

March 27, 1934.

D. A. HESS ET AL

1,952,984

AIR TEMPERING APPARATUS

Filed Feb. 9, 1932

2 Sheets-Sheet 1

Fig. 1.

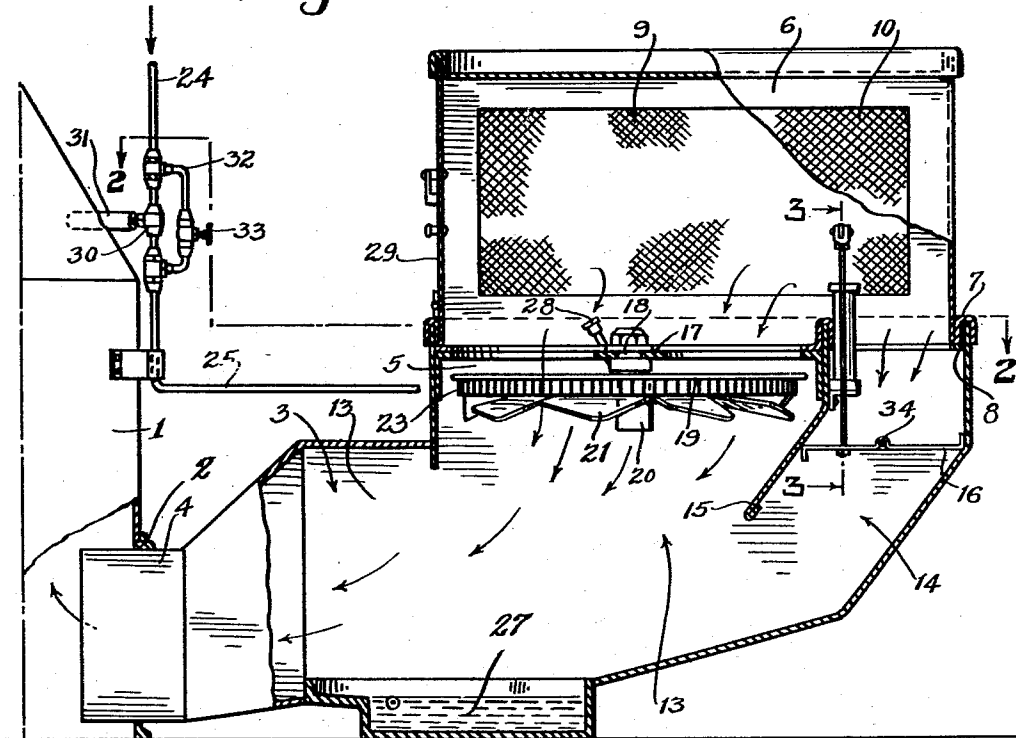


Fig. 3.

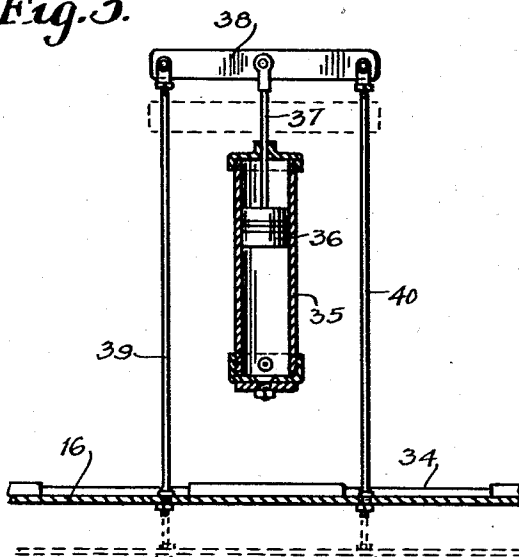
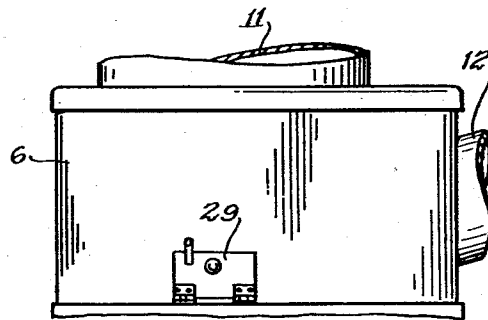


Fig. 4.



