D. P. GOSLINE.

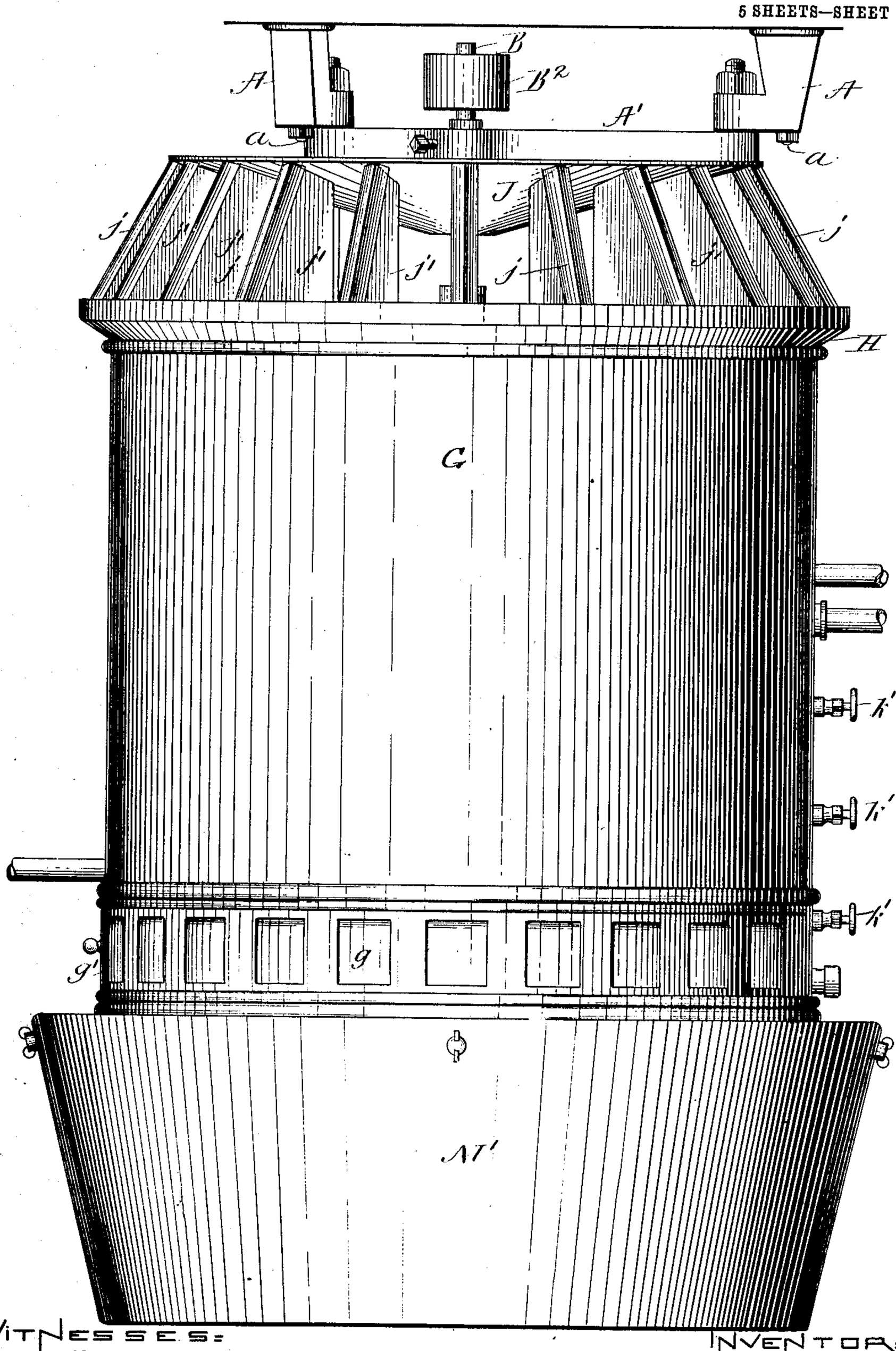
MACHINE FOR CONDITIONING AIR.

APPLICATION FILED MAY 29, 1907.

916,147.

Patented Mar. 23, 1909.

5 SHEETS—SHEET 1.



WITNESSES:

M. E. Flaherty.

M. V. Foley.

FIG. 1.

INVENTOR=

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5 SHEETS—SHEET 2.

