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Patented Dec. 11, 1900.

A. FOWLER & A. J. HARPOLE.
SYSTEM OF VENTILATION, HEATING, AND COOLING.

(Application filed Aug. 8, 1899.)

(No Model.)

2 Sheets—Sheet 1.

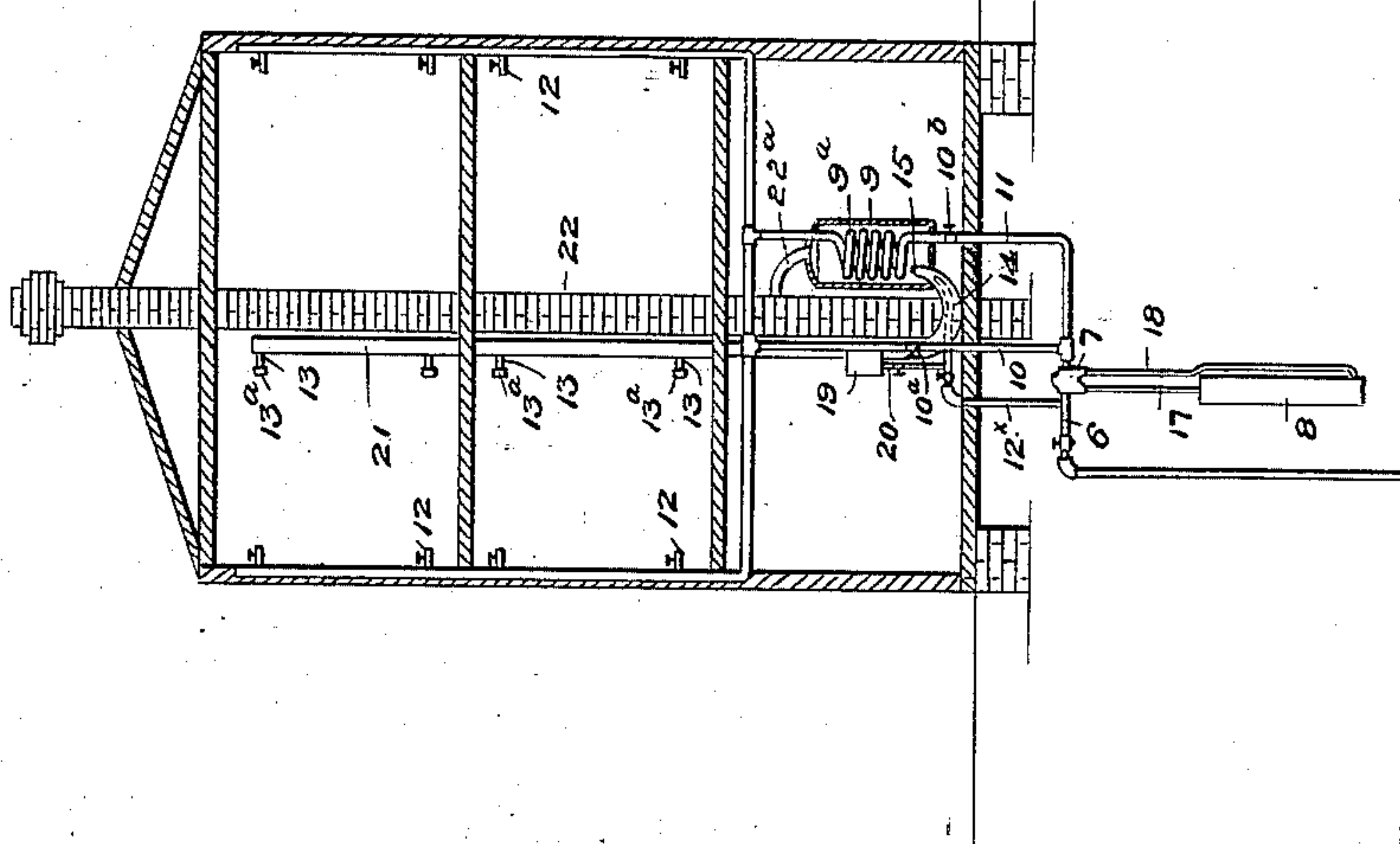
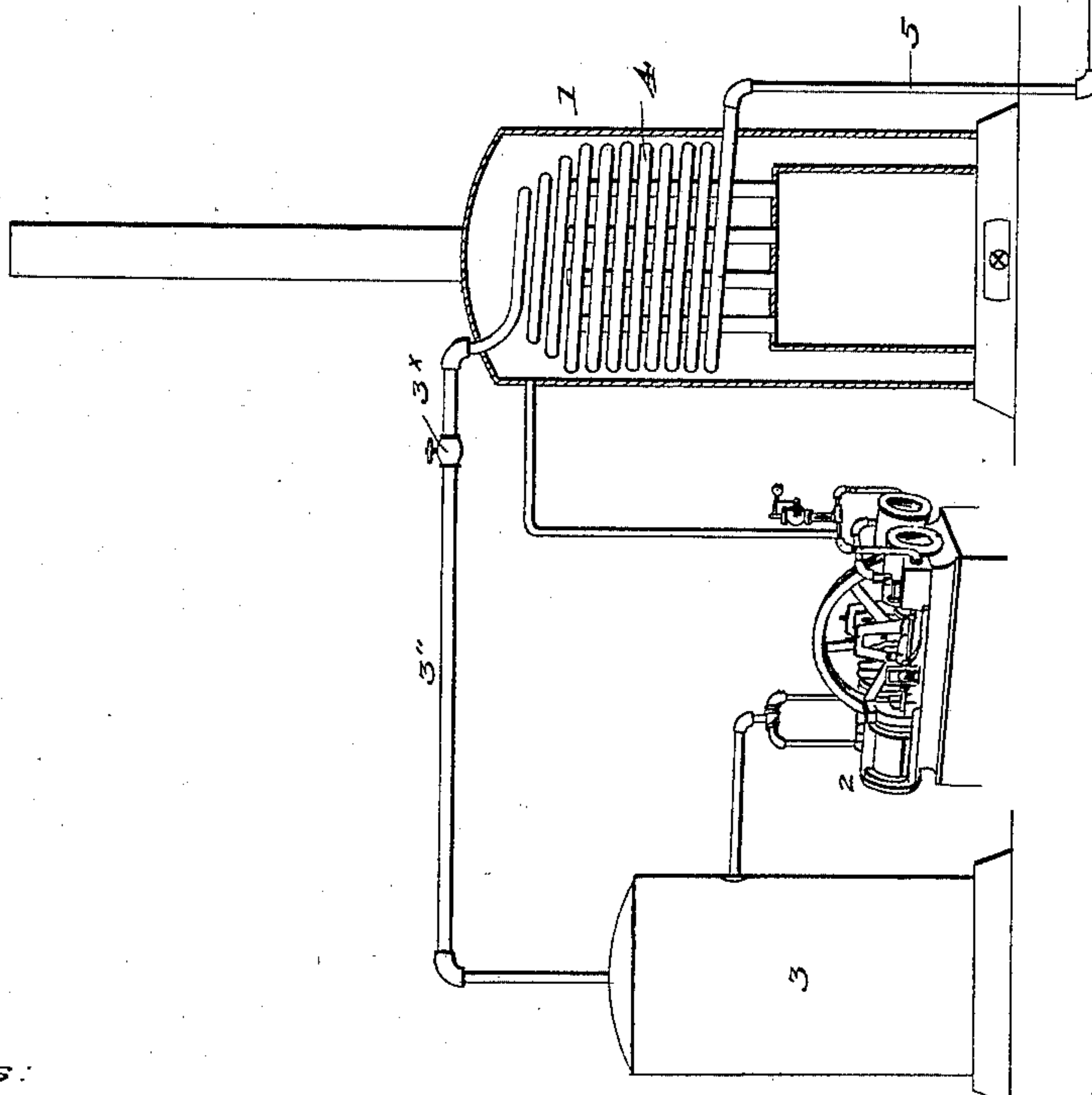


Fig. 1.



