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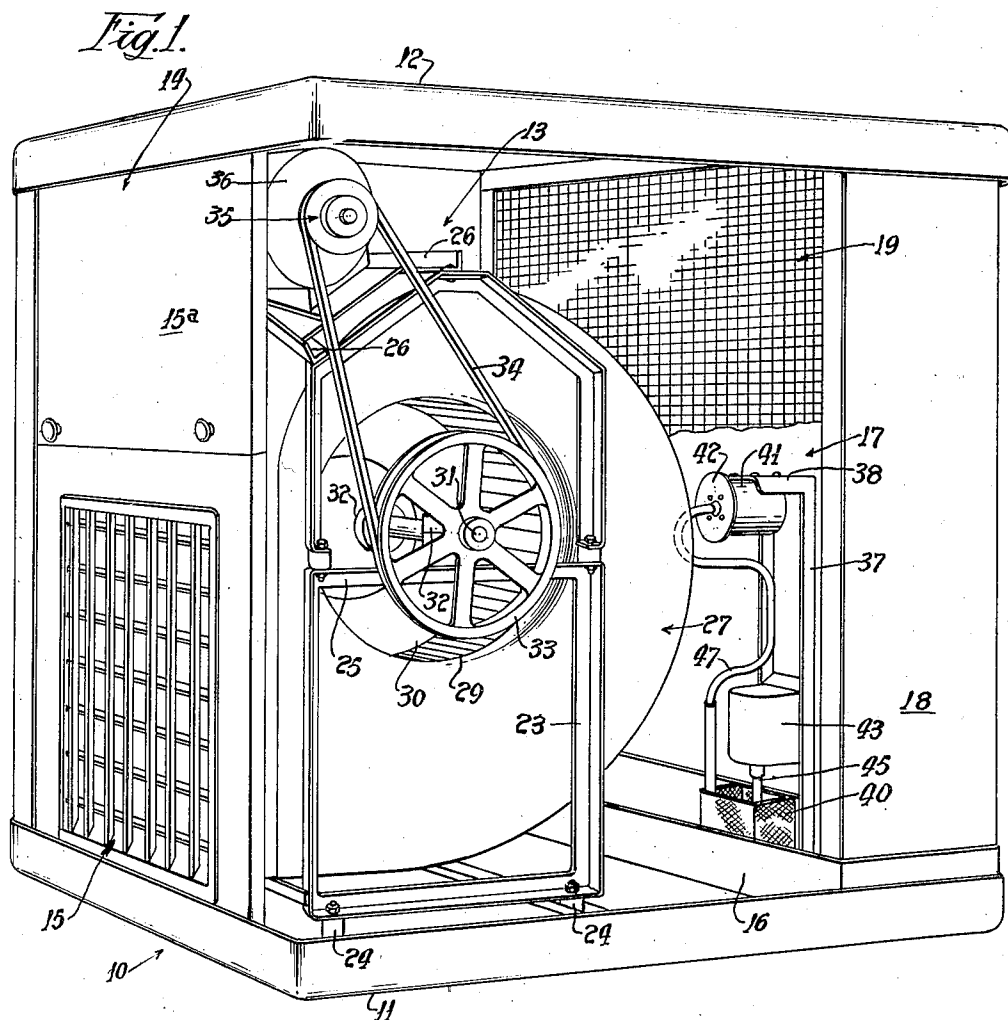
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2,225,740

