March 25, 1924. 1,487,743

W. B. HODGE

HUMIDIFYING APPARATUS

Filed Aug. 31, 1918 2 Sheets-Sheet 1

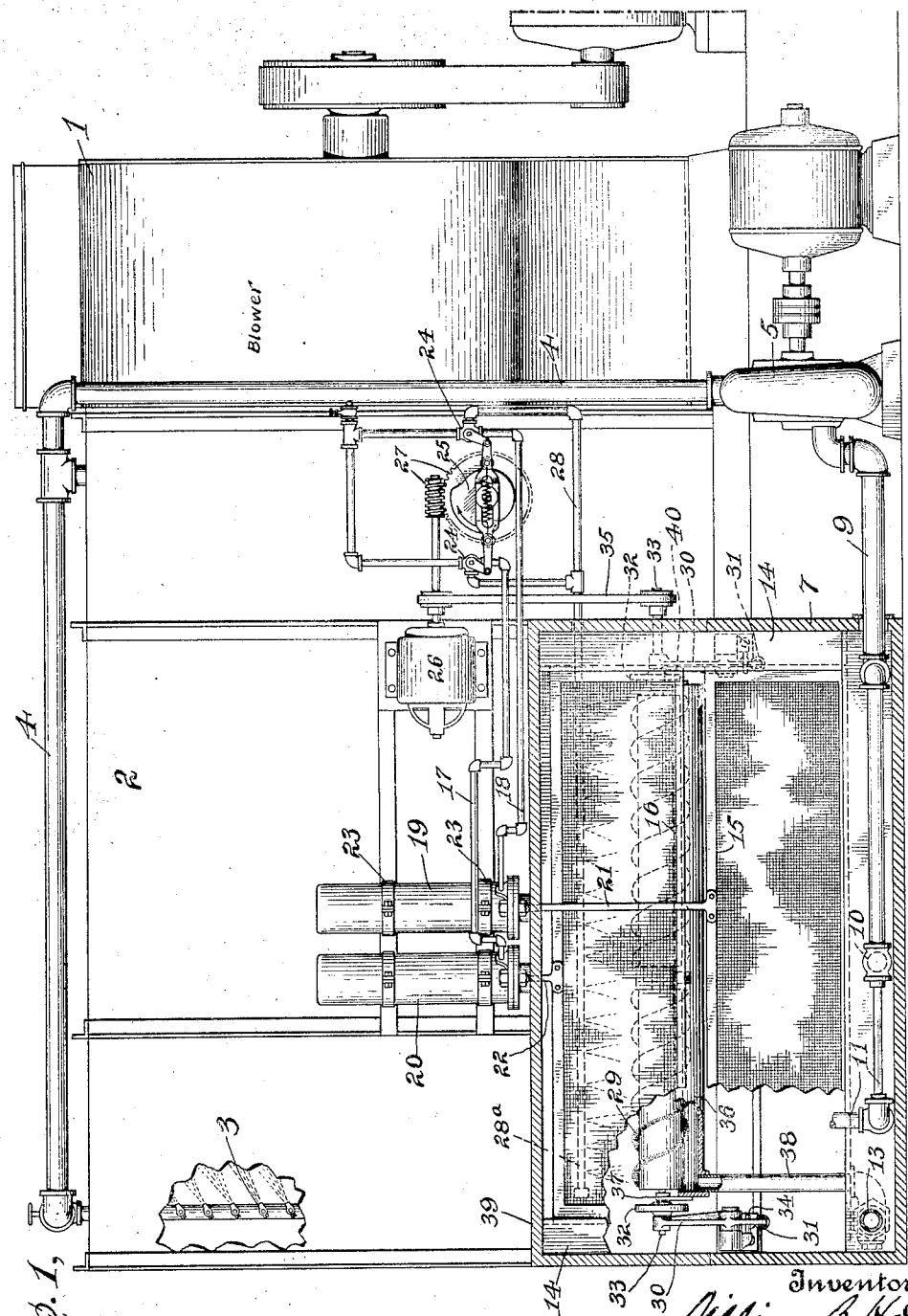


Fig. 1.

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Fig. 2.