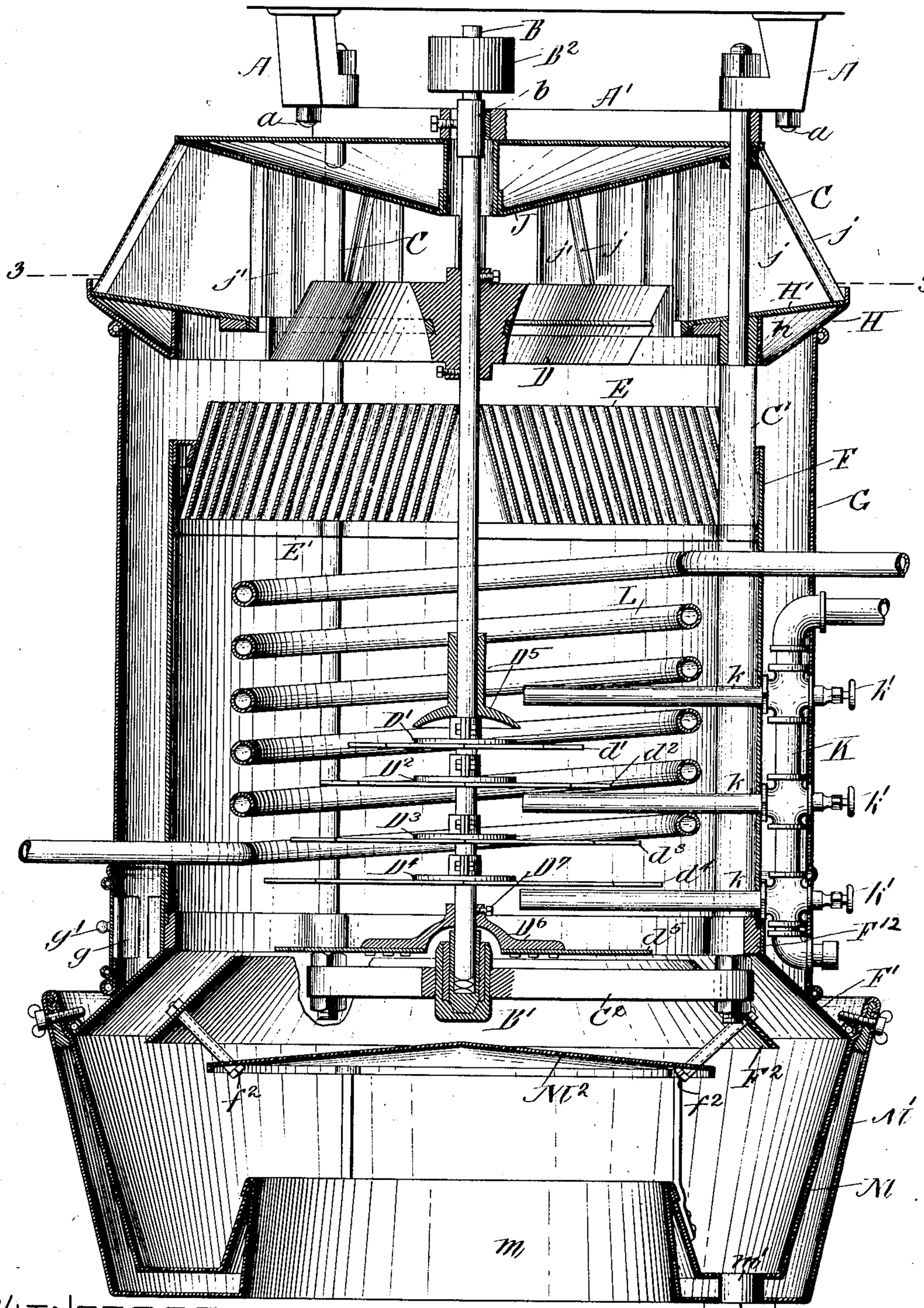

Fig. 2.

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5 SHEETS—SHEET 3.