AIR CONDITIONING APPARATUS

Filed Feb. 23, 1939

3 Sheets-Sheet 1



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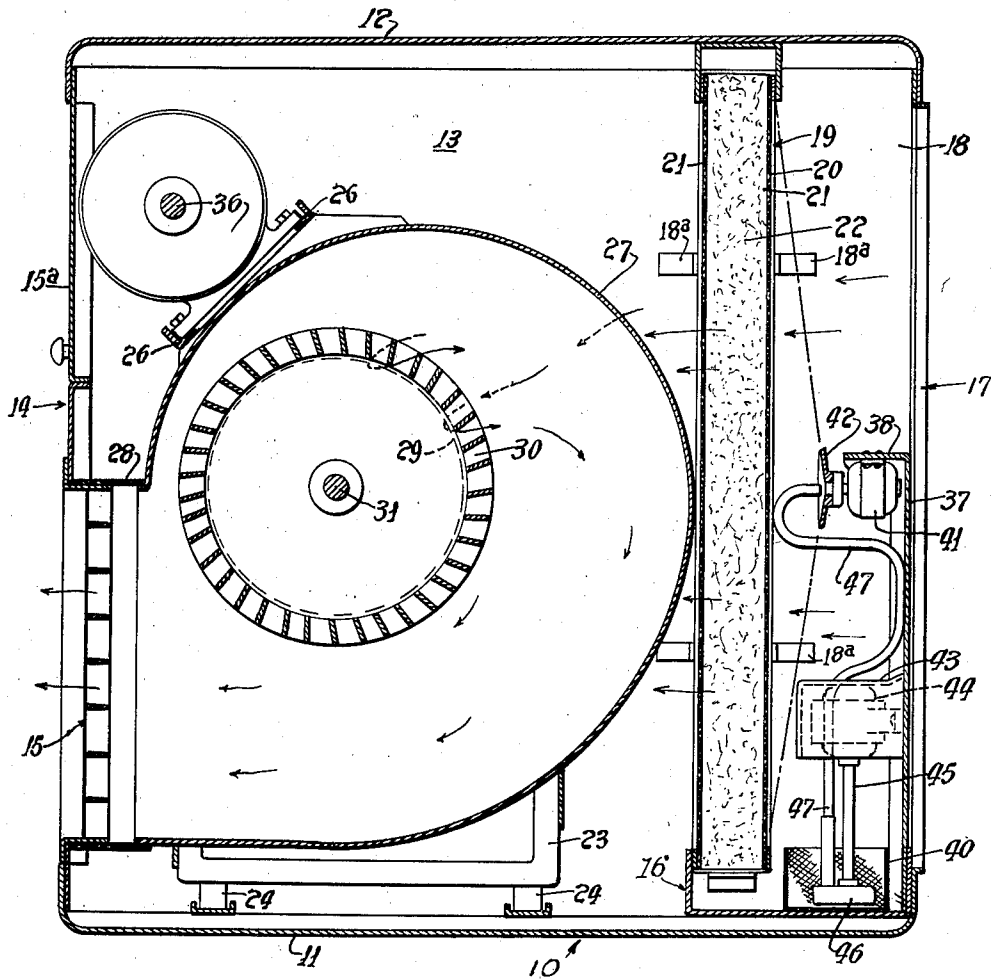
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Fig. 2.