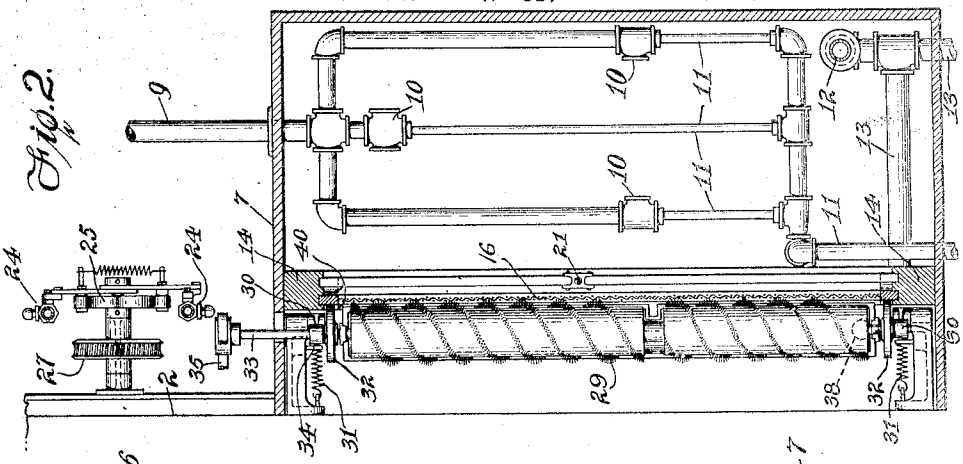


Fig. 4.

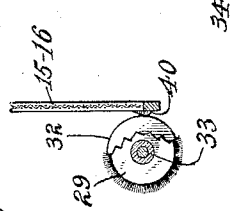


Fig. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM B. HODGE, OF CHARLOTTE, NORTH CAROLINA, ASSIGNOR TO PARKS-CRAMER COMPANY, OF FITCHBURG, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

HUMIDIFYING APPARATUS.

Application filed August 31, 1918. Serial No. 252,221.

To all whom it may concern:

Be it known that I, WILLIAM B. HODGE, a citizen of the United States, residing in Charlotte, North Carolina, have invented the following described Improvements in Humidifying Apparatus.

The invention relates to improvements in the water cleaning apparatus for air humidifying plants, etc., and may also have uses in other relations as will hereinafter appear. In said central station plants as commonly installed the spray chamber is a portion of the main entrance conduit of a large fan blower from which various branch passages deliver the humidified air to different sections of the building served. This chamber is provided at its bottom with a pit or basin to receive the surplus water falling from the super-saturated air in the chamber. Into this pit also falls the dirt carried into the chamber by the unwashed and unhumidified air. Inasmuch as the surplus water in the pit is desirably saved by repumping it through the spray nozzles in the chamber it is necessary to strain it at some point in the circulation and for this purpose screens or strainers are used in the collecting basin. Such screens require frequent attention for cleansing, on which occasions the entire plant, as heretofore built, must be shut down to enable the workmen to enter and the screens to be removed and scoured. By the present invention the delay and labor involved in this interruption are entirely eliminated and the straining apparatus is kept in a clean condition with a minimum of attention and labor and may be maintained in such condition either automatically or manually as preferred, in any event improving the efficiency of the plant by reducing the possibility of stoppage by dirt of the spray nozzle orifices which are exceedingly fine.

In accordance with this invention the floor of the spray chamber is inclined toward a tank or pit located outside of the chamber and provided with a double or multiple set of screens through which the dirty water must flow to reach the suction pipe of the pump in its return to the spray nozzle. The suction pipe is also located in the exterior pit or tank and the screens are brought into and out of straining position, alternately and in such manner that one of them is always acting, while the other or others are out of position, to be cleansed. All of the apparatus is appropriately enclosed. These and other features hereinafter described, separately and collectively, constitute the present invention and are all employed in the straining apparatus illustrated in the accompanying drawings which represent the form at present preferred.

In said drawings—

Fig. 1 is a side elevation of the fan blower and spray chamber of an ordinary humidifying plant having the present invention applied to it and shown partly in section;

Fig. 2 is a plan view of the pit and straining apparatus, partly in section;

Fig. 3 is a vertical section transversely to the straining apparatus; and

Fig. 4 is a detail.