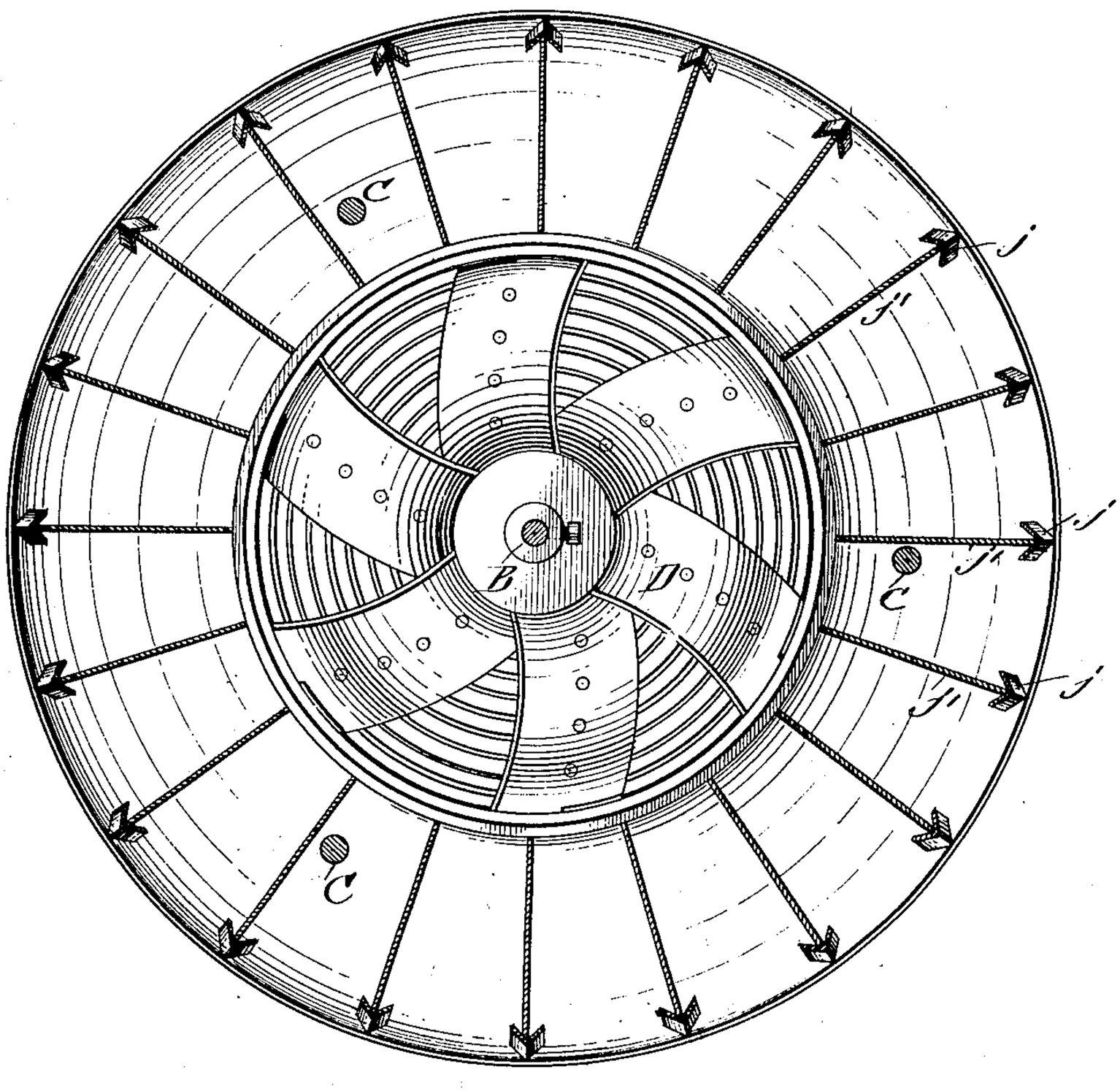

Fig. 3.

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5 SHEETS—SHEET 4.

