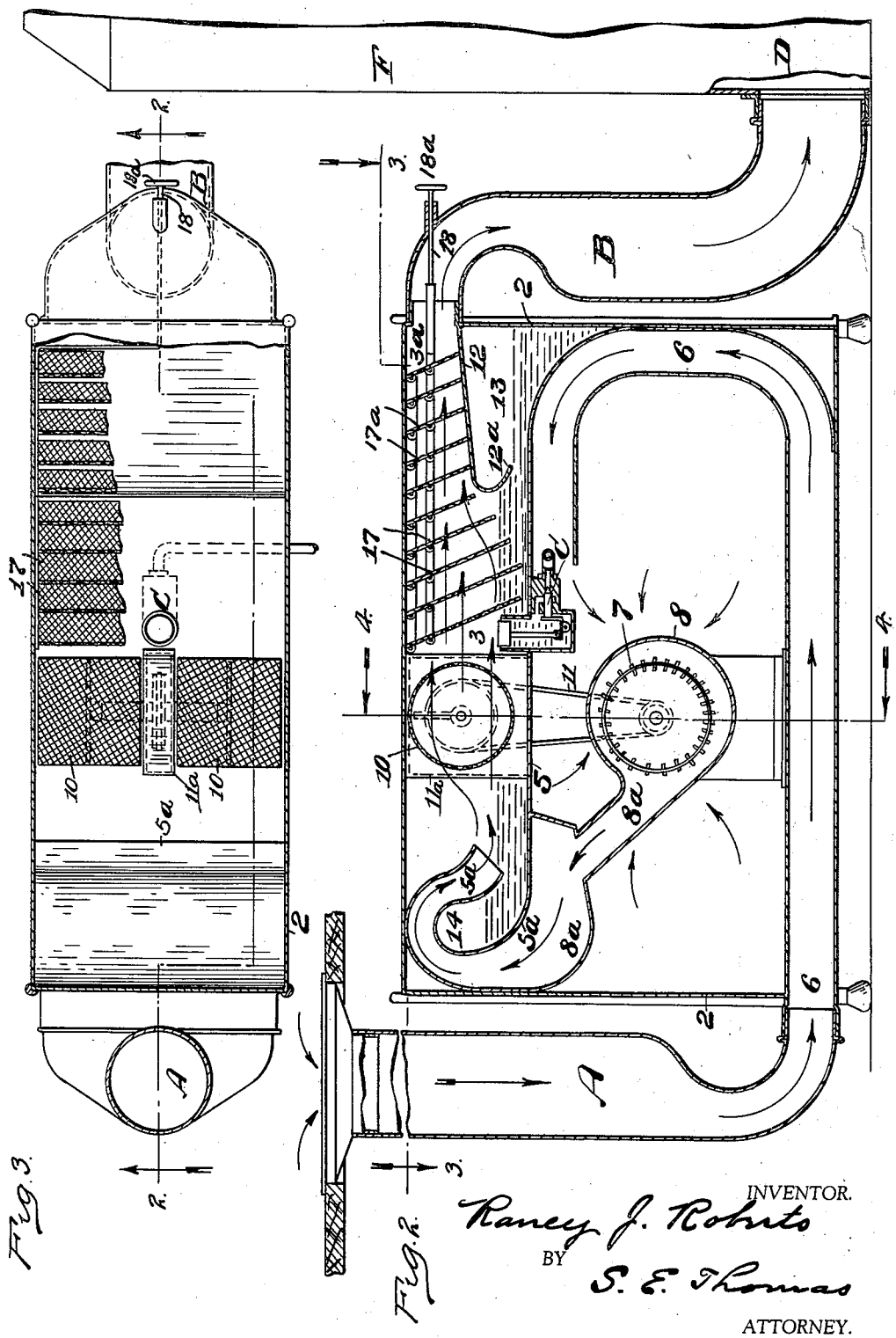


Fig. 3.

Fig. 2.

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APPARATUS FOR COOLING AND CONDITIONING AIR

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Fig. 6.

