

J. W. FRIES.

HUMIDIFIER.

APPLICATION FILED SEPT. 14, 1908.

947,300.

Patented Jan. 25, 1910.

2 SHEETS—SHEET 1.

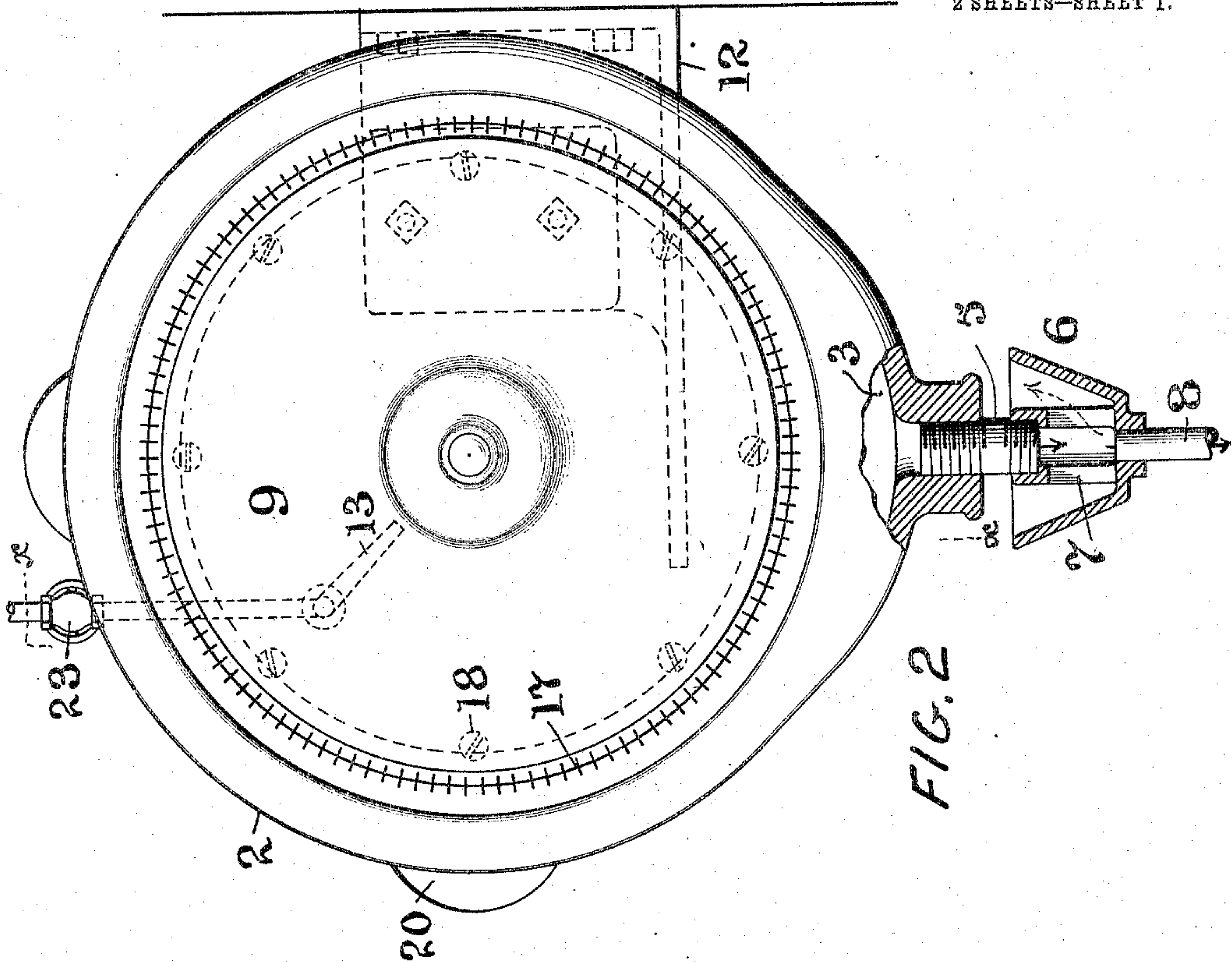