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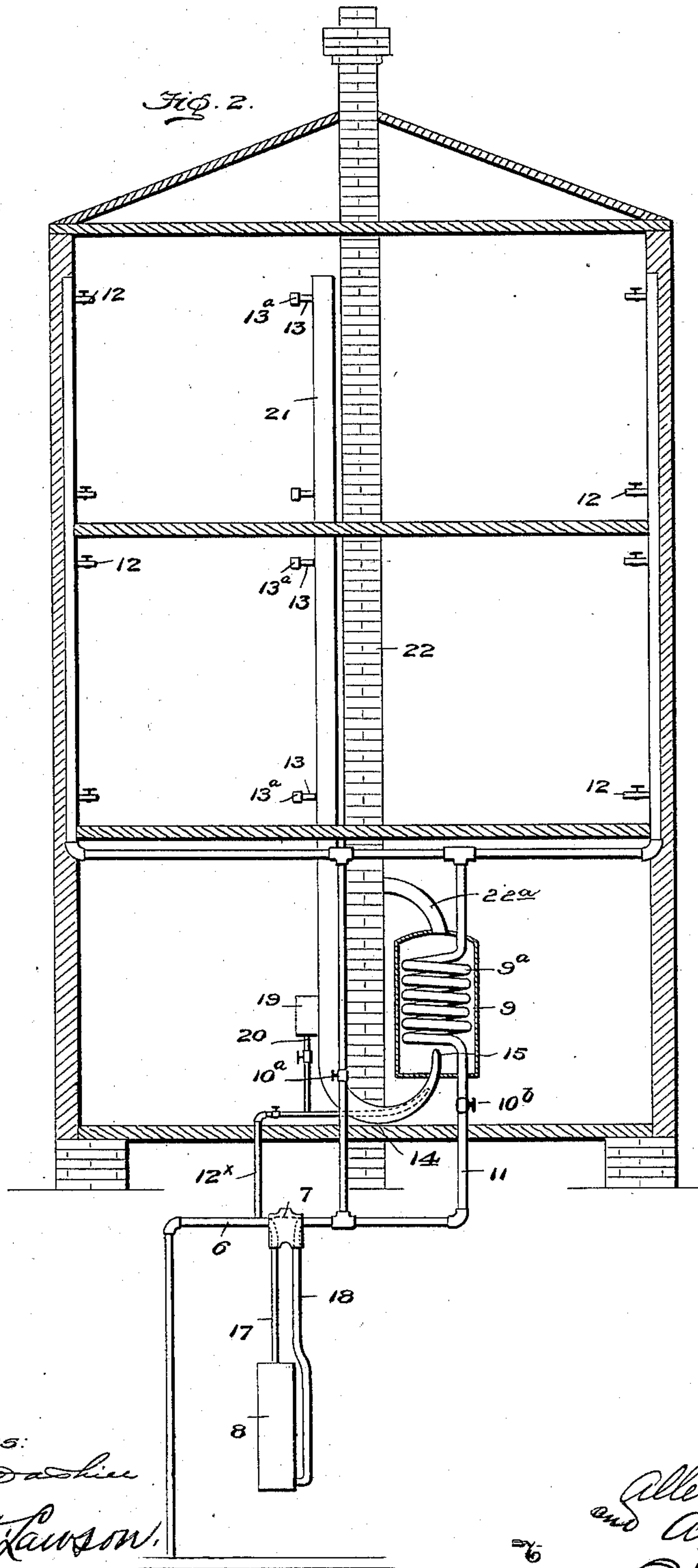
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UNITED STATES PATENT OFFICE.

ALLEN FOWLER AND ANDREW J. HARPOLE, OF UNION CITY, TENNESSEE.

SYSTEM OF VENTILATION, HEATING, AND COOLING.

SPECIFICATION forming part of Letters Patent No. 663,746, dated December 11, 1900.

Application filed August 8, 1899. Serial No. 726,585. (No model.)