In these drawings the motor-driven fan-blower 1 appears at the right-hand side of Sheet 1 and the portion of the air conduit which represents the spray chamber is marked 2. This chamber contains a multiplicity of spray nozzles 3 supplied with water by a pipe 4 from the water pump 5. It may also be assumed to contain various other appurtenances necessary or desirable in spray chambers. The chamber is formed with a pit 6, the floor of which is sloped off laterally in such manner as to drain the excess and dirty water off to an auxiliary pit or tank 7 at a lower level and located preferably adjacent to and alongside of the wall of the chamber and exterior to said chamber. The suction pipe 9 of the water pump 5 draws the water from the auxiliary pit through a number of inlets 10 located in different parts of the pit, and completes the circuit comprising the pump 5, pipe 4, spray nozzles, chamber 2, pit 6, auxiliary pit 7 and pipe 9, through which the water is circulated and used over and over again. A steam supply is provided to the intake water by the pipes 11. An overflow pipe 12 is also located in the auxiliary pit and connected to a waste pipe 13.

The strainer apparatus is mounted in a frame 14 applied to the interior of the pit or tank 7 between the spray chamber and the pump suction and providing vertical slideways or tracks for two parallel strainer screens 15 and 16. When either of these screens occupies its lowest position in the slideway it constitutes a complete partition intercepting the flow of discharged water toward the pump suction and when the

other screen is raised in the slideway it occupies a position wherein it may be readily cleansed, either by hand or automatically as may be preferred. The screens are raised by power, in the present case, which is applied by hydraulic pressure taken from the pressure pipe 4 of the pump and transmitted by pipe lines 17 and 18 to each of two adjacent and duplicate cylinders 19 and 20, respectively, the pistons of which are connected by their rods 21 and 22 to the rigid frames of the strainer screens 15 and 16. The cylinders are mounted directly over the screens, in the present case, in brackets 23 on the chamber wall but they might be mounted on the frame 14 or elsewhere as desired. Their actuation at appropriate intervals and in a proper sequence is accomplished by the control of the two three-way valves 24 provided in the pipe lines 17 and 18 and operated by a cam 25 which cam is revolved by a slow-motion-drive taken from any convenient source of power as for instance from a small motor 26 geared to the cam through a worm and worm wheel 27. Such a motor can be connected in the circuit with the main fan motor so as to be in operation continuously with the latter and when so connected the cam disc will operate the valves 24 at predetermined intervals of time and in such manner as will raise and lower the screens in alternation, but always keeping one of them in a fully lowered position so that there will be no moment of cessation in the straining process. For instance, when the cam depresses the lever of one of the valves 24 it thereby admits water to the corresponding cylinder, raising the screen of that cylinder and holding it raised for as long as the said valve stem remains depressed. At the end of the period of depression the return of the valve stem to original position opens the said cylinder to an exhaust pipe 28 thereby allowing the screen to descend by gravity. The cam disengages the lever of each valve just before it engages the lever of the opposite valve which therefore results in keeping one screen down under all conditions. While the control gear just described is preferred, the skilled mechanic will readily devise other means in the same relation to accomplish the same purpose and all such means are comprehended by this invention. It is preferred to have the cam in constant motion as by means of the described connection to the motor but it will presently appear that the invention is not limited to such a drive and, indeed, it is not necessary that the cam be power driven. In any case the cam represents a means of operating the screens in a predetermined sequence which will always eliminate the possibility of dirt reaching the spray nozzles in the chamber. The principle of construction of the valves 24 will be understood without description.