FIG. 2

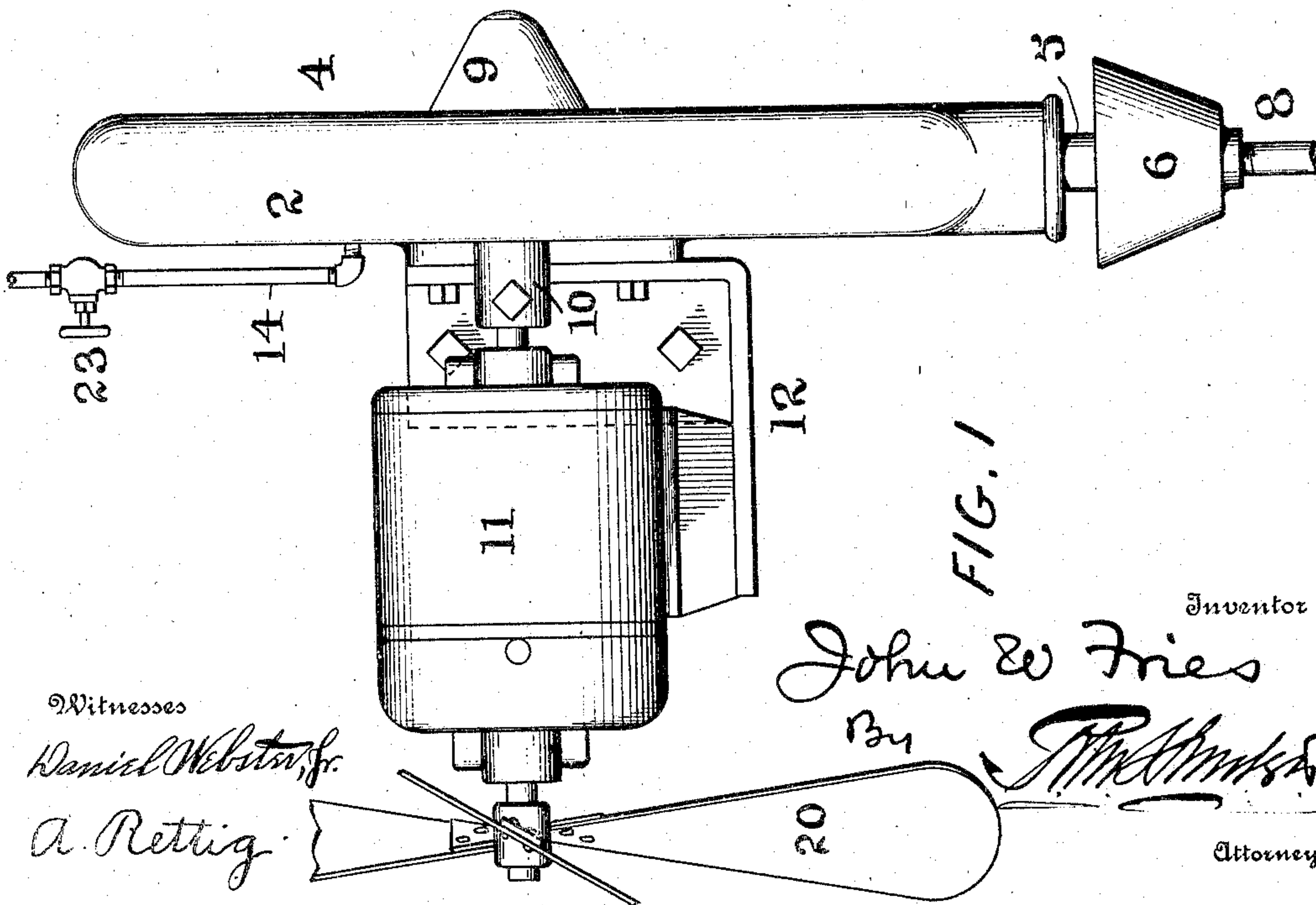


FIG. 1

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2 SHEETS—SHEET 2.