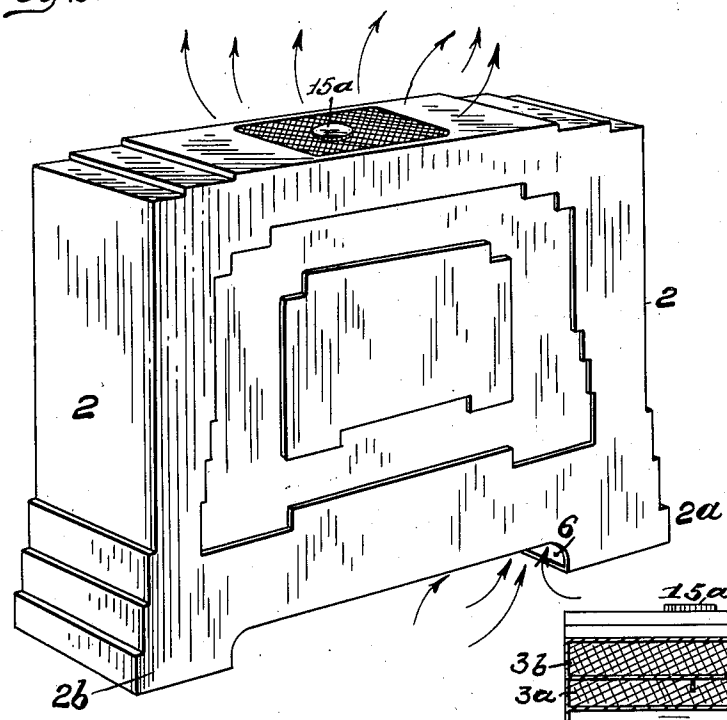


Fig. 10.

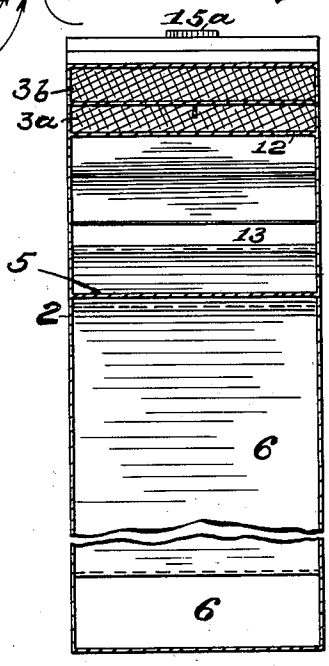
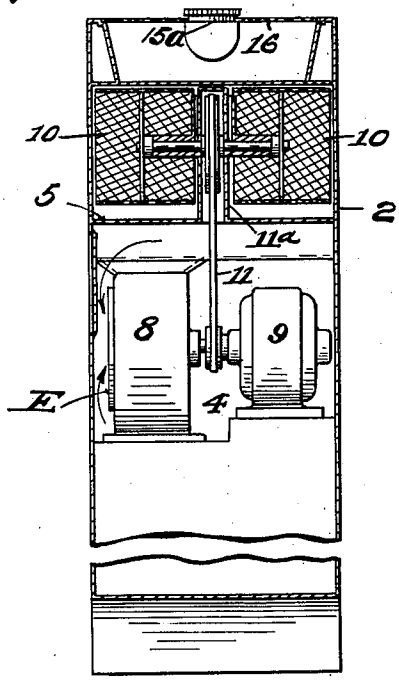


Fig. 9.