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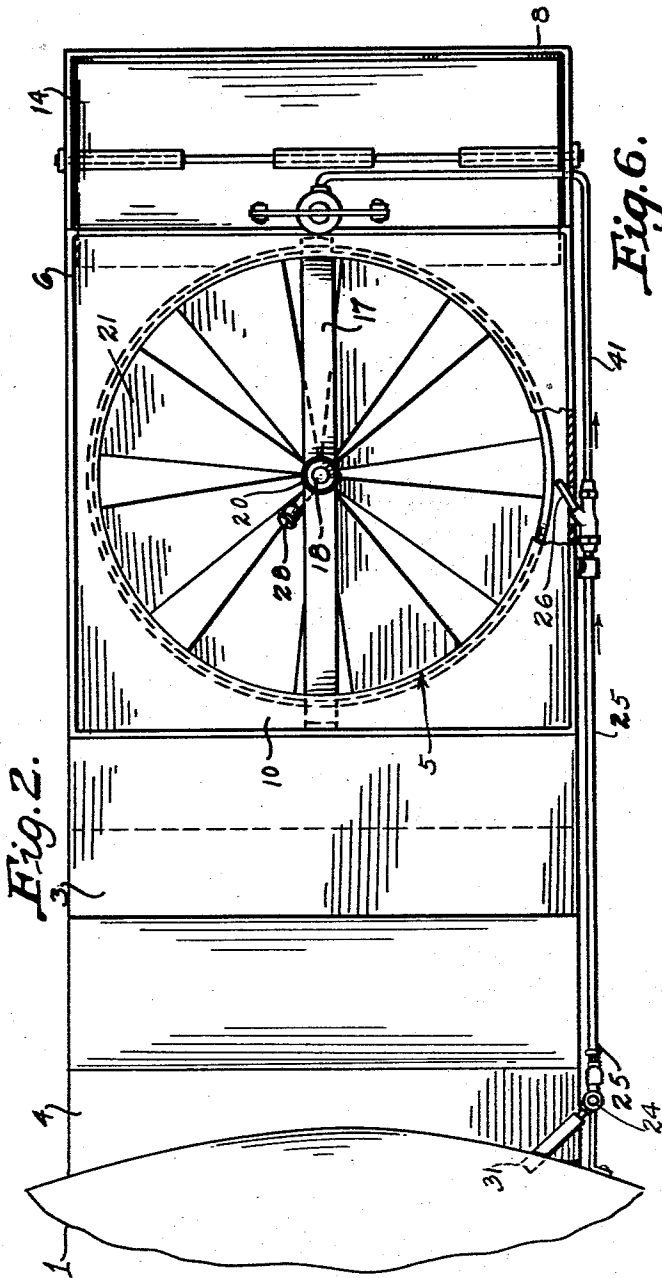


Fig. 6.

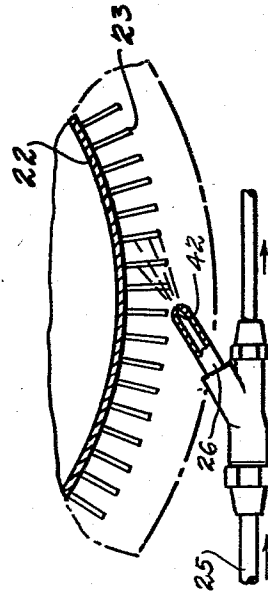
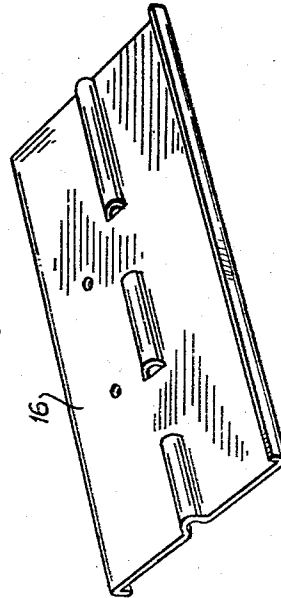


Fig. 5.

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UNITED STATES PATENT OFFICE

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AIR TEMPERING APPARATUS

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Louisville, Ky.