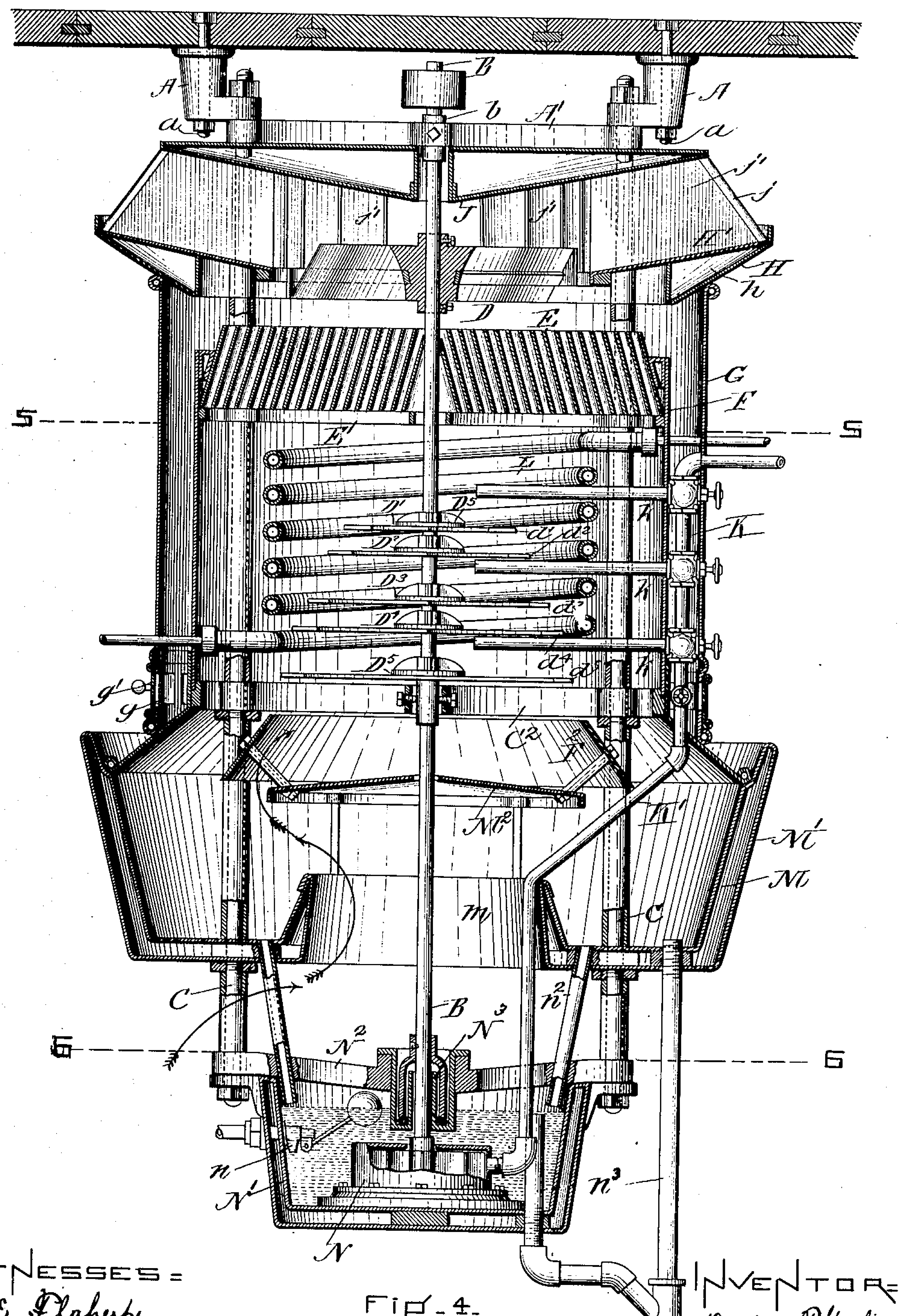

Fig-4-

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5 SHEETS—SHEET 5.