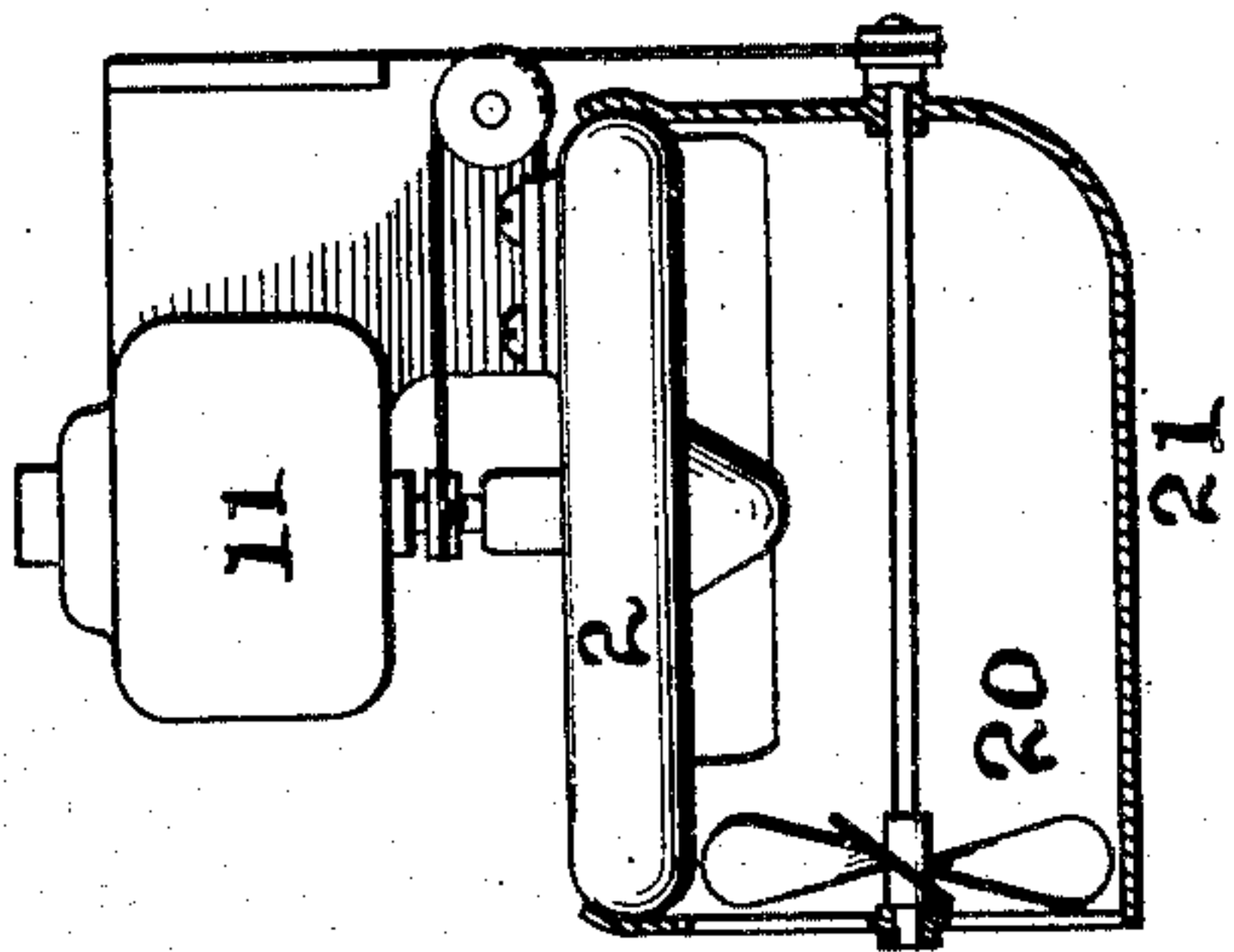


FIG. 6

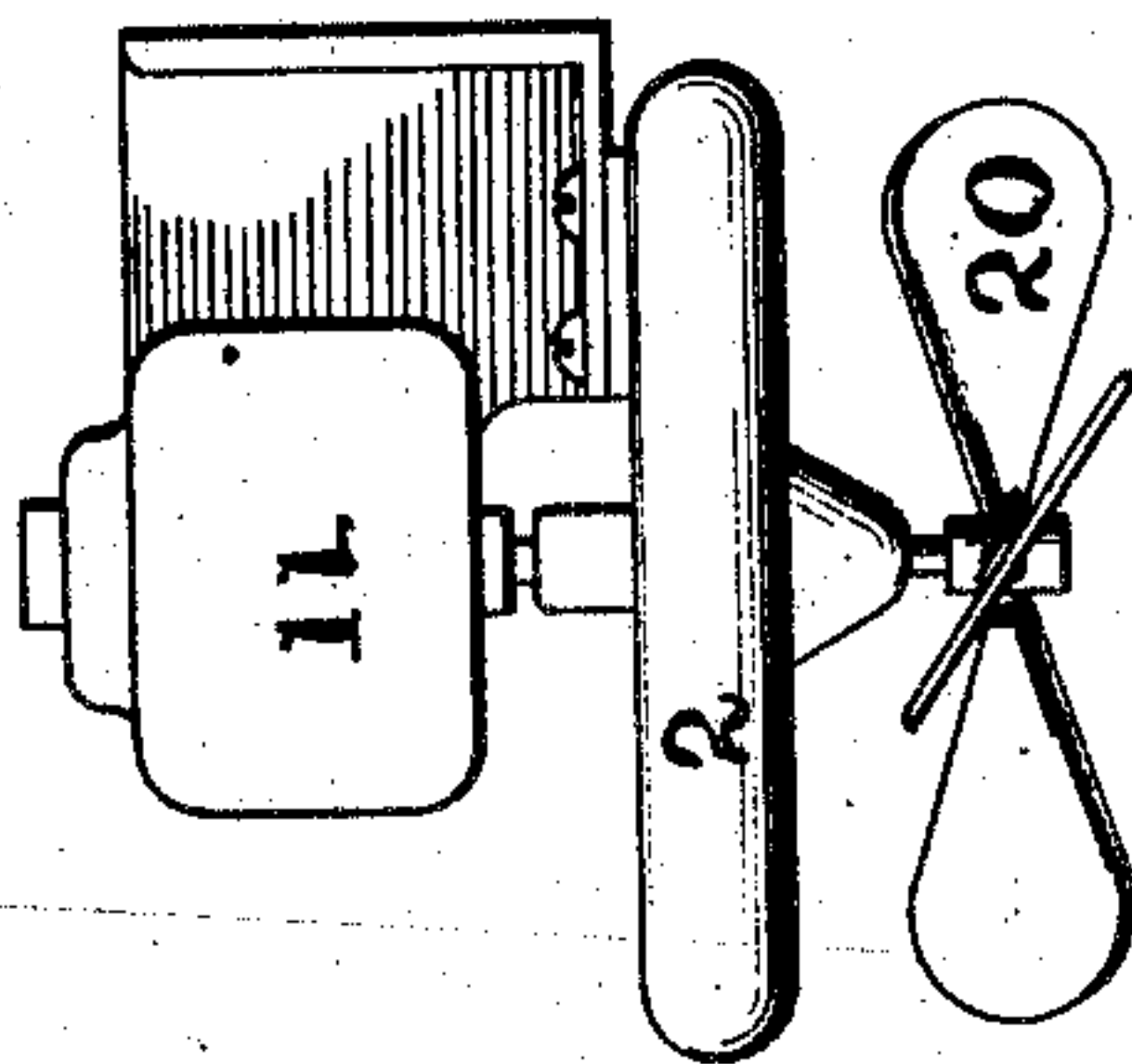


FIG. 7

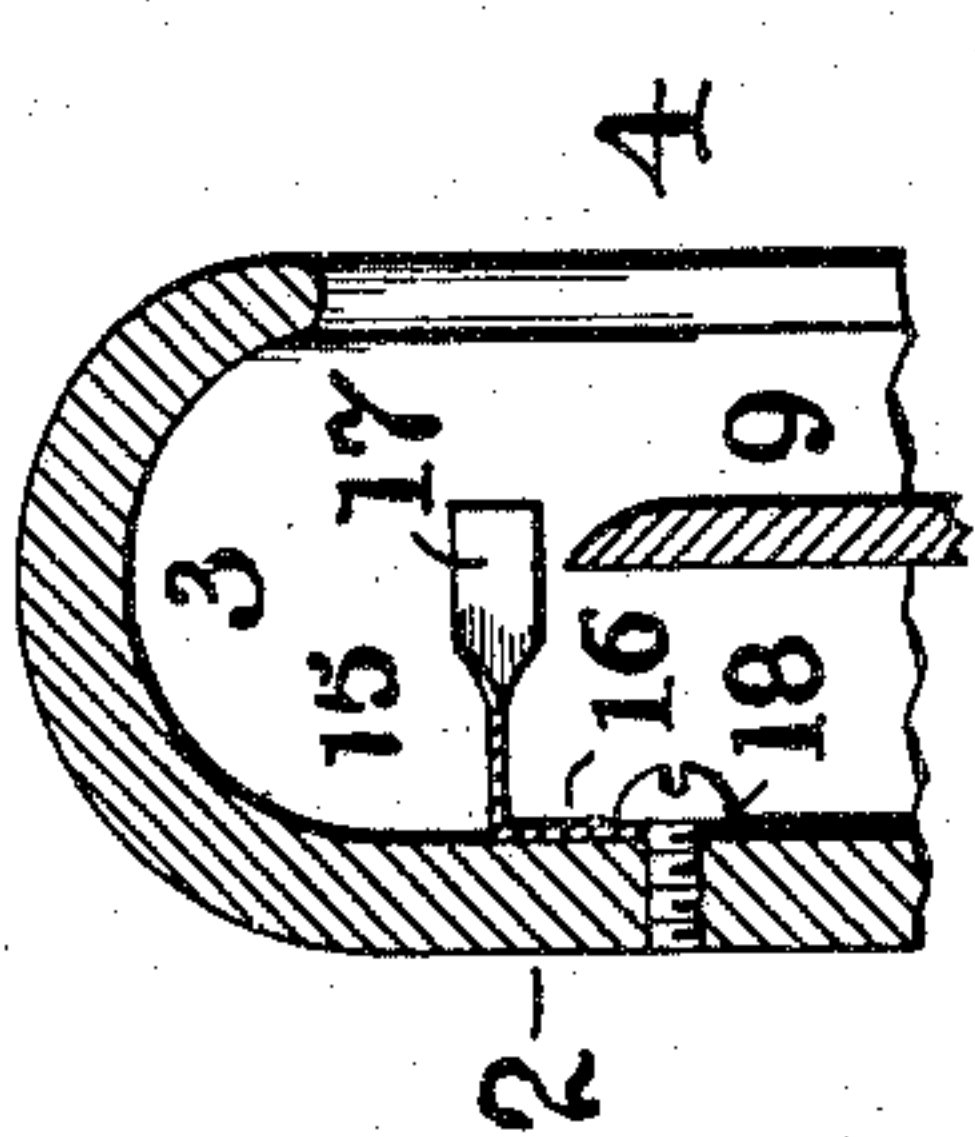


FIG. 4

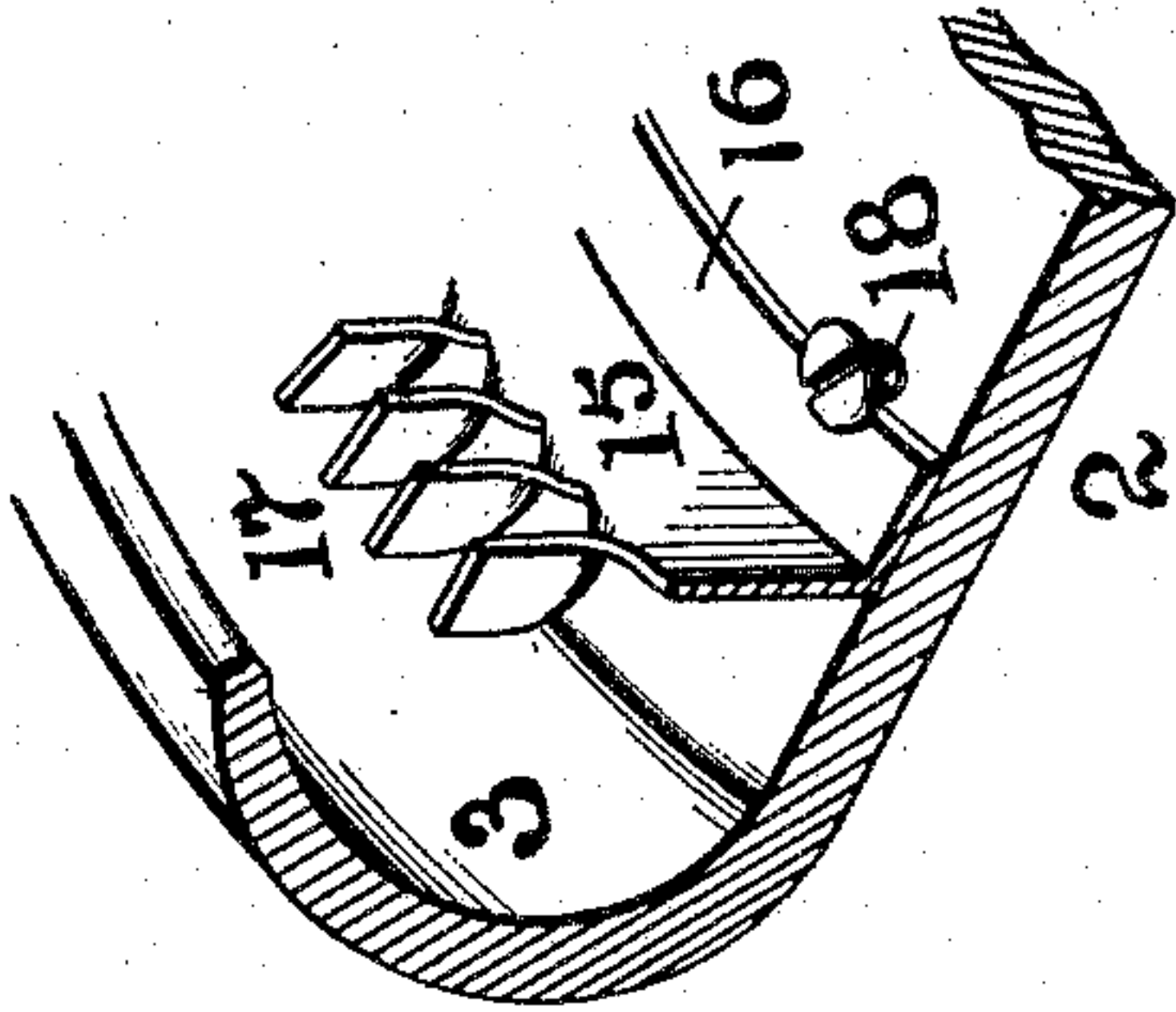


FIG. 5

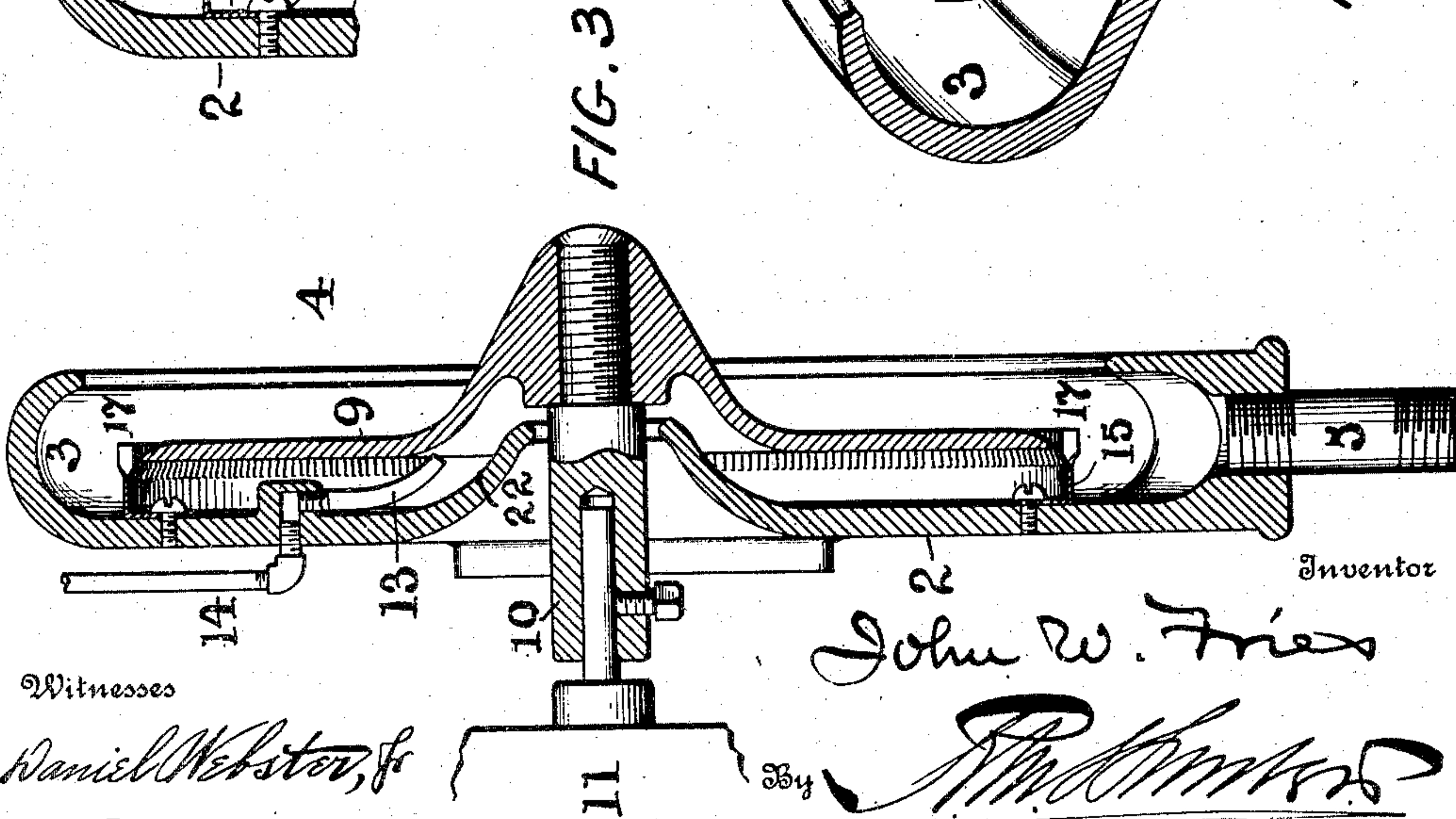


FIG. 3

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN W. FRIES, OF WINSTON SALEM, NORTH CAROLINA.

HUMIDIFIER.

947,300.

Specification of Letters Patent.

Patented Jan. 25, 1910.

Application filed September 14, 1908. Serial No. 452,809.

To all whom it may concern:

Be it known that I, JOHN W. FRIES, a citizen of the United States, and a resident of Winston Salem, county of Forsyth, State of North Carolina, have invented an Improvement in Humidifiers, of which the following is a specification.

My invention has reference to humidifiers and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings which form part thereof.

The object of my invention is to provide a construction of humidifier which shall, by mechanical means, transform a stream of water or other fluid into a fine vapor and dissipate it into the atmosphere, the construction of the humidifier being simple, inexpensive, durable, and not liable to get out of repair.