To all whom it may concern:

Be it known that we, ALLEN FOWLER and ANDREW J. HARPOLE, citizens of the United States, residing at Union City, in the county of Obion and State of Tennessee, have invented certain new and useful Improvements in Systems of Ventilation, Heating, and Cooling; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a new and useful improvement in a combined system of ventilation and heating and cooling, and is more especially designed for use with the air compressing and sterilizing apparatus described and claimed in our application for Letters Patent filed December 31, 1897, Serial No. 664,920, and allowed March 11, 1899.

There has been a recognized need for an efficient and economical method for ventilating and warming dwellings, school-houses, churches, asylums, and more particularly hospitals, and numerous devices of this character have heretofore been constructed and used without, however, that degree of efficiency sufficient to bring them into general use. We are also aware that efforts have been made to provide apparatus for cooling air to be used for ventilating purposes; but such have generally been found too expensive and troublesome to be practical.

In our application hereinbefore referred to we described and claimed that portion of our apparatus in which air is vitalized—*e. g.*, sterilized or purified—and cooled.

Our present application relates to the distribution of the air for ventilating purposes and the means employed for heating the same, as well as for exhausting or extracting the vitiated air and destroying any disease-producing germs contained therein, thereby serving to preserve health, prevent disease, and stop epidemics. The invention also furnishes an economical means for raising or lowering the temperature in buildings or other inclosures and whereby pure vitalized air of an even temperature may be supplied thereto.

To these ends the invention consists in the novel construction and combination of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawings, showing the preferred form of our invention, and in which—

Figure 1 is a diagrammatic view of the complete system. Fig. 2 is a detail view of the ventilating and heating apparatus.

The operation by which the air is sterilized and purified is by running the air-compressor 2 by steam from the boiler 1 and compressing the air into the receiver 3, then forcing it through the pipe 3', attached to the top of the receiver, and conducting the compressed air through the coiled pipe 4 in the boiler, where it is heated by the steam and hot water in the boiler, and it may be conducted out at the side of the boiler above the fire-box or furnace, or, if it is desired to subject the air to a greater degree of heat, the coiled pipe 4 may be continued down into the fire-box or furnace and brought into direct contact with the fire; but for all ordinary purposes it is sufficient to let the compressed air pass through the several coils of the pipe in the hot water and steam. The air is first compressed into the receiver, where it is nominally cool, its temperature being raised only by the friction of compressing it therein. From thence it passes into the pipe 3', in which is located the gate-valve 3^x, which is operated to regulate the flow of the air therein to the desired volume or to shut it off altogether.

The air is heated while passing through the coiled pipe in the boiler or in the boiler and furnace and is conveyed off through the main 5 and is distributed to the various places of use through lateral pipes connected to said main.

The reservoir 8 is made rather long in proportion to its diameter and sunk into the earth a few feet and set in a vertical position, with the pipe 17 connected to its top and leading up to and connected with the switch-valve 7, through which pipe the air passes from the switch-valve down into the said reservoir, where it assumes the temperature of the earth. The air passes out of the reservoir through the pipe 18, which is connected

thereto at or near its bottom and leads up to and connects with the switch-valve 7 and on through the distributing-pipes into the rooms or places to be cooled and ventilated. The purpose of taking the air from the bottom of the reservoir is to get the coolest air therein and also in order that the accumulation of water from condensation in the reservoir, if any, may be blown out and exhausted. When it is desired to warm the rooms or apartments, the switch-valve 7 is turned in position, so that the air will pass through it without being conducted down into the reservoir, and by closing valve 10^a in the cool-air pipe 10 and opening valve 10^b in the warm-air pipe 11 the air will flow through the coil-pipe in the reheating-furnace 9, where it is warmed or reheated by the blast from the fuel therein and forced out into the rooms or apartments through the distributing-jets 12, which may be manipulated by the occupants of the rooms to regulate or cut off the flow. In order that the heat may be regulated in said reheating-furnace and a steady and uniform temperature maintained, the oil-tank 19 is preferably used and so arranged that a cheap grade of oil may with safety be vaporized in said furnace and used for fuel.