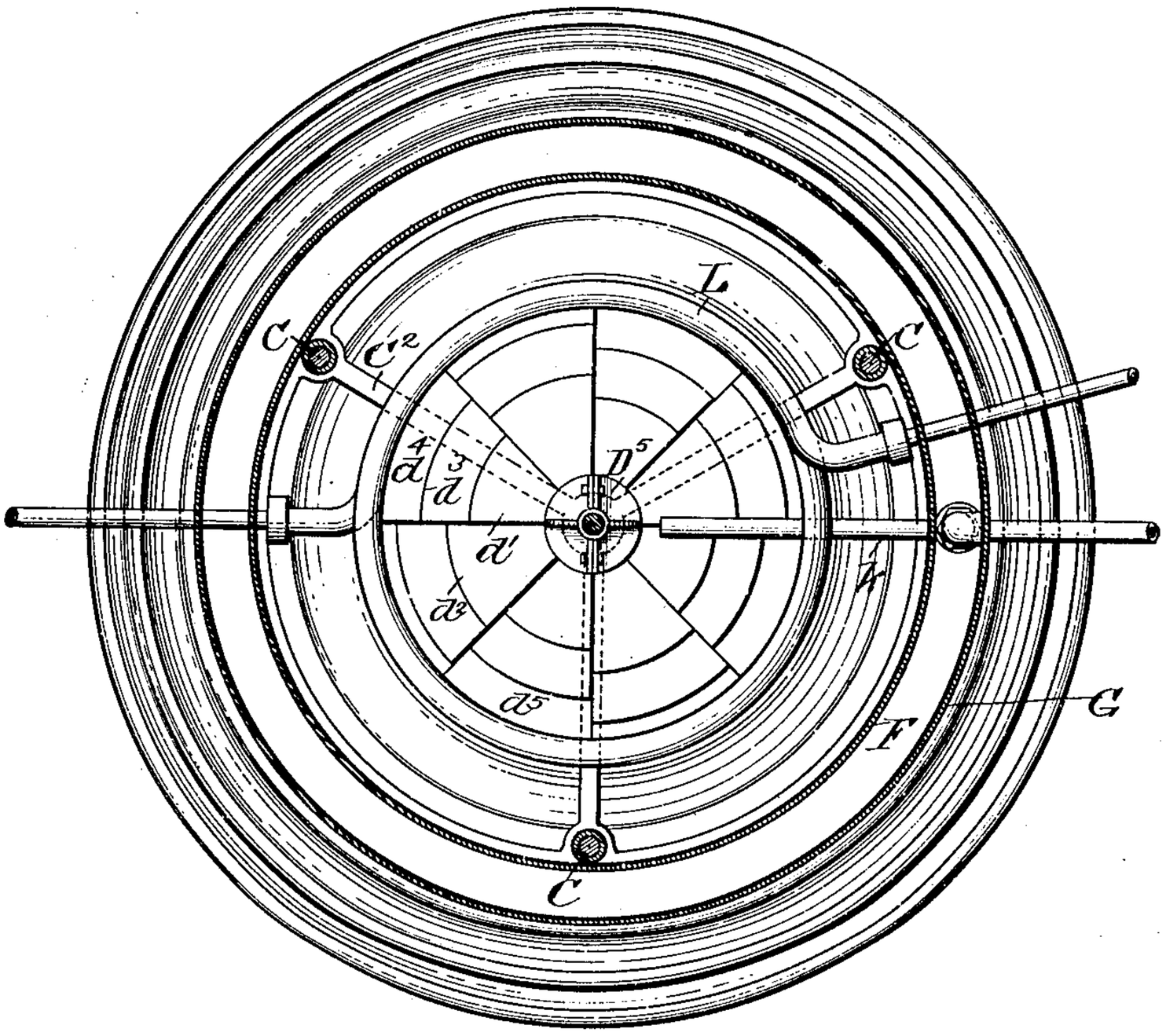

Fig. 5.

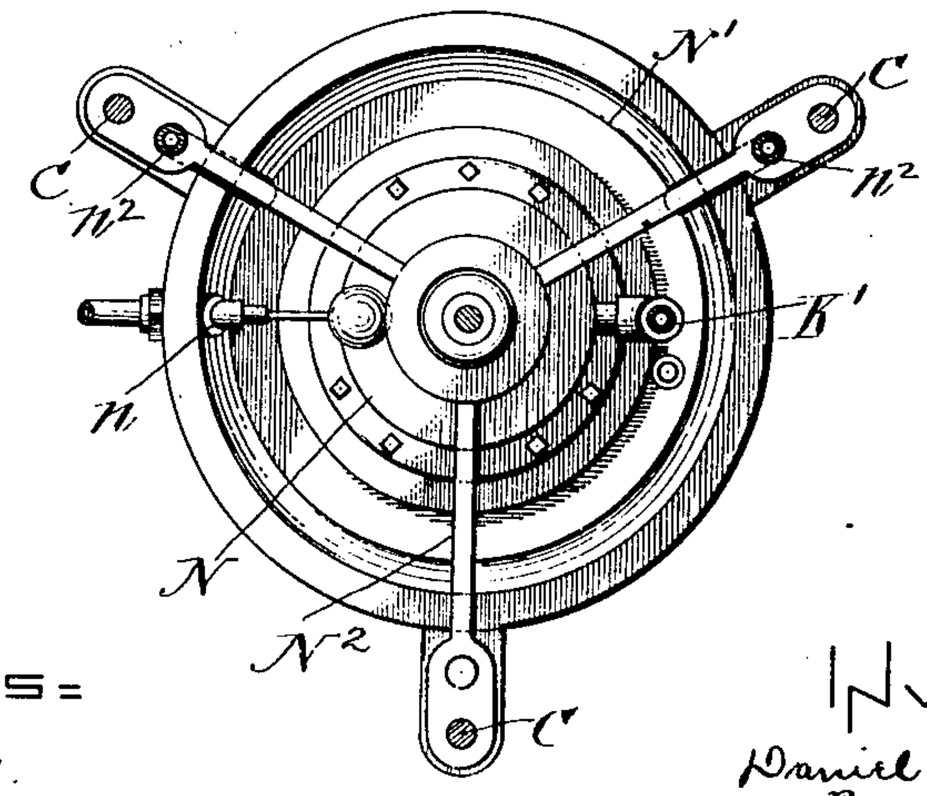

Fig. 6.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR CONDITIONING AIR.

No. 916,147. Specification of Letters Patent. Patented March 23, 1909.

Application filed May 29, 1907. Serial No. 376,391.

To all whom it may concern:

Be it known that I, DANIEL P. GOSLINE, of Boston, in the county of Suffolk and State of Massachusetts, a subject of His Majesty King Edward VII, have invented a new and useful Improvement in Machines for Conditioning Air, of which the following is a specification.