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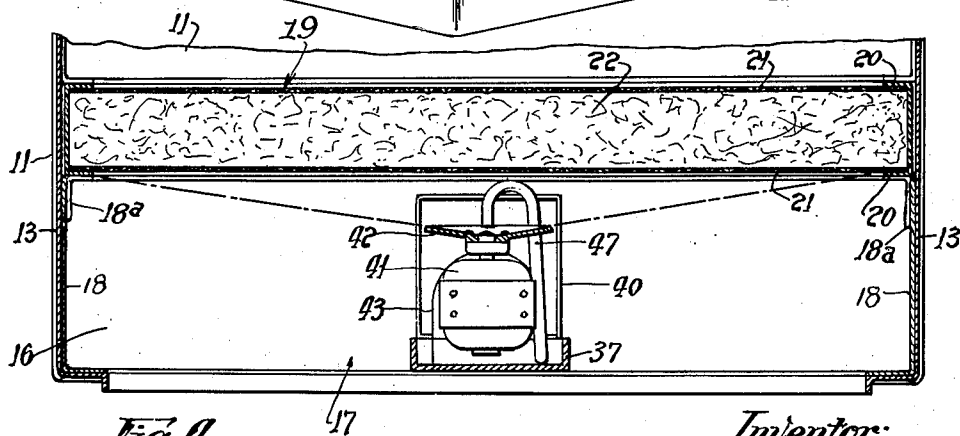
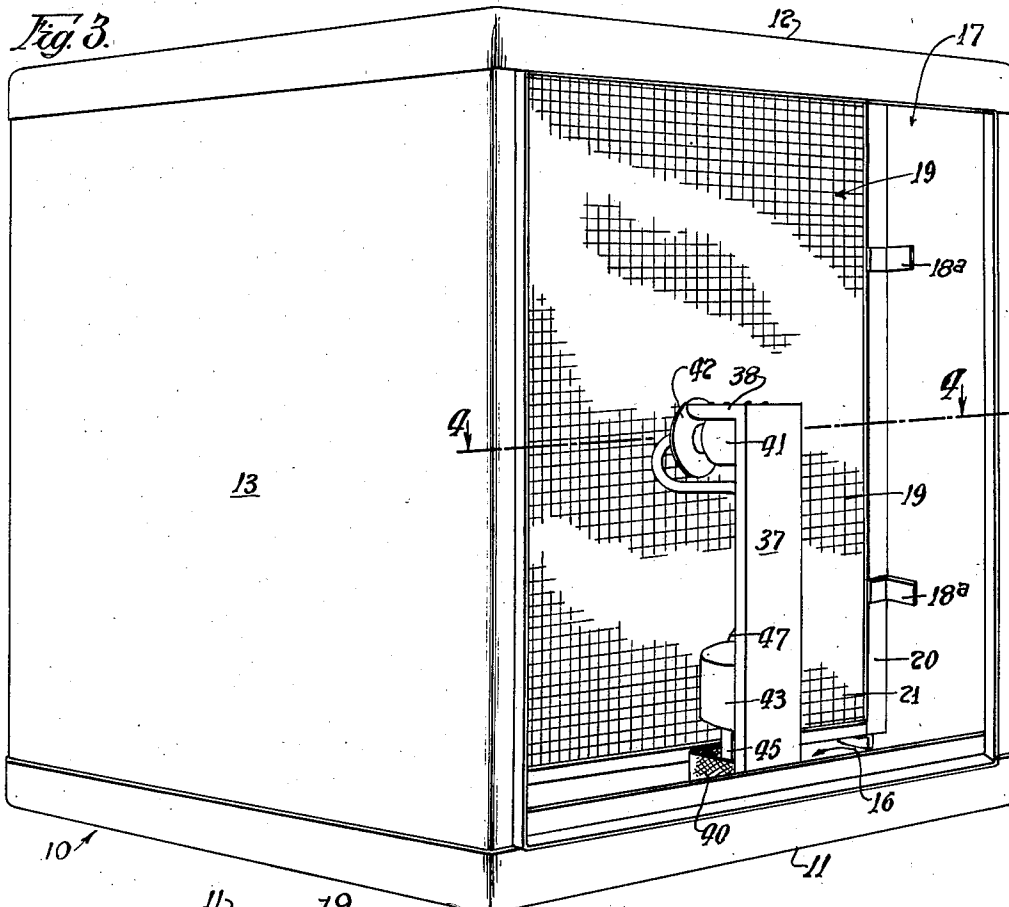
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UNITED STATES PATENT OFFICE

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AIR CONDITIONING APPARATUS

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Application February 23, 1939, Serial No. 257,827

9 Claims. (Cl. 261—90)

This invention relates to improvements in air conditioning apparatus and it consists of the matters hereinafter described and more particularly pointed out in the appended claims.

5 The apparatus with which the present invention is more especially concerned, is of the smaller unitary type that includes an air filter in the form of a fibrous mat to which water is applied, for a cleaning and humidifying action on the air
10 passed through the apparatus. Heretofore in apparatus of this kind, water was supplied to the top edge of the filter mat and the excess collected in a tank arranged beneath the same. This
15 manner of supplying the water content to the filter mat is not satisfactory. It does not permit of an even distribution of the water throughout the mat so that air cleaning action is spotty and it does not keep the mat clean because the matter
20 removed from the air passing through the mat accumulates upon the inlet face thereof. Furthermore, the presence of the water supply pipe above the filter mat makes it more difficult to remove the mat for back washing. Therefore, the
25 mat is not backwashed as often as it should be and it becomes foul and clogged to such an extent that it resists abnormally, the passage of air therethrough. This reduces the efficiency of the apparatus as a whole.

30 One of the objects of the present invention is to provide an apparatus of this kind which is not only more simple so that it can be made at low cost, but which eliminates the objections previously inherent in apparatus of this kind.

35 Another object of the invention is to provide apparatus of this kind, which includes a more efficient means for supplying water to the filter mat whereby the water is better distributed over the inlet face of the mat with a washing action
40 which prevents the accumulation of foreign particles thereon so that the mat cannot become clogged.

45 A further object of the invention is to provide apparatus of this kind, in which the water supply pipe for the filter mat is so arranged that the filter mat may be easily removed and replaced without interference by said pipe.

50 The above mentioned objects of the invention, as well as others, together with the advantages thereof will more fully appear as the specification proceeds.