Application February 9, 1932, Serial No. 591,908

4 Claims. (Cl. 261—12)

This invention relates to air tempering apparatus for dwellings, offices and buildings in general, and it has for its principal object the provision in combination with the air duct of an air heating plant, of a turbine blower driven by a jet of water under pressure from the main, the water spraying from the turbine in the form of a shower or curtain through which the air inducted by said blower must pass to the jacket of the heating plant or other conduit through which the tempered air is distributed.

Another object of the invention is the provision of a system by which the water supply to the turbine is thermostatically controlled by heat conditions in the furnace to operate the blower when there is fire in the furnace, and a manually or otherwise controlled by-pass for supplying water as a motive agent to the turbine when the heating plant is not being operated.

Still another object of the invention relates to the novel construction of the water operated blower per se.

Another object of the invention resides in the provision of an air conduit having a fan-supplied chamber and an adjacent chamber opening direct to atmosphere for receiving air under natural draft, with a damper in a common partition wall open when the fan is not working, but closing under water pressure when the turbine is operated.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In the drawings which accompany and form a part of the following specification and throughout the several figures of which the same characters of reference have been employed to designate identical parts:

Figure 1 is a side view partly in section showing the device of our invention installed in connection with a hot air furnace;

Figure 2 is a section taken along the line 2—2 of Figure 1;

Figure 3 is a section taken along the line 3—3 of Figure 1;

Figure 4 is a slightly modified form of draft hood;

Figure 5 is a perspective view of the balanced damper; and

Figure 6 is a transverse section showing a fragment of the turbine blower.

Referring now in detail to the several figures, the numeral 1 represents the outer casing or jacket of a hot air furnace having an opening at 2 by means of which the air chamber within said

casing is placed in communication with the air tempering apparatus constituting the subject matter of the present invention.

The invention comprises a casing which in general, is designated by the reference character 3, defining an air conduit having one end 4 connected to the furnace casing at the opening 2. The mouth 5 of the casing 3 communicates with any desired source of fresh air by means of a hood 6 having its lower edge provided with a flange 7 defining a channel 8, said flange resting upon the edge of the surrounding wall of the casing 3, the edge of said wall extending into said channel. Said hood may have an opening 9 which may be screened if desired, as indicated at 10, said opening taking in air from the immediate room or chamber within which the apparatus may be located. It may be preferred however, as shown in the modification illustrated in Figure 4, to take the air in from an outside source and the conduits 11 and 12 are suggestive of such an arrangement.

The casing 3 is preferably segregated into two chambers 13 and 14 by a common partition wall 15. Under certain conditions as will appear, the two chambers are put into communication by means of a damper 16 which will presently be described. The mouth of the chamber 13 is preferably circular and in said mouth is mounted a cross bar 17 supporting a shaft 18. A turbine blower 19 is rotatably mounted through suitable bearings upon said shaft.

The turbine blower may be made with sheet metal blades secured to a hub 20. The blower is formed with inner and outer series of vanes. The inner series take the form of blades 21 whose function is to deliver air under pressure to the chamber 13. The inner vanes are separated from the outer vanes by an annular partition 22. The outer vanes 23 are preferably perpendicular and arranged at close intervals radially of the blower. Their function is to serve as turbine blades when impinged by a motive fluid.

In the present instance the motive fluid is water from the main 24. Under ordinary conditions a comparatively small flow of water is sufficient to operate the turbine at the required velocity entailing small cost to the operator, while in the winter season particularly, the time when the furnace is most used and the tempering of the air is most necessary, the water consumed is as a rule merely part of the surplus minimum allowance of the municipality or water company, which must be paid for under the fixed minimum service charge, whether it is used or

not. From the main, the water passes through the pipe 25 and issues from the nozzle 26 in the form of a jet against the blades 23. The balance of the turbine blower is presumed to be very nice so that it is readily set in motion with a small jet. The water dashing against the blades 23 which are almost normal to the direction of impingement of the jet, is shattered into spray which dripping from the turbine blades as the turbine blower revolves, forms a surrounding curtain of finely divided water particles about the air inducted by the central series of blades 21. The air must pass through this curtain on its way to the furnace casing and thus becomes humidified.

The excess water flows into a sump 27, either dropping directly from the blades 21 which overhang the sump, or by dropping upon the inclined partition 15 and gravitating down into said sump.