My invention has utility for supplying the requisite humidity to the atmosphere in textile mills, cigar factories and stores and any and all places where an increase in humidity is desired.

My invention consists of a rapidly revolving disk upon which a jet of liquid is delivered, combined with an annular series of blades or obstructions arranged about the periphery of the disk and against which the water is mechanically projected under centrifugal force and by which it is sub-divided into a spray or vapor whose density is proportional to the speed of the disk and impact of the fluid upon the blades, and means to shield the vapor against the action of strong air currents at the moment the vapor is being formed by the disk and blades.

My invention also consists in the above apparatus where further provided with means for dissipating the vapor so formed into the atmosphere.

More specifically my invention comprises a case closed at the back and open at the front with a surrounding gutter and a drainage outlet, combined with a rotating disk, a motor to rotate the disk at a high rate of speed, an annular row of stationary blades or obstructions shielded by the closed back of the case and surrounding the disk against which the fluid is projected and vaporized, means for supplying the water or other fluid to the disk, and a dissipating blower for producing a current of air for carrying off the vapors after they have been expanded into the air.

My invention also comprehends details of construction which, together with the features above specified, will be better understood by reference to the drawings, in which:

Figure 1 is a side elevation of my improved humidifier; Fig. 2 is a front elevation of the same; Fig. 3 is a vertical sectional view on line $x-x$ of Fig. 2; Fig. 4 is an enlarged section view corresponding to a portion of Fig. 3; Fig. 5 is a perspective view of the impacting blades; and Figs. 6 and 7 are plan views of modifications of my invention.

2 is a circular fixed case with an inwardly directed gutter 3 at its periphery and is open at its front as indicated at 4. The bottom of the gutter 3 terminates in a drainage tube 5 connecting with a waste pipe 8 through a funnel shaped casting 6, which latter has vent openings 7 surrounded by an upwardly extending circular flange. The waste water passes from the gutter through the pipes 5 and 8, and any air, carried down by the water, escapes from the vent apertures 7. The funnel 6 prevents the escape of any water not in the form of vapor. The rear and central part of the case 2 is formed with an opening having a forwardly extending conical flange 22.

12 is a bracket to which the case 2 is bolted and by which it may be suspended from a post or other part of a building. This bracket may be of any shape desired.

11 is an electric motor which is bolted to the bracket 12 and has its shaft extending centrally with the opening within the flange 22 of the case 2. A disk 9 is arranged within the case 2 and has a rearwardly extending hub 10 fitting upon the motor shaft and secured thereto by a set screw or other suitable means. The disk has a thin peripheral edge, the rear face being flat as indicated in Fig. 4.