My invention relates to means for humidifying and cleansing air and controlling its temperature such as are described in an application filed by me in the United States Patent Office April 7, 1906, Serial No. 310,426. In that application I have shown no means other than the water which is supplied for evaporation and a controllable amount of air taken directly from the room and humidified for changing the conditions of the air as it passes through my machine.

In my present invention I use in addition a coil of pipe which may be supplied with a chilling fluid such as brine or ammonia or with steam or hot water according to the conditions to be secured, and I have also modified somewhat the details of construction.

My invention will be understood by reference to the drawings in which—

Figure 1 is an elevation of a device embodying my invention. Fig. 2 is a vertical section thereof. Fig. 3 is a cross section on line 3—3 of Fig. 2. Fig. 4 is a vertical section of a modification of my invention. Fig. 5 is a cross section on line 5—5 of Fig. 4, and Fig. 6 is a cross section on line 6—6 of Fig. 4.

The apparatus is usually hung from the ceiling of a room in which it is to be used by means of three brackets A; from each bracket depends a rod C, each rod being attached to said bracket by a nut as shown or in any other convenient way. These rods C are partly surrounded by channel irons C^1 as in my said application. The brackets A are attached to the ceiling by means of bolts *a*. A^1 is a spider on said rods and journaled in a sleeve *b* fixed in the center of the spider is a shaft B.

In the form of my invention shown in Figs. 1 and 2 the lower end of the shaft is set into a step B^1 mounted in the spider C^2 attached to the lower ends of the rods C. Upon this shaft B is mounted a fan D to rotate therewith, and also a series of sectional disks D^1, D^2, D^3 and D^4 each provided with projecting sections d^1, d^2, d^3 and d^4. Water breakers D^5 are also provided as described in my said application, the lower water breaker D^6 carrying a sectional disk having sections d^5 is attached to the shaft B by means of a clamp D^7. This provides segmental or sectional disks and water breakers, all of which are constructed to operate substantially as described in my previous application and are rotated by means of power applied to the pulley B^2. E is a deflector located and suitably supported from the rods C below the fan by means of a spider E^1 which may be attached to the rods C or channel irons C^1 in any desirable way. The purpose of the deflector is to direct the upward currents of air which pass through the apparatus into the fan. This whole construction is inclosed within a casing F made of sheet metal which is supported by a ring F^{12} attached to channel bars C^1 surrounding the rods C just above the lower spider C^2. This casing is sufficiently high to direct the air into the deflector E and prevent its escape laterally. Outside of this casing F I provide a second casing G which forms the outer wall of the apparatus and which is provided near its lower end with openings *g* and a slide damper g^1 by means of which the size of the openings *g* may be controlled. By this means a supplemental air duct is formed to deliver a controllable amount of outside air to be mixed with the air which passes through the apparatus and so change its character to meet any given conditions. For this purpose the upper end of the second casing G extends above the deflector E and the top of the casing F and upon it rests the concave flange H which supports the annular portion H^1 of the top of the apparatus. Between H and H^1 an air chamber *h* is formed to prevent condensation. A deflecting cover J is supported over the fan D by means of the rods C and spider A^1 and between this deflector J and the part H^1 are ribs *j* and walls j^1 which together with the deflector J and part H^1 form passages for the escape of air into the room.

Apparatus of this kind which is intended to humidify the air is apt to collect moisture by condensation and as it is desirable that this moisture shall remain in the apparatus and not trickle down upon its outside into the room I have constructed these ribs in channel form as shown in Fig. 3 so that any moisture which collects upon the walls j^1 will tend to be driven toward the interior of the ribs *j* where also moisture may collect

from the air as it passes out. Such moisture will run down the inside of these ribs onto the parts H^1 and drain back into the apparatus by means of the floor of the passage formed between the walls j^1 which it will be noted is sloping toward the axis of the machine.

In order to supply moisture I have shown means similar to those described in my previous application, namely,—a series of supply pipes k each projecting from a main pipe K and each controlled by a stop cock k^1 so that the amount of moisture fed the apparatus may always be under control.

In my previous apparatus I have relied entirely upon vaporization for chilling the air. I have found, however, that under certain conditions it is necessary to cool the air to a greater degree than is practicable if vaporization alone is relied upon. Such a situation is often found either in a very hot season or in a very hot room or when a low temperature is required. I have therefore provided within the apparatus a coil L which may be used either with brine or other chilling liquid, or heat-absorbing gas according to the requirement of the situation in which the apparatus is located, the brine or other fluid being caused to circulate by means of a pump or in any other way, as the expansion of ammonia from a compressor through this coil, thus serving either with or without the addition of vaporization to bring the air into proper condition for use.