The turbine blower may be lubricated by means of a grease cup 28, and access to the grease cup is had by way of the hand-hold closure 29. It is contemplated to temper the air with moisture whenever heated air is being supplied by the furnace. With this object in view a valve 30 is intercalated in the pipe 25 actuated by a thermostat 31 responsive to temperature conditions within the furnace casing. When the air is heated, the thermostat opens the valve and the turbine blower operates. When the fire is let go out the thermostat closes the valve 30 and the water supply to the turbine blower is cut off. The thermostat may be set with such delicacy as to regulate the speed of the turbine blower according to the temperature of the air. Since the speed depends upon the water supply, not only the volume of air but also its humidification is controlled simultaneously by the same thermostat.

The air tempering apparatus is useful in summer as well as winter. A by-pass 32 is built around the valve 30 and provided with a manually operated valve 33. Normally in seasons when the thermostat 31 is controlling the operation of the turbine blower, the valve 33 will be closed. When the furnace is cold the valve 33 may be opened, supplying water to operate the turbine which then forces humidified fresh unheated air, through the furnace from which it is distributed.

The damper 16 is preferably hingedly mounted on a pintel 34 in the chamber 14. The damper is preferably balanced. It is operated hydraulically through water pressure admitted into a cylinder 35 against the lower face of a piston 36 having a piston rod 37 connected intermediately to a cross arm 38. From opposite ends of the cross arm depend links 39 and 40 which connect the spaced points to the damper on one side of its pivotal axis. When the piston rises, the damper is closed. The piston descends by gravity, opening the damper.

Water is supplied to the cylinder adjacent its lower end and through a conduit 41 communicating with the pipe 25 which supplies the nozzle. The orifice 42 of the nozzle being quite restricted, pressure builds up in the pipe 41 and in the cylinder whenever the turbine is being operated. When the water supply is cut off from the turbine, the water in the cylinder is exhausted, through the orifice of the nozzle permitting gravital descent of the piston.

While we have in the above description disclosed what we believe to be a practical and desirable embodiment of our invention, it is to be understood that the details of construction as shown and described are merely by way of example and not to be construed as limitative in their bearing upon the invention as defined in the claims.

What we claim is:

1. In combination with the air duct of an air heating plant, a casing communicating at one end with atmosphere and at the other end with said air duct, a turbine blower mounted in the mouth of said casing having centrally disposed air vanes and peripherally disposed turbine blades, a nozzle supplying water under pressure to said turbine blades, the splash from said blades forming a curtain of spray through which the air projected therethrough by said vanes must pass, and a thermostat responsive to the temperature of the heated air in said duct for controlling the water supply to said turbine blower.
2. In combination with the air duct of an air heating plant, a casing communicating at one end with said air duct, a partition within said casing dividing it into two chambers having mouths opening to atmosphere, a hingedly mounted damper occluding one chamber, a turbine blower mounted in the mouth of the other chamber, a nozzle for supplying water under pressure to said turbine blower and hydraulic means for actuating said damper comprising a cylinder, a piston in said cylinder and linkage connecting said piston to said damper, for biasing said damper in open direction upon movement of the piston in one direction, and means for supplying water to said cylinder to actuate said piston for opening said damper comprising a conduit in communication with the supply to said nozzle.
3. Air conduit having heating means in one region and a turbine blower in another region in advance of the first named region, means for supplying water under pressure to said turbine blower for operating it and humidifying the air inducted thereby, means responsive to the temperature of the heated air for regulating the supply of water to said turbine blower, and a manually controlled by-pass for directing the supplying of water at will to said turbine blower when said heating means is not in operation.
4. In combination with the air duct of an air heating plant, a casing communicating at one end with said air duct, a partition within said casing dividing it into two chambers having mouths opening to atmosphere, a damper in said partition adapted to place said chambers in communication with each other, a turbine blower mounted in the mouth of one chamber, a nozzle for supplying water under pressure to said turbine blower, a sump at the bottom of said casing, said partition and damper sloping beneath said turbine blower, forming a chute for directing drip from said turbine blower into said sump, and means responsive to the temperature of the heated air in said air duct for controlling the supply of water to said turbine.

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