In the drawing:

55 Fig. 1 is a perspective view of an apparatus embodying the preferred form of the invention, with one side of the casing shown as removed

for a better illustration of the parts within the casing.

Fig. 2 is a vertical longitudinal sectional view through the apparatus.

Fig. 3 is a perspective view of the apparatus 5 which better shows the inlet side of the apparatus.

Fig. 4 is a horizontal sectional view through the air inlet end of the apparatus as taken on the line 4—4 of Fig. 3. 10

Referring now in detail to that embodiment of the invention illustrated in the accompanying drawings: 10 indicates as a whole the casing of the apparatus and which casing is rectangular and includes a bottom 11, a top 12, sides 13—13 15 and a front 14. The sides and the top of the casing are removable from the other parts thereof, whereby the operating parts within the casing are more readily accessible for inspection, cleaning and servicing thereof. 20

The bottom end portion of the front 14 is made to form a louvered opening 15 which constitutes the air outlet of the casing and above said opening is provided a removable panel 15a for easy access to operating parts located in that portion 25 of the casing back of said panel.

In the bottom portion of the rear end of the casing, which is open so as to provide the air inlet 17 of the casing as appears in Fig. 3, is located a rather shallow open-top reservoir, tank or pan 16 which extends from substantially one side to the other of the casing. Rising from each side of the reservoir are upright panels 18 that form the sides of a spray chamber in communication with the air inlet of the casing. In the sides of the spray chamber and carried by the panels 18 are pairs of vertically spaced guide clips 18a (see Fig. 3) in which a unitary air filter means 19 is disposed so as to overhang the front portion of the reservoir, tank or pan 16 before mentioned. 30
35 This air filter means may be positioned in the casing by slidably engaging the lateral margin thereof between the pairs of guide clips carried by the panels, when the top of the casing has been removed. Said filter means which is in the form of a mat, has an area approximating that of the cross section of the casing 10 above the reservoir 16, and includes a rectangular boundary frame 20 with front and rear facings of wire mesh 21 and a filler of fibrous material 22. 40
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In the casing between said air filter means 19 and the front 14 of the casing and spaced inwardly from each side 13 thereof is a pair of upright open frames 23—23. Only one of said frames 55

appears in Fig. 1. Said frames are secured to the bottom 11 of the casing, in spaced relation, by spacer blocks 24. Each frame includes a horizontal cross member 25 and the top end portions of both side frames are cross connected by angle bars 26. The purpose of said cross members and angle bars will appear later.

27 indicates a blower casing arranged between and supported by the side frames 23. The discharge end of the blower casing, which is the front bottom end thereof, is connected by a duct section 28 (see Fig. 2) to the louvered discharge opening in the front wall of the casing. The blower casing has an inlet opening 29 in each side and in said casing is located the rotor 30 thereof of the duplex squirrel-cage type. This rotor is mounted on a shaft 31 arranged coaxially with the inlet openings 29 and said shaft is journaled at its opposite ends in bearing blocks 32 carried by the cross bars 25 of the side frames 23.

A pulley wheel 33 is fixed to one end of the shaft 31 outside of the associated side frame and this pulley is driven by a belt 34 from a smaller pulley 35 carried by the armature shaft of a motor 36. This motor is located in the upper front end corner of the casing behind the panel 15a and its feet are fixed to the angle bars 26 that connect the top end of the side frames 23—23 together. It is apparent that when the motor 36 is energized, the blower produces a movement of air, in through the air inlet 17 at the rear of the casing, through the air filter means 19 and into the casing 10 in advance of said filter means. Such air is then drawn into each side inlet 29 of the blower casing to pass out through the duct 28 and then through the louvered air outlet opening 15 for the casing 10 into the space to be air conditioned.

At the rear portion of the reservoir or tank 16 in the vertical median plane of the air inlet opening 17 is an upright support 37 having a top end forward extension 38. This support may be conveniently formed from a piece of channel iron with its flanges directed forwardly. The bottom end of the web of said member is fixed to the rear wall of the reservoir. Associated with the reservoir in front of the support 37, is a strainer basket 40 of relatively fine wire mesh.

A small electric motor 41 is suspended from the underside of the extension 38 of the support and a centrifugal spraying disk 42 is secured to the front end of the armature shaft of said motor. Said disk has a concaved front face and the axis of said disk as exemplified by the armature shaft of the motor is located substantially centrally with respect to the area or outline of the air filter means 19.