As in my former apparatus I provide means such as a pan M provided with a central opening through which air is drawn into the apparatus. This pan is hung from a deflecting wall F^1 attached to the casings F and forming the bottom of the duct between F^1 and G. I prefer to jacket this pan to prevent condensation of moisture in the room, the jacket being marked M^1, the pan being provided with an outlet m^1 for draining. Above the pan M I provide a deflector M^2 so that the air will pass into the device through the central opening m around under the deflector M^2 and into the apparatus, and in order to diffuse it more thoroughly I provide a second deflecting plate F^2 between the deflecting wall F^1 and the deflector M^2, this deflecting plate F^2 being supported by suitable bolts f^2 upon the deflector M^2.

The operation of this apparatus will be easily understood. The shaft B being rotated carries with it the fan D and the other parts attached to the shaft, and the chilling liquid or gas being circulated through the coil L, the air passing up through the device will be chilled according to the temperature of the coil and the atomized liquid from the breakers, thus drying the atmosphere by contact with the cold surfaces. Humidification is caused by the introduction of more or less water at such a temperature as may be required through the supply pipes k as will meet a stipulated condition. If a considerable change of temperature in the room is desired, cold water may be used, the vaporization of which in conjunction with the chilling fluid or gas in the coil will cause a decided chilling of the atmosphere as it passes through the apparatus and into the room, and if the air is too moist atmospheric air is introduced through the openings controlled by the damper g^1. If the air is not moist enough more water is supplied at such temperature as to cause the delivery of air at a proper saturation into the room.

In Figs. 4, 5 and 6 I have shown a modification of this apparatus in which in addition to the parts above enumerated there is added a pump N power for which is furnished directly from the shaft B. This pump is set in a supplemental insulated pan N^1 hung from the lower ends of the rods C which are elongated for the purpose, a spider N^2 also hung from the said rods being provided to properly center the lower end of the shaft B and for this purpose having a special step bearing N^3. This supplemental pan N^1 is provided with a ball cock n by means of which a predetermined level of water is maintained in the pan N^1, the pan serving also to drain the water from the pan M through the drain pipes n^2. An overflow n^1 is provided for the pan in case of accident. A waste pipe n^3 is also provided the top of which rises somewhat above the bottom of the pan M to serve as a supplemental drain if necessary and as a ventilating pipe.

The well as shown is hung some little distance below the pan M so as not to interfere with a proper air inlet to the device. The pump N is connected with the main pipe K by means of the pipe K^1 and so that the water may be pumped directly up to the supply pipe k. The main pipe is also provided with means for connecting it with a permanent water supply, as is shown in the main form of my invention.

While I have described the use of a chilling liquid or heat-absorbing gas in my apparatus, it is evident that it may be used equally well with steam or hot water as an air heating apparatus by means of which the air may be heated and at the same time may be properly moistened according to the requirements of the situation. Thus it will be seen that every condition may be met by it. Heating, chilling, moistening and drying of the air may be accomplished by a variation in the temperature of the coil which forms a heating or chilling surface against which the air contacts in its passage, of the supply and temperature of the water atomized by the breakers and revolving and other surfaces from the supply pipes, and the amount, if any, of atmospheric air admitted through the supplemental duct. It is evident that

these various factors may be differently arranged to accomplish the desired result without departing from the spirit of my invention.

What I claim as my invention is:—

1. An air conditioning apparatus, comprising a casing forming an air passage, means such as a fan for moving air therethrough, means for delivering liquid into said passage controllable from without the apparatus, and means located within said passage for receiving and atomizing said liquid and delivering liquid in an atomized form to the air as it passes through said passage, and means adjacent to said means for delivering liquid whereby the temperatures of said liquid and air may be changed by contact therewith.

2. An air conditioning apparatus comprising a casing forming an air passage, means such as a fan for moving air therethrough, means for delivering liquid into said passage controllable from without the apparatus, and means located within said passage for receiving and atomizing said liquid and delivering liquid in an atomized form to the air as it passes through said passage, means adjacent to said means for delivering liquid whereby the temperatures of said liquid and air may be changed by contact therewith, and means whereby outside air is mixed with the air passing through said air passage to modify its conditions, as described.

3. In an air conditioning apparatus comprising a casing having an air inlet at one end, an air outlet at the other end, means for delivering liquid into said passage controllable from without the apparatus, and means located within said passage for receiving and atomizing said liquid and delivering liquid in an atomized form to the air as it passes through said passage, a coil located within said casing and extending so far as to partially surround said means for delivering liquid, the said coil being adapted to be connected with outside means whereby it may be heated or chilled, as described.

4. In an air conditioning apparatus comprising a casing forming an air passage, a pump located within said casing, means for automatically supplying it with liquid, and one or more supply pipes connected thereto and adapted to distribute liquid within said casing in atomized form, together with means adjacent to said liquid distributing means whereby the temperatures of said liquid and the air may be changed by contact therewith.