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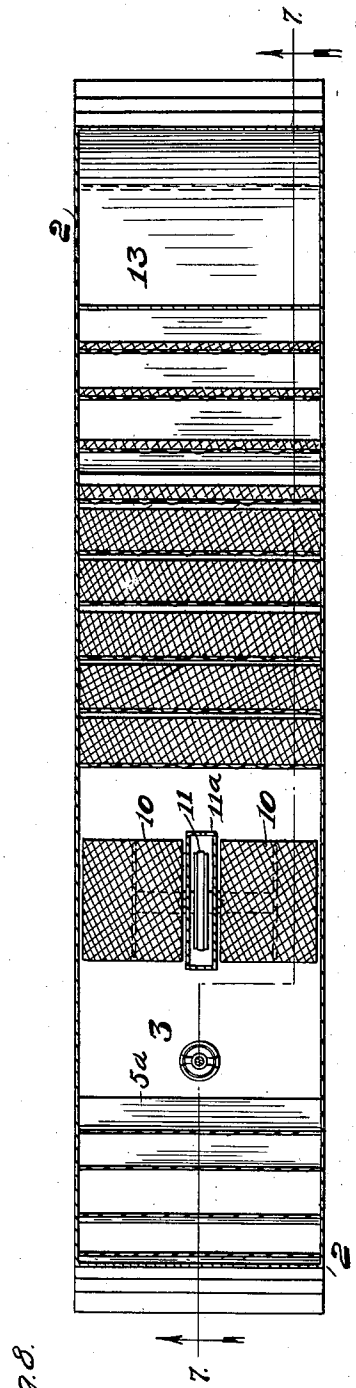


Fig. 8.

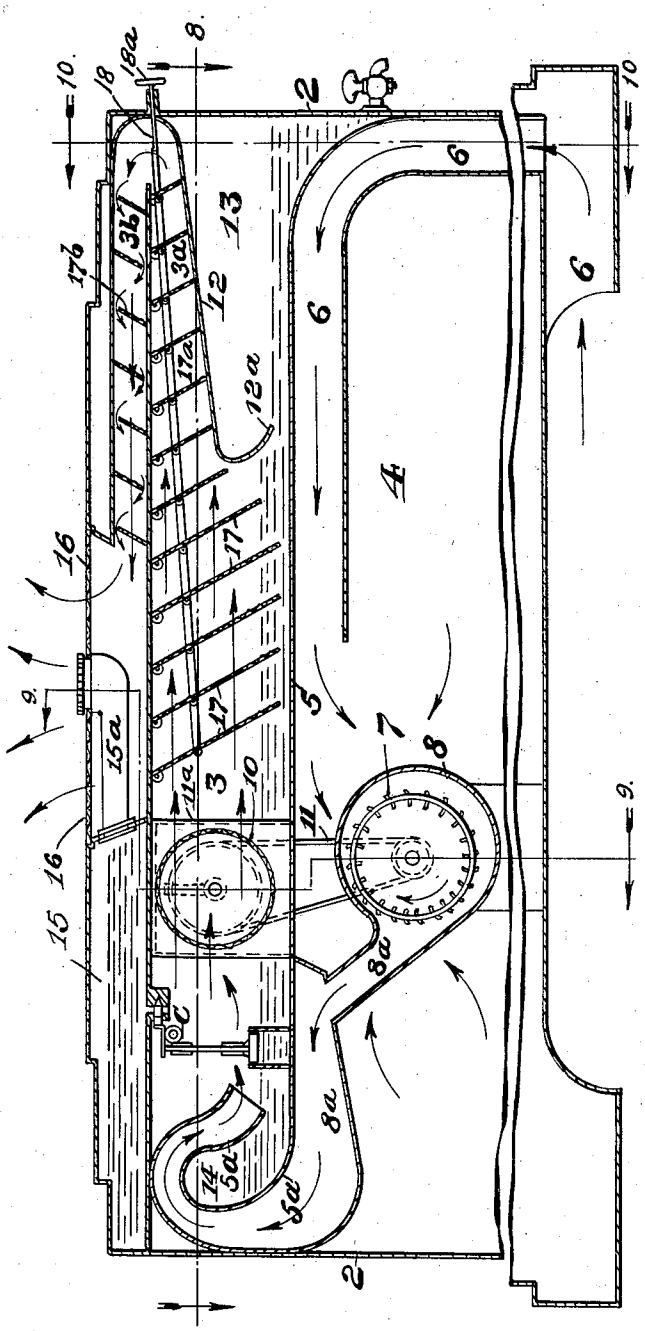


Fig. 7.

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UNITED STATES PATENT OFFICE

2,062,728

APPARATUS FOR COOLING AND CONDITIONING AIR

Raney J. Roberts, Detroit, Mich.

Application March 22, 1935, Serial No. 12,413

3 Claims. (Cl. 261—119)

My invention relates to an apparatus for cooling and conditioning air and the object of my improvements is to insure greater efficiency than has been obtained by devices designed for a like purpose,—as now employed.