An open bottom housing 43 is fixed to the front side of the support 37 and this housing encloses and supports motor 44 (see Fig. 2) with its armature shaft 45 extending vertically downward. The bottom end of said shaft 45 carries the rotor of a small pump 46 located at the bottom of the reservoir within the basket 40 so as to be submerged in the water in said reservoir. The outlet side of said pump has one end of a conduit 47 secured thereto. The other end of said conduit is arranged to discharge axially into or upon the centrifugal spraying disk 42 and the mid portion of said conduit is so bent as to engage with the upright support 37 and to which it is secured. With the arrangement described both motors are well protected from water spray.

When both motors 37 and 44 are energized, the pump 46 delivers water axially to the spraying

disk 42 which by reason of its convex front face, throws the water centrifugally radially outwardly and forwardly upon the rear inlet face of the air filter means for substantially a complete coverage of said face. This wets and washes down said inlet face of the air filter means and as the discharge of said sprayed water is generally in the direction of the passage of air through the filter means, a part of said water is carried into the fibrous mat 22 of the filter means to insure saturation thereof. Thus the air as it passes between the fibers of the mat comes into intimate contact with the wet fibers thereof, so as to be cleaned and cooled thereby.

By spraying water upon the inlet face of the filter means, said face is kept clean because such dirt particles as may be carried in by the incoming air is washed from said inlet face of the filter means into the reservoir or tank. The excess water from the mat drains into said reservoir 20 or tank where it is again drawn into the pump 46 and then discharged axially against the centrifugal spraying disk 42 to be resprayed upon the inlet face of the filter means. Of course, the basket 40 in the tank screens out the dirt particles washed from the mat so that the water returned to the spraying disk is substantially clean.

Water for replenishing the reservoir 16 may be supplied from a service pipe controlled by a float mechanism which may be located at one end of the reservoir. As this mechanism is of the conventional type and forms no particular part of the present invention, it is not necessary to illustrate or describe the same in detail.

It is to be noted that the water is sprayed upon the inlet face of the filter means in the direction of the flow of air in through the air inlet 17 and filter means 19 respectively. Thus the incoming air assists in applying the sprayed water to the face of the filter and into the fibrous material thereof so that the entire mat is evenly wetted. Also, such dirt particles as may be entrained with the air lodges upon the inlet face of the filter and is washed therefrom by the sprayed water to be carried by the excess thereof into the reservoir. As this reservoir is accessible from the open rear inlet end of the casing, it may be readily cleaned when necessary.

With this arrangement, no header pipes are disposed above the top edge of the filter mats for supplying water thereto so that there are no pipes in the way or which require removal when it is desired to remove the filter mat from its position in the casing.

As a better distribution of water is effected by the centrifugal spraying disk, much better air cleaning action is afforded by the use of a single air filter mat. This cuts down the resistance to the passage of air so that smaller motors may be employed to advantage and this, of course, reduces initial costs.

While in describing the invention I have referred in detail to the form, arrangement and construction of the parts involved, the same is to be considered only in the illustrative sense so that I do not wish to be limited thereto except as may be specifically set forth in the appended claims.

I claim as my invention:

1. In an apparatus of the kind described, a casing having an air inlet and an air outlet, air filter means in said casing including a fibrous mat capable of being water saturated, arranged between said inlet and said outlet, centrifugal

means in said casing between said inlet and said filter means for spraying water in a combined radial and axial direction and directly upon the inlet face of said filter means, and means for causing a blast of air to pass through said inlet, through said filter means to carry the sprayed water into said mat to saturate the fibres thereof and through said air outlet.

2. In an apparatus of the kind described, a casing having an air inlet and an air outlet, air filter means in said casing including a fibrous mat capable of being water saturated, arranged between said inlet and said outlet, centrifugal means in said casing between said inlet and said filter means for spraying water in a combined radial and axial direction and directly upon the inlet face of said filter means, means in said casing for collecting excess water from said filter means, means for delivering water from said collecting means to said centrifugal means, and means for causing a blast of air to pass through said inlet, through said filter means to carry the sprayed water into said mat to saturate the fibres thereof and through said outlet.