5. In an air conditioning apparatus, a casing having an opening at either end adapted to be used either as an air inlet or outlet, means within said casing for conditioning air, means such as a fan near one of said openings for passing air through said apparatus, an air passage connecting directly with the outer atmosphere and extending to a point between said conditioning means and said fan whereby the atmospheric air may be mingled with the conditioned air for the purpose of tempering the same.

6. In an air conditioning apparatus, a casing having an air inlet at one end and an outlet at the other, means within said casing for conditioning air, means such as a fan near said outlet for passing the air through said apparatus, and a passage connecting directly with the outer atmosphere at a point remote from said outlet in said casing, said passage extending to a point between said fan and said conditioning means whereby the atmospheric air may be mingled with the conditioned air for the purpose of tempering the same, as described.

7. In an air conditioning apparatus, a casing open at each end whereby a passage is formed for the air to be conditioned, a shaft, means located outside of said casing for rotating said shaft, a fan mounted on said shaft, a pump also carried by said shaft, one or more supply pipes connected with said pump and adapted to distribute liquid within said passage, and one or more sectional disks also carried by said shaft and adapted to break up and vaporize the liquid from said supply pipe or pipes as described.

8. In an air conditioning apparatus a casing open at each end whereby a passage is formed for the air to be conditioned, a shaft, means located outside said casing for rotating said shaft, a fan mounted on said shaft, a pump also carried by said shaft, one or more supply pipes connected with said pump and adapted to distribute liquid within said passage, means for controlling the amount of liquid so distributed, one or more sectional disks also carried by said shaft and adapted to break up and vaporize the liquid from said supply pipe or pipes, as described.

9. In an air conditioning apparatus a casing open at each end whereby a passage is formed for the air to be conditioned, a shaft, means located outside said casing for rotating said shaft, a fan mounted on said shaft, a pump also carried by said shaft, one or more supply pipes connected with said pump and adapted to distribute liquid within said passage, means for controlling the amount of liquid so distributed, one or more sectional disks also carried by said shaft and adapted to break up and vaporize the liquid from said supply pipe or pipes, and means for changing the temperature of the air in said passage, as described.

10. In an air conditioning apparatus, casings open at each end whereby passages are formed for the air to be conditioned, a coil located within one of said passages and provided with connections whereby it may be connected with a source of heating or chilling

fluid, a shaft adapted to be rotated by means outside of said casing, a fan mounted on said shaft, a pump also mounted on said shaft, one or more supply pipes having controllable outlets connected with said pump and adapted to distribute liquid therefrom within said passage, and one or more sectional disks also carried by said shaft and adapted to vaporize the liquid from said supply pipe or pipes, as described.

11. In an air conditioning apparatus, a casing open at each end whereby a passage is formed for the air to be conditioned, means for conditioning air located in said passage, a top for said casing supported above it and adapted to form a substantially horizontal outlet through said passage, and a series of substantially vertical ribs angular in cross section, the apex of the angle of each rib pointing outwardly whereby a vertical gutter is formed to receive free moisture as and for the purposes set forth.

12. In an air conditioning apparatus, a casing open at each end whereby a passage is formed for the air to be conditioned, means for conditioning air located in said passage, a top for said casing supported above it and adapted to form a substantially horizontal outlet through said passage, said outlet having a floor sloping toward the axis of the apparatus a series of ribs angular in cross section, and a series of plates projecting inwardly from said ribs, as described.

13. In an air conditioning apparatus, a casing open at each end whereby a passage is formed for the air to be conditioned, a shaft, a fan located upon said shaft, a pump located on said shaft below said fan, a pan adapted to hold said pump, means for supplying liquid to said pan whereby a constant level is maintained therein, a pan located above said pump pan adapted to receive moisture not taken up by the air, means connecting said upper pan with said lower pan whereby said upper pan will drain into said lower pan, and a passage for air between said pans, as described.

14. An air conditioning apparatus comprising a casing forming an air passage, means such as a fan for moving air therethrough, controllable means for delivering liquid into said passage, means located within said passage for receiving and atomizing said liquid, and temperature-changing means lying in the path of atomized liquid whereby the atomized liquid will impinge upon said temperature-changing means and its temperature will be changed thereby.

15. An air conditioning apparatus comprising a casing forming an air passage, means such as a fan for moving air therethrough, controllable means for delivering liquid into said passage, means located within said passage for receiving said liquid and delivering it in atomized form, and means within said passage located to be impinged upon by said atomized liquid and change its temperature whereby the temperature of both air and liquid will be changed as set forth.

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