April 16, 1935. H. MATTHEWS ET AL 1,998,284

AIR CONDITIONING SYSTEM

Filed Sept. 18, 1933 2 Sheets-Sheet 1

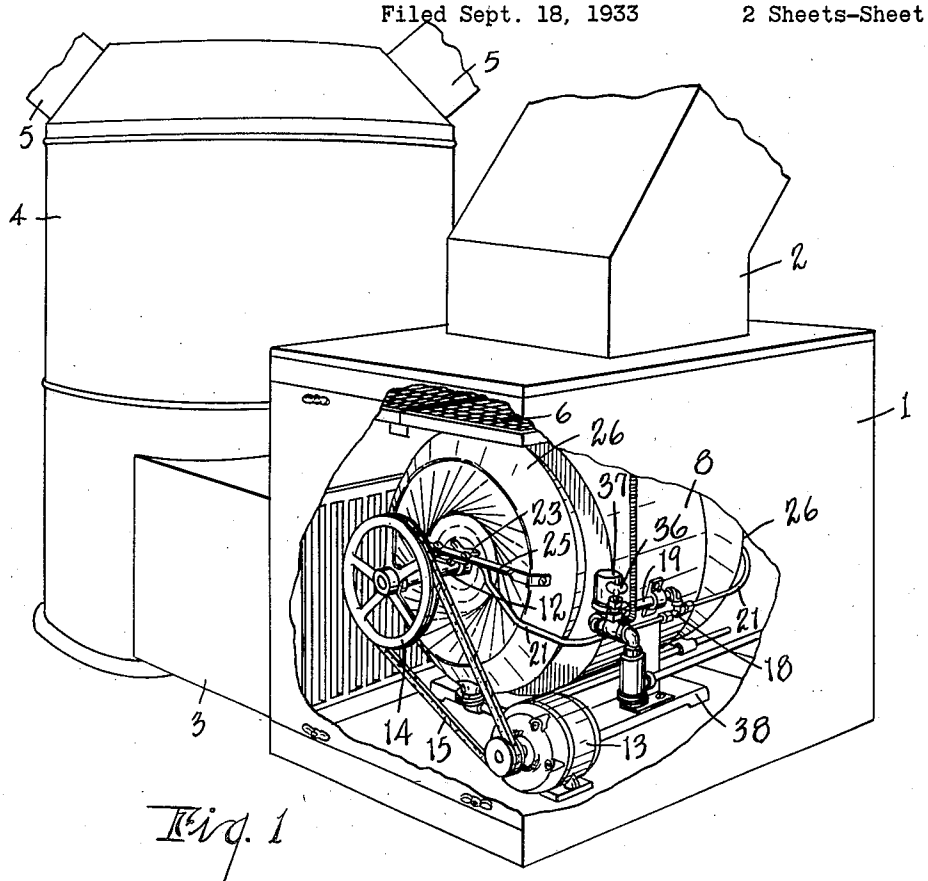


Fig. 1

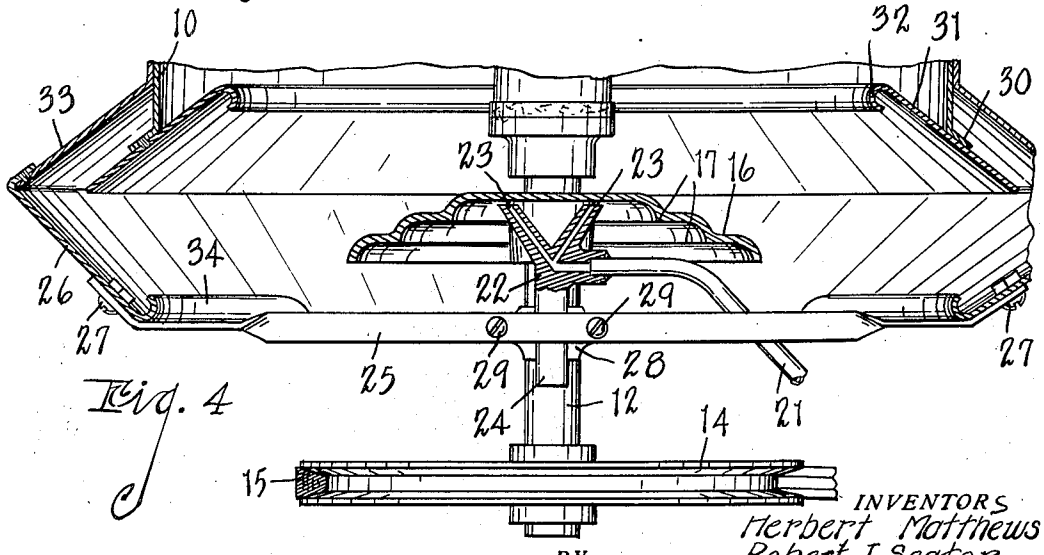


Fig. 4

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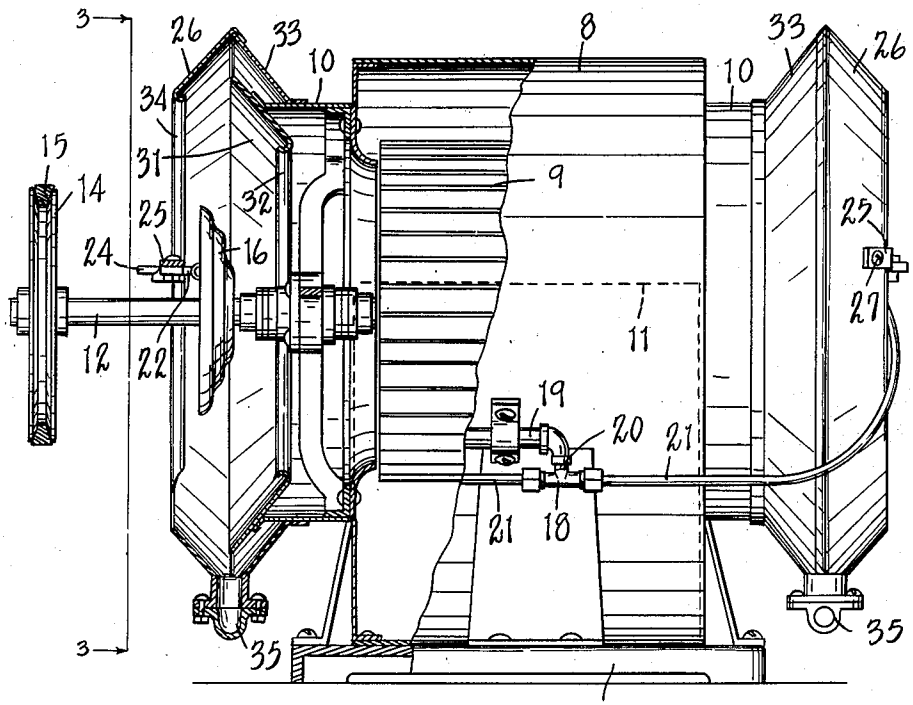
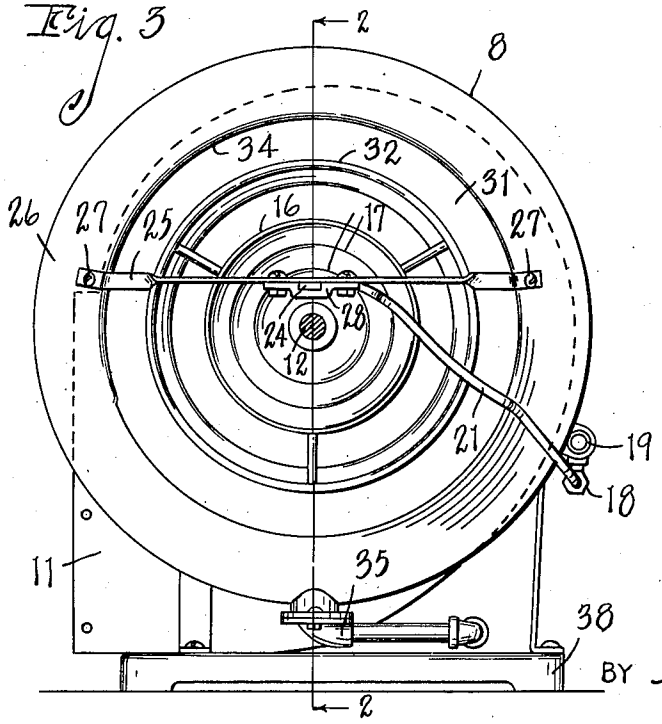


Fig. 2

Fig. 3



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AIR CONDITIONING SYSTEM

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9 Claims. (Cl. 261—90)

The main objects of this invention are:

First, to provide an improved air conditioning system comprising means for successively filtering, washing, moistening, and heating the air.

Second, to provide an air washer having improved centrifugal means for quite uniformly distributing the water in a screen or curtain across the path of the air.

Third, to provide a fitting comprising a plurality of diverging nozzles for supplying the interior of the water impeller with water.

Fourth, to provide a water supply system arranged so that water is supplied to a plurality of impellers without the possibility of one of the branches acting as an injector and diverting the water away from another.

Fifth, to provide an air washer having improved baffling and water collecting means for preventing the air current from picking up drops of water.

Sixth, to provide an air conditioning system having the above desirable features and characteristics and which is very efficient in operation.

Objects relating to details and economies of our invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A structure which is a preferred embodiment of our invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a fragmentary perspective view of an air conditioning system embodying the features of our invention, a portion of the air receiving chamber being broken away to show the contents thereof.