3. In an apparatus of the kind described, a casing having an air inlet and an air outlet, air filter means in said casing including a fibrous mat capable of being water saturated, arranged between said inlet and said outlet, means providing a tank in said casing beneath said filter means, centrifugal means in said casing between said inlet and said filter means for spraying water in a combined radial and axial direction and directly upon the inlet face of said filter means, the excess water from said filter means draining back into said tank, means for delivering water from said tank to said centrifugal means, and means for causing a blast of air to pass through said inlet, through said air filter means to carry the sprayed water into said mat to saturate the fibres thereof and through said outlet.

4. In an apparatus of the kind described, a casing having an air inlet and an air outlet, air filter means in said casing including a fibrous mat capable of being water saturated, arranged between said inlet and said outlet, means providing a tank in said casing beneath said filter means, centrifugal means in said casing between said inlet and said filter means for spraying water in a combined radial and axial direction and directly upon the inlet face of said filter means, the excess water from said filter means draining back into said tank, means for delivering water from said tank to said centrifugal means, and means in said casing between said air filter means and said outlet for causing a blast of air to pass through said inlet, through said air filter means to carry the sprayed water into said mat to saturate the fibres thereof and out through said outlet.

5. In an apparatus of the kind described, a casing having an air inlet and an air outlet, air filter means in said casing including a fibrous mat capable of being water saturated, arranged between said inlet and said outlet, means in said casing providing a water collecting tank beneath said filter means, a support arranged between said inlet and said filter means, a motor driven centrifugal disc carried by said support and having a concaved side facing said filter means and adapted to spray water in both a radial and axial direction and directly upon the inlet face of said filter means, means for delivering water from said tank to said disc, and means for causing a blast of air to pass through said inlet, through

said filter means to carry the sprayed water into said mat to saturate the fibres thereof and through said air outlet.

6. In an apparatus of the kind described, a casing having an air inlet and an air outlet, air filter means in said casing including a fibrous mat capable of being water saturated, arranged between said inlet and said outlet, means in said casing providing a water collecting tank beneath said filter means, a support arranged between said inlet and said filter means, a centrifugal spraying disc and a motor therefor carried by said support, said disc having a concaved side facing said filter means and adapted to spray water in both a radial and axial direction and directly upon the inlet face of said filter means, means also carried by said support and including a pump arranged in said tank for supplying water to said disc, and means for causing a blast of air to pass through said inlet, through said filter means to carry the sprayed water into said mat to saturate the fibres thereof and through said air inlet.

7. In an apparatus of the kind described, a casing having an air inlet and an air outlet, filter means in said casing including a fibrous mat capable of being water saturated, arranged between said inlet and said outlet, said filter means having an area approximating that of said air inlet, means in said casing providing a water collecting tank beneath said air filter means, means providing a motor driven centrifugal spraying disc arranged centrally of that face of the filter means facing said inlet and which disc has a concaved side facing said filter means and adapted to spray water in both a radial and axial direction and directly upon and over substantially the entire area of that face of said filter means facing said inlet, means for supplying water from said tank to said disc, and means for causing a blast of air to pass through said inlet, through said filter means to carry the sprayed water into said mat to saturate the fibres thereof and through said air outlet.

8. In an apparatus of the kind described, a casing having an air inlet and an air outlet, an air filter means in said casing between said inlet and said outlet and including a fibrous mat capable of being water saturated, a tank arranged at the bottom of the casing beneath said filter means adjacent said inlet, a centrifugal spraying unit including a support rising from said tank, a driven centrifugal spraying disc having a concaved side facing the filter means and adapted to spray water in a combined radial and axial direction and directly upon the inlet face of said filter means, said spraying unit further including a driven pump for delivering water axially to the concaved side of said disc so as to be sprayed upon the inlet face of said filter means, and means for causing a blast of air to pass through said inlet, through said filter means to carry the sprayed water into the mat to saturate the fibres thereof and through said outlet.

9. In an apparatus of the kind described, a casing having an air inlet and an air outlet, an air filter means in said casing between said inlet and said outlet and including a fibrous mat capable of being water saturated, means in said casing providing a water collecting tank beneath said inlet and said filter means, a centrifugal spraying disc and a driving motor therefor carried by said support near the upper end thereof and which disc has a concaved side facing said

filter means, means also carried by said support and including a pump arranged in said tank for supplying water to said disc, conduit means for said pump adapted to discharge water substantially axially against said concaved side of said disc so that said water is sprayed in a combined radial and axial direction and directly

upon the inlet face of said filter means, and means for causing a blast of air to pass through said inlet, through said filter means to carry the sprayed water into said mat to saturate the fibres thereof and through said outlet.

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