Surrounding the disk, and close to it, is an annular cylinder 15 having a flange 16 resting against the case and secured thereto by screws 18, and also having its forward edge provided with a series of blades 17, annularly arranged close to and about the periphery of the disk 9. In practice, I form the cylinder 15 of copper spun into shape, slitted on its edge and the slitted portions twisted into a radial direction to form blades, as shown. These blades receive the liquid thrown off of the disk and subdivide it into vapor. The blades 17 are directed

toward the open face of the case 2 so that the vapor may pass freely away. Moreover, the blades 17 are considerably within the rim forming the gutter so as to leave
5 radial space beyond the blades for the passage of the vapor and yet collect the unvaporized water in the gutter.

While I have shown a convenient and inexpensive manner of making the blades, it
10 is to be understood that they may be formed in any way desired so long as they act as obstructions and receive the impact of the liquid and break it up into vapor.

14 is a pipe for supplying liquid, (usually
15 water) and connects with the back of the case 2 and in communication with a nozzle 13 inside of the case and discharging upon the disk 9 near its center. This nozzle 13 is arranged between the disk and interior back
20 wall of the case, as shown in Fig. 3. The aperture of the case is formed by the inwardly directed conical wall 22 which insures any water, passing from the nozzle 13, reaching the disk should the force of the jet
25 not be sufficient to directly project the water upon the disk.

The end of the motor shaft most distant from the disk 9 is provided with a fan or
30 blower 20 which produces a current of air over the periphery of the case 2 and adapted to dissipate the vapor and carry it out into the atmosphere of the room.

The extent of humidity produced depends upon the amount of water supplied by the
35 nozzle 13 and the speed of the disk, and hence with a given speed, the humidity may be varied and regulated by controlling the supply of the water. To do this I provide a valve 23 in the water supply pipe 14 which
40 may be regulated by hand or otherwise as desired.

It will be understood that the water that is delivered to the back of the disk 9 is quickly spread out over its surface by the
45 centrifugal action of the rotating disk and while traveling outward upon the surface of the disk, its speed is quickly increased and its thickness diminished so that an attenuated film of water extends all around
50 the edge of the disk and is literally mechanically vaporized by the violent impact which takes place by it upon the fixed blades 17. The less the volume of the water, the thinner is the film and the finer is the vapor,
55 and vice versa; and likewise, does the humidity vary but in an inverse ratio, that is to say, with the finer film of water the humidity would be less than where the film was thicker.

60 While for compactness and symmetrical arrangement, I prefer to place the disk and fan upon opposite ends of the motor shaft, I do not confine myself to such a construction, as the fan may be placed in front of
65 the disk, as indicated at 20 in Fig. 7, in

which case both the disk and fan are on the same end of the motor shaft and revolve as a unit. In Fig. 6, I have shown the fan 20 arranged at an angle to the disk and its shaft driven indirectly by the motor; and I
70 have also shown the fan at the front of the case 2 and with a draft casing 21 for directing the air and vapor laterally. Any other arrangement may be employed for creating
75 an air current for dissipating the vapor, as I do not confine myself to the means shown.

While I employ an electric motor 11 for rotating the disk 9 and fan 20, any other motor may be employed; or the shaft carrying the said disk and fan may be driven by
80 any other means.

If desired, the fan may be dispensed with in cases where the vapor is very fine, as the normal currents of air will suffice for its
85 dissipation.

While I have described my invention in the form I have found most excellently adapted for commercial use, I do not restrict myself thereto, as the details may be modified without departing from the spirit of
90 the invention.

In modified form, my invention may be employed with the rotating disk revolving in any plane desired, the only point to be kept in mind is the proper supply of water
95 to the disk and the drainage of surplus water. For example the machine shown, instead of being supported with the disk rotating in a vertical plane, may be so supported as to have the disk rotating in a
100 horizontal or any other plane, as the high velocity of the disk will cause the water to properly distribute itself under any conditions. It is, of course, important that the waste water may run off by gravity and
105 that the supply water shall be positively delivered to the disk, but it is immaterial how these are done.

In using the term "vapor" as defining the finely subdivided water, I have used it
110 in a general sense, and to include the true gas of water as well as the fine spray, mist or fog, as aside from the gasified water, the denser mist or fog will become largely dissipated and absorbed into the air as a vapor
115 and impart to it the hygrometric condition desired.

In the operation of my improved machine the film of liquid as it leaves the edge of the disk is thoroughly dissipated by the fixed
120 blades so that it is converted into a fine vapor and at the same time is shielded, during the formation of such vapor, against strong drafts or currents of air which would cause the formation of large drops of liquid
125 and its precipitation out of the machine in an objectionable manner, as well as, in textile mills, the causing of floating lint to be deposited upon and to clog the dissipating blades. In my machine the casing is closed
130