Fig. 2 is a view in side elevation of the combined air blower and washer, portions being broken away and shown in vertical section on line 2—2 of Fig. 3.

Fig. 3 is a view in end elevation and section on line 3—3 of Fig. 2.

Fig. 4 is an enlarged fragmentary horizontal section of the air washer.

In the embodiment of our invention illustrated in the drawings, numeral 1 represents an air receiving chamber insulated against sound and vibration and arranged in series with the cold air inlet ducts 2 and 3 of the furnace 4. The furnace is provided with the usual hot air pipes 5. Arranged in the top of the air receiving chamber 1 is an air filter 6 which removes the larger particles of dust and dirt from the air to be conditioned.

The combined air washing and humidifying unit 8 comprises a rotary fan or blower 9 for drawing the air into the unit through the cylindrical casings 10, 10 at opposite ends thereof and out of the unit at 11 toward the air duct 3 as illustrated. The shaft 12 which carries the fan or blower is driven by the electric motor 13 by means of the pulley 14 and belt 15. The motor 13 is preferably automatically controlled by suitable means not shown which form no part of this invention.

At each end of the unit, the shaft 12 is provided with an outwardly facing dished centrifugal water impeller 16 for rotation with the shaft. Each water impeller has a series of concentric annular steps 17 of progressively increasing diameter, the outer walls or peripheries of these steps being preferably quite sharply curved. Water is discharged against the inner step and is carried outwardly by centrifugal force, the curved outer wall of the step serving to distribute the water, that is, to prevent its being thrown off in defined streams as distinguished from being uniformly distributed in a sheet-like curtain or spray substantially uniform throughout the circumference of the impeller. The series of concentric steps as in the embodiment illustrated accomplishes this result very effectively although the water pressure may vary considerably.

Water is supplied to the interior of the impellers by a water feed system consisting of an inverted T-fitting 18 arranged below the level of the impellers and having a feed pipe 19 connected to its stem 20. Branch conduits 21, 21 are connected to the ends of the T-fitting and terminate in special fittings 22 having diverging nozzles 23, 23 delivering to the impellers. The nozzles are arranged above the level of the T-fitting to prevent one nozzle from acting as a syphon and drawing the water from the other. The nozzles terminate in a plane parallel to and spaced from the plane of the impeller as illustrated by Fig. 4. This insures an adequate supply of distributed water to the interior of each impeller.

Each of the special fittings 22 is provided with a rearwardly extending arm 24 which is adjustably carried by the cross bracket 25, the ends of which are connected to the trough 26 by the bolts 27. The arm is secured in adjusted position to the bracket by the clamp 28 which is secured to the bracket by the bolts 29. With the parts thus arranged, the position of the nozzles 23, 23 relative to the impeller 16 can be readily adjusted and secured in adjusted position.

Each of the cylindrical casings 10, 10 has an outturned end flange 30 to which is secured, as by welding, an inner inclined baffle 31. The

inner edge of the baffle 31 is provided with an inturned flange 32 forming a water collecting and directing trough or channel for preventing the same from dropping into the air current. The water collecting trough 26 surrounds the impeller and is of inwardly facing V-section and is secured to the casing 10 in spaced relation to its end flange 30 to provide an annular channel 33 which returns the collected water to the bottom of the trough. The outer edge of the trough has an inturned flange 34 forming a water directing channel for preventing the collected water from dripping into the air current.

As illustrated by Fig. 4, the back of the water impeller is in the plane of the angle of the trough. This places the discharging edge of the water impeller in a vertical plane in front of the forward edge of the baffle 31 so that the curtain of water thrown out by the impeller is discharged against the rearwardly inclined wall of the trough 26. This tends to direct the water to the rear of the portion of the baffle projecting into the trough and minimizes splashing into the air current. Thus, the air is prevented from picking up drops of water and carrying them into the fan or blower. The collecting trough 26 is provided with a discharge or drain connection 35 at its bottom.

The feed water pipe 19 is provided with an automatically controlled valve adapted for simultaneous operation with the motor 13. Since this control forms no part of our invention, it will not be described. A manually controlled regulating valve 36 is also provided in the feed water pipe 19 for manually adjusting the quantity of water delivered to the unit and also for shutting off the water entirely if desired. The solenoid for controlling the automatic water control valve is indicated at 37, Fig. 1. The unit is provided with a supporting base 38.

In operation, the air to be conditioned is drawn by the fan or blower into the receiving chamber through the air filter which removes the larger particles of lint and dirt, then through the spray of water which cleans and humidifies it and finally through the fan and into the furnace from which it is discharged in a clean, fresh, and humidified condition. The fan circulates the air, the filter collects the large particles carried by the air, the air washer moistens and washes the air, and the furnace heats it. The temperature operated controls automatically start and stop the driving motor and water supply.