By allowing the compressed, sterilized, and purified air to escape into and fill the rooms or inclosures any noxious gases or other impurities that may be therein are driven out through interstices, cracks, &c., around the windows, doors, &c., and in this manner it may be used for cooling or warming any building or other similar structure and for thoroughly ventilating it.

In hospitals and pest-houses, where infectious and contagious diseases are treated, the inlets 13 are preferably arranged in the exhaust-flue 21, which is made of light sheet metal and of sufficient length to extend up through all of the different stories of the building to be ventilated, the top end of which is closed and made air-tight and the lower end of which is bent up in a semicircular shape, as at 14, and reduced in size to a small aperture 15, terminating in the bottom of the reheating-furnace 9, just below the coiled pipe 9^a therein. Said exhaust-flue is to be made air-tight from top to bottom with the exception of the inlets or tubes 13 in the sides thereof, which are located near the floor and ceiling of the rooms, as shown, and which are closed with a cap 13^a, made to fit over them, so that they may be opened or closed at will. Pipe 12^x is a branch from the lateral pipe 6 and is attached thereto just in front of switch-valve 7, through which a current of the compressed air passes and to which the oil-pipe 20, leading from the tank 19, is attached for the purpose of spraying the oil and fanning the blast in the furnace to reheat the air as it passes through the coiled pipe therein. Pipe 12 enters the lower part of the semicircu-

lar or bent end of the exhaust-flue 21 and extends to a point at or near a suitable burner 15, fitted within the end of the exhaust-flue within the heating-furnace. By the heat created in said furnace and the jet or current of compressed air from pipe 12^x blowing therein a partial vacuum is created, causing a draft or suction of air through the inlets or tubes 13, or such of them as may be opened, which draws the air out of the sick-rooms and with it all of its impurities, as gases, disease-producing germs, exhalations from the body of the sick person, &c., and discharges it into said furnace, where it is consumed, thereby reducing the danger to the physician and the nurse and the spread of the disease to the minimum. The coiled pipe 9^a, that passes through the reheating-furnace, may be branched at any point above the furnace and the air conducted to the different apartments or rooms to be warmed and ventilated. If it is desired to use cooled air for cooling the sick-rooms and at the same time use said furnace for destroying the disease-producing germs and gases, it may be done by closing valve 10^b and by opening valve 10^a and by turning the switch-valve 7 in proper position to force the air down through the cooling-reservoir 8 and then turning on the air and oil through the pipe 12 and lighting the vaporized oil in the furnace. It is obvious that the products of combustion and the destroyed vitiated air will pass off through the pipe 22^a and chimney 22.

Having thus fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the character described, the combination of an outlet-flue communicating with one or more apartments of a structure, a furnace having an outlet therefrom, a reduced end of said flue projecting into the furnace, and a pipe within said reduced end for supplying fresh air to the furnace, substantially as described.

2. In an apparatus of the character described, the combination of an outlet-flue communicating with one or more apartments of a structure, a furnace, a portion of said flue having its end projecting into the furnace, a fuel-supplying pipe, terminating in said end of flue, a series of air-distributing pipes, a pipe connecting said series with the air-supply, a coiled pipe within the furnace, and also connecting said series with the air-supply, an outlet for said furnace and means for supplying air to the furnace, substantially as described.

3. In an apparatus of the character described, the combination of an outlet-flue having inlets and communicating with one or more compartments of a structure, means for closing said inlets, a reduced lower end of said flue having a burner therein, a furnace receiving said end, a pipe within the reduced

end of the flue adapted to supply fuel to the
furnace, an outlet from said furnace, air-dis-
tributing pipes, pipes connecting the distrib-
uting-pipes with the air-supply, one of said
5 connecting-pipes passing through, and coiled
within, said furnace and means for directing
air through either of the connecting-pipes,
substantially as described.

In testimony whereof we affix our signa-
tures in presence of two witnesses.

ALLEN FOWLER.
ANDREW J. HARPOLE.

Witnesses:

V. JONES,
T. Z. BRAMFORD.