I obtain this object in the apparatus shown in the accompanying drawings, in which:

Figure 1 is a perspective view of an apparatus embodying my invention.

Figure 2 is an elevation of the same in longitudinal section,—in the plane taken on the dot and dash line 2—2 of Figure 4,—and shown connected with a hot-air furnace.

Figure 3 is a plan view partly broken away, as indicated by the dot and dash line and arrows 3—3, in Figure 2.

Figure 4 is a vertical cross-sectional view, taken substantially on the line 4—4, in Figure 2.

Figure 5 is a detail elevation taken as indicated by the broken line 5—5, in Figure 4.

Figure 6 is a perspective view showing a modified construction.

Figure 7 is a sectional elevation of the construction of Figure 6, as indicated by the dot and dash line 7—7, in Figure 8.

Figure 8 is a sectional plan view in the plane indicated by the dot and dash line 8—8, in Figure 7.

Figure 9 is a transverse central section, taken on the dot and dash line 9—9 in Figure 7.

Figure 10 is a similar section in the plane indicated by the dot and dash line 10—10, in Figure 7.

In the form shown in Figures 1, 2, 3, 4 and 5, the apparatus may be located in the basement and the air taken from an upper room through a descending conduit A and delivered to the distributing system D of the furnace F, through a delivery pipe B;—water being supplied from service pipes—not shown—under control of a float actuated conical valve C. The supply of air delivered to the intake of the fan casing, may be regulated by a damper E, manipulated from an upper floor by a rod *e*.

Referring in the first place more particularly to Figures 6 to 10 inclusive:

The numeral 2 denotes an approximately rectangular casing having at its ends the downwardly extending pedestals 2*a* and 2*b*. Said casing is divided into an upper compartment 3 and a lower compartment 4 by a partition 5, which is bent downward at the right to serve as the upper wall of the intake passage and at the left at 5*a* it is bent upward over and downward to form a part of the wall of a passage for delivering air into the upper compartment 3. The numeral 6 indicates an intake passage opening, preferably from the inner side of the pedestal 2*a*, and extending upward and then horizontally to about the center of the casing 2, along the partition 5 forming the bottom of the compartment 3 and a part of the wall of said passage. The numeral 7 indicates a centrifugal fan having the casing 8 in which its axis is eccentrically located. The casing 8 is open at its outer end to the compartment 4, and its delivery passage 8*a* extends to the part 5*a* of the partition 5 to form therewith a passage opening downward and inwardly, into the compartment 3.

The numeral 9, (Figure 9) indicates an electric motor for operating the fan 7. 10, 10 are cylinders of wire meeting in the compartment 3 secured upon a shaft resting in bearings parallel to the shaft of the fan 7. The numeral 11 indicates a belt passing over pulleys on the shafts of the fan 7 and cylinders 10, 10. Numeral 11*a* denotes a casing, opening at its lower end into the compartment 4, and extending into the compartment 3, to enclose the pulley on the shaft of the cylinders 10, 10, and to support its bearings.

The numeral 12 indicates a partition located at the opposite end of the casing 2 from that of the opening through which the air passes into the compartment 3. This partition extends from the upper portion of the end wall of the casing 2 into the compartment 3 sloping gradually downward, and then bends abruptly downward to bring the lower edge 12*a* at a slightly lower level than the inner edge of the wall 5*a*. This forms the enclosed air space 13, and the wall 5*a* forms a similar enclosed air space 14 at the other end of the casing 2. The numeral 15 indicates a reservoir to contain water to supply the same to the compartment 3 as required. The top of the compartment 3 is also the bottom of the reservoir 15,—except where the passage 3*b* passes through the top wall of said compartment. The numeral 16 indicates a vertical opening through the center of the reservoir 15, and 15*a* is a filling passage for said reservoir. The numerals 3*a* and 3*b* indicate consecutive connecting discharge passages leading from the compartment 3 and to the opening 16. The passage 3*a* has the partition 12 for its lower wall and the top of the compartment 3 for its upper wall.