We have illustrated and described our improvements in an embodiment which we have found very practical. We have not attempted to illustrate or describe other embodiments or adaptations, as it is believed this disclosure will enable those skilled in the art to embody or adapt our improvements as may be desired.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. An air conditioner comprising a dished centrifugal water impeller arranged to rotate about a horizontal axis, and means for supplying the interior of said impeller with water comprising a stationary fitting having a lateral inlet and a pair of diverging nozzles terminating in end outlets in a plane parallel to and spaced from the plane of the impeller and having a rearwardly extending arm, a cross bracket and a clamp associated with said cross bracket for clamping the arm of said fitting in adjusted position with the nozzles spaced from the impeller as desired.

2. An air conditioner comprising a centrifugal water impeller, and means for supplying the interior of said impeller with water comprising a fitting having a lateral inlet and diverging nozzles terminating in end outlets in a plane parallel to and spaced from the plane of the impeller and having a rearwardly extending arm, a cross bracket and a clamp associated with said cross bracket for clamping the arm of said impeller in adjusted position with the end outlets of the nozzles spaced from the impeller as desired.

3. An air conditioner comprising an outwardly facing dished centrifugal water impeller arranged to rotate about a horizontal axis, a cylindrical casing having an outturned end flange, a water collecting trough of inwardly facing V-section on said casing and spaced from said flange, the plane of the face of said impeller being in the plane of the forwardly inclined wall of said trough, the outer edge of the trough having an inturned flange forming a water directing channel, an inclined inner baffle fixed to said end flange and having an inturned flange on its inner edge forming a water directing channel, means for supplying water to the face of said impeller, and means for establishing a current of air through said trough into said casing.

4. An air conditioner comprising a cylindrical air conduit, a centrifugal water impeller having a plurality of concentric steps, an upwardly facing water collecting trough surrounding the impeller, the inner wall of said trough being mounted on said conduit in spaced relation to its outer end so that the end of the conduit extends into the trough, and a rearwardly inclined annular baffle mounted on the end of said trough with its outer edge projecting into the trough and in substantially the plane of the apex of the trough, the inner edge of the baffle projecting into the conduit and terminating in a water collecting channel, the impeller being arranged to discharge upon the front wall of the trough, the front wall of the trough terminating in a water collecting channel.

5. An air conditioner comprising a cylindrical air conduit, a centrifugal water impeller having a plurality of concentric steps, an upwardly facing water collecting trough surrounding the impeller, the inner wall of said trough being mounted on said conduit in spaced relation to its outer end so that the end of the conduit extends into the trough, and a rearwardly inclined annular baffle mounted on the end of said trough with its outer edge projecting into the trough and in substantially the plane of the apex of the trough, the impeller being arranged to discharge upon the front wall of the trough.

6. An air conditioner comprising a cylindrical air conduit, a dished centrifugal water impeller having a plurality of concentric steps, a water collecting trough of inwardly facing V-section, the inner wall of said trough being mounted on said conduit in spaced relation to its outer end so that the end of the conduit extends into the trough, and a rearwardly inclined annular baffle mounted on the end of said conduit with its outer edge projecting into the trough and in substantially the plane of the apex of the trough, the inner edge of the baffle projecting into the conduit and having an outwardly turned flange on its edge providing a water collecting channel, the plane of the face of the impeller being in the plane of the forwardly inclined front wall of the trough, the front wall of the trough having an

inturned flange on its front edge forming a water collecting channel.

7. An air conditioner comprising a cylindrical air conduit, a dished centrifugal water impeller having a plurality of concentric steps, a water collecting trough of inwardly facing V-section, the inner wall of said trough being mounted on said conduit in spaced relation to its outer end so that the end of the conduit extends into the trough, and a rearwardly inclined annular baffle mounted on the end of said conduit with its outer edge projecting into the trough and in substantially the plane of the apex of the trough, the inner edge of the baffle projecting into the conduit and having an outwardly turned flange on its edge providing a water collecting channel.

8. An air conditioner comprising a cylindrical air conduit, a water impeller having a plurality of concentric steps, a water collecting trough of inwardly facing V-section, the inner wall of said trough being mounted on said conduit in spaced relation to its outer end so that the end of the conduit extends into the trough, and a rearwardly inclined annular baffle mounted on the end of said conduit with its outer edge projecting into the trough and in substantially the plane of the apex of the trough, the inner edge of the baffle projecting into the conduit.

9. An air conditioner comprising an air conduit, means for drawing air into the end of said conduit, a centrifugal water impeller, an inwardly facing water collecting trough surrounding said impeller, the inner end of said trough being mounted on said conduit in spaced relation to its end, and an annular baffle mounted on the front end of the conduit to provide a closed joint therebetween with its front edge projecting into the trough and its inner edge projecting into the conduit.

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