at the back so as to prevent any drafts of air across the dissipating blades or obstructions, and consequently the vapor which leaves the machine is required to be of such fineness as to be capable of being readily absorbed into the atmosphere to give to it the desired humidity. The employment of the blower or fan is only to cause the surrounding air to be kept in motion so that, as each portion of the air absorbs the desired amount of the vapor, fresh bodies of air will be brought successively into reasonable distance of the dissipating means to take up the moisture as fast as it is produced. While employing under some conditions the blower, provision is made to prevent the said blower acting upon the vapor while in the act of being formed by the disk and the radial obstructions, said protection being secured by placing the fan behind the closed back of the casing in which the said disk and dissipating obstructions are located. Even though the fan is located in other positions, it is not permitted to blow upon the vapor at time of its production. The function of the fan is simply to put the atmosphere outside of the machine into motion, so that the moist air may be conveyed away and drier air brought in contact with the machine, but without disturbing or interfering with the normal action of the vapor producing devices, or upon the vapor itself during its production. The radial blades, 17 by which the water is dissipated, are unobstructed at their radial extremities, so that the vapor after being produced is not projected against the solid wall, or into a pocket which would tend to condense, but the construction is such that, as soon as the vapor is formed, it is free to pass on in a radial direction and also forward without resistance, and in this manner be retained in its vapor form.

Having now described my invention what I claim as new and desire to secure by Letters Patent, is:

1. In a humidifier, the combination of a rotatable disk arranged in a vertical plane, means to rotate the disk at high velocity, means for delivering a liquid to the disk, and an annular row of obstructions arranged in a vertical plane about the circumference of the disk and close to it against which the film of liquid driven outward from the disk by centrifugal force is projected and subdivided into vapor and a case closed at its back and open at its front within which the vapor is formed and shielded against strong drafts.

2. In a humidifier, the combination of a rotatable disk arranged in a vertical plane, means to rotate the disk at high velocity, means for delivering a liquid to the disk, an annular row of obstructions arranged in a vertical plane about the circumference of the disk and close to it against which the

film of liquid driven outward from the disk by centrifugal force is projected and subdivided into vapor, and a case closed at its back and open at its front within which the vapor is formed and shielded against strong drafts and means for creating a forced current of air around the outer edges of the case to dissipate the moisture after it leaves the case and expands into the atmosphere.

3. In a humidifier, the combination of a rotatable disk arranged in a vertical plane, means to rotate the disk at high velocity, means for delivering a liquid to the disk, an annular row of obstructions arranged in a vertical plane about the circumference of the disk and close to it against which the film of liquid driven outward from the disk by centrifugal force is projected and subdivided into vapor, a vertical case closed at its back and open at its front inclosing the means for subdividing the liquid said case being provided with an annular inwardly directed grooved channel, a drain pipe opening downward from the bottom of the grooved channel, and a blower for creating a forced current of air over the outer edges of the case to dissipate the moisture.

4. In a humidifier, the combination of a rotatable disk rotating in a vertical plane, means to rotate the disk at high velocity, hand-controlled means for delivering a liquid to the disk near its center, a case closed at the back open at the front and in which the disk rotates and provided with guiding means arranged in a vertical plane for conveying away the surplus liquid, and an annular row of obstructions secured to the case so as to be arranged in a vertical plane in front of the closed back and about the circumference of the disk and close to it against which the film of liquid driven outward from the disk by centrifugal force is projected and subdivided into vapor.

5. In a humidifier, the combination of a case closed at its back and open at its front and having an annular gutter at its outer portion formed of a grooved part directed inwardly, a rotatable disk arranged within the case in front of the closed back and in the plane of the annular gutter, means for rotating the disk at a high velocity, hand controlled means for delivering a liquid to the surface of the disk during its rotation whereby the supply of liquid is independent of the speed of the disk, and an annular row of obstructions arranged about the periphery of the disk and close to it and supported by the case and in front of the closed back thereof.

6. In a humidifier, the combination of a vertical case closed at its back open at its front and having an annular gutter at its outer portion formed of a grooved part directed inwardly, a rotatable disk arranged within the case, means for rotating the disk

at a high velocity, means independent of the rotation of the disk for regulating the delivery of a liquid to the surface of the disk during its rotation, and an annular row of obstructions arranged about the periphery of the disk and close to it and supported by the case and in front of the closed back thereof said obstructions consisting of a series of radial blades unobstructed at both radial extremities and extending outward in a circle from a cylindrical base secured to the case.

7. In a humidifier, the combination of a case closed at its back and open at its front and having a gutter at its outer portion formed with the grooved part directed inwardly, a rotatable disk arranged within the case, means for rotating the disk at a high velocity, means for delivering a liquid to the surface of the disk during its rotation, an annular row of obstructions arranged about the periphery of the disk and close to it and supported by the case in front of the closed back thereof, and a blower arranged behind the closed back of the case for causing a current of air to pass forward around outer

edges of the case to dissipate the vapor produced by the disk and obstructions.

8. In a humidifier, the combination of a rotating disk, means for rotating the disk with a high velocity, means for delivering a liquid to the surface of the disk while rotating, dissipating means presenting irregular surfaces against which the film of liquid extending from the perimeter of the disk is projected and finely subdivided into a vapor said means being arranged close to the perimeter of the disk, means for creating currents of air for dissipating the vapor after it has left the dissipating means, and a shield between the means for creating the currents of air and the means for subdividing the fluid into vapor, to prevent blasts of air striking and condensing the vapor at the moment of its production.

In testimony of which invention, I have hereunto set my hand.

JOHN W. FRIES.

Witnesses:

H. ALLIE WHITE,
C. T. PROHL.