The strainer screens are cleansed during their ascent and also to some extent during their descent and the cleansing is done automatically and preferably by a rotary brush such as indicated at 29 although other forms of cleansing agents are also comprehended by the invention. The brush 29 is journalled in a carriage represented by the two levers 30, pivoted at each end of the brush upon the adjacent tank wall and connected to springs 31 which constantly urge them and the brush towards the screens. When neither screen is in a position to be cleansed the forward position of the brush is limited by some stop means such as the pin indicated at 34 in Fig. 3. A loose idler roller 32 is mounted on the brush shaft 33 adjacent each end of the brush and in position to register with and bear upon the screen surface or upon the vertical frame bars of the screen. By such engagement these rollers determine the position of the brush with reference to each reticulated screen surface and thereby provide a bearing of the brush bristles upon said surface which is uniform under all conditions and adequate to remove the dirt. Moreover these idler rollers are of large enough diameter to guide or move the brush backwards against the springs 31, when they are engaged by the upper edge of an ascending screen, that is to say when the screen is down and the brush is occupying a forward position with the lever 30 against the stop pin 34 whereby it is caused to advance or recede into engagement with these screens which move in different vertical planes. This specific organization of brush and brush carriage is preferred because of its simplicity and the effectiveness with which the screens may be scoured.

The brush 29 is rotated by a belt 35 from a pulley on the shaft of motor 26, the belt being of course long enough to follow the movement of the brush carriage under its actuation by the ascending screens. The dirt cleaned from the brush is caught in a trough 36 or other receptacle. The said trough is suspended by links 37 (Fig. 1) from the brush shaft 33 and connected to the waste pipe 13 by a swivelled pipe connection 38 so that the trough may thus follow the travel of the brush, being always in position to catch and discharge the cleanings to the waste pipe. Ordinarily enough water will be lifted by the screens to flush the trough but it is preferred to use the exhaust water from the cylinders for this purpose and the exhaust pipes 28 are therefore connected to a shower pipe 28[a] suitably mounted parallel to and above the brush so as to spray it thoroughly each time the hydraulic cylinders are called into use. The cover 39 which encloses

the entire tank or auxiliary pit is of course removable. When removed it manifestly admits access to the pit for the removal of sediment collecting therein or for any other purpose, which access can be had without interrupting the operation of the tank. The operation will be apparent. So long as the humidifying plant is in operation the screens are raised and lowered automatically, one being always fully down while another is being cleansed. As each screen frame reaches its extreme uppermost position, the cam projections 40 thereon ride under the guide rollers 32, as indicated in Fig. 4, and press the brush rearwardly, so that although it may continue to rotate, being belted to the motor 26, it does so idly and in consequence without wearing itself out upon the screen.

It will of course be understood that the drawings above described do not purport to show the mechanical detail of all of the mechanism described. All of which however will be readily furnished by the builder on the description of function above given, and likewise as appears from the appended claims that various modifications, alterations, reversals and changes of proportions and relative arrangement may be resorted to without departing from the principle of the invention which has now been exemplified.

What I claim is:

1. In a humidifying plant, the combination of a conduit providing a passageway for the air, a blower to cause the air to flow through said passageway, means in said conduit for delivering water to the flowing air, a pit below said means to collect the excess water, a strainer comprising a plurality of parts arranged to be interposed alternately in and removed alternately from the flow of the water collected by said pit, and means for cleaning the individual parts of the strainer seriatim while said parts are removed from the water.

2. In a humidifying plant, the combination of a conduit providing a passageway for the air, means in said passageway for delivering water to the air, a pit below said means to collect the excess water, a pump for returning the water from the pit to said delivery means, a water strainer located in the water circulation in advance of the pump, means for removing the dirt from the strainer while the strainer remains in operation, and means for conveying away the dirt removed by said means.

3. In a humidifying plant, the combination of a conduit providing a passageway for the air, means in said passageway for delivering water to the air, a pit below said means to collect the excess water, a pump for returning the water from the pit to said delivery means, a water strainer located in the water circulation in advance of the pump, means for removing the dirt from the strainer while the strainer remains in operation and means for conveying away the dirt removed by said means, said means for removing the dirt from the strainer being automatic intermittently-operating.

4. In a humidifying plant, the combination of a conduit providing a passageway for the air, a blower to cause the air to flow through said passageway, means in said conduit for delivering water to the flowing air, a pit below said means to collect the excess water, a strainer comprising a plurality of parts arranged to be interposed alternately in and removed alternately from the flow of the water collected by said pit, means for cleaning the individual parts of the strainer seriatim while said parts are removed from the water, and control means operating to retain one of said plurality of strainer parts in straining position while the other of said parts is raised.

In testimony whereof, I have signed this specification.

WILLIAM B. HODGE.