The numeral 17 indicates diaphragms of wire netting extending transversely across the compartment 3, between the cylinders 10 and the partition 12, and 17*a* are similar partitions in and adapted to the passage 3*a*. Said diaphragms

are hinged at their upper edges and slant downward and forward in the direction of motion of the air.

The numeral 18 indicates a rod pivotally connected to the diaphragms 17 and 17a, and passing through the end of the tank 2 is provided with a handle 18a on its outer end. The angle at which said diaphragms may be adjusted is controlled by manipulating the rod 18. Diaphragms 17b in the upper wall of the passage 3b slant downward and in the direction of the air flow, and are cut away at their lower edges, and alternate with diaphragms cut away at their upper edges, so as to deflect the current of air toward the upper and then the lower wall of the passage 3b.

The water supply apparatus C keeps the level of the water in the compartment 3 at the level of the lower edge of the partition 5 where it extends into the compartment 3 at 5a.

The operation of the above described apparatus is as follows:—

The fan 7 is rotated by the electric motor which also rotates the cylinders 10 through the belt 11, and the pulleys and the respective shafts.

The fan 7 takes air from the compartment 4, through an open end of the casing 8 and discharges it into the compartment 3 through the passage 8a in a downward and slanting direction against the surface of the water in said compartment. The air is forced by, and through the interstices of the cylinders 10. These cylinders dip into the water at their lower portions and carry the water up in films across the spaces of the netting, and the current of air passing this film has water removed from it.

The air passing along past the diaphragms 17 and 17a has the drops therein arrested or deflected down upon the surface of the water or upon the partition 12, as the case may be. The current of air continuing through the passage 3b is further acted upon by the partitions 17 and brought into contact with the walls of said passage which are cooled by contact with the water in the reservoir 15.

The current of air flowing from the passage 8a draws a vacuum in the chamber 14 which causes the level of the water to rise in said chamber as shown in the drawing. The action of the air and cylinders 10 upon the water between the chambers 13 and 14 causes an oscillating motion thereof, the pressure of air in one of said chambers being diminished and in the other increased alternately, thus producing a cooling action on the walls 5a of the chamber 14 and the partition 12 of the chamber 13.

The water in the above described apparatus is always cooler than the surrounding medium.

The air entering at the passage 6 is cooled by contact with the partition 5 forming a wall of said passage. The air is further cooled by contact with the wall 5a of the chamber 14 and the wall 12 of the chamber 13 which have been cooled by the alternate compression and expansion of the air therein.

It may be observed that the fan 7 is placed eccentric to the casing 8. This secures a quiet action of the fan.

Water is thrown upon the partition 12 and evaporated from the surface thereof by the passing current and cools said partition and the air passing over it.

The operation of the apparatus, as shown in Figures 1 to 5, as applied to hot-air furnace installation, is similar to that just described, except, for obvious reasons, the descending conduit A, from an upper room to the distributing system D of a furnace F, is dispensed with. In furnace installations the water reservoir 15, the passage 3b, and the diaphragms 17b, have been eliminated;—the "conditioned air" being delivered directly from the passage 3a, into the distributing system D, of the furnace.

Having thus described my invention, what I claim is:

1. In an apparatus for conditioning air, a compartment containing water; a passage for air having an orifice adapted to deliver air against the surface of the water, the wall of said passage being so shaped as to form an enclosed chamber with an open mouth below the surface of the water in said compartment; a second chamber in spaced relation to the first named chamber having an open mouth below the surface of said water; and means for impelling the water located between said chambers.

2. In an apparatus for conditioning air, a compartment containing water; an enclosed chamber having an open end below the surface of the water; a second chamber in spaced relation to the first named chamber having an open end below the surface of said water; a passage for air having an orifice adapted to deliver air against the surface of said water; and means for impelling the water between said chambers.

3. In an apparatus of the character described, a compartment containing water; an enclosed chamber having an open end below the surface of said water; a second chamber in spaced relation to the first named chamber having an open end below the surface of said water; a passage for air having an orifice adapted to deliver air against the surface of the water; a fan for propelling a current of air through said passage over the surface of the water; and means for impelling the water between said chambers.

RANEY J. ROBERTS.