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(54) A self-cleaning hood for recirculating and purifying air.

(57) A self-cleaning hood for recirculating and purifying air comprises a casing (5), and an internal fan unit (35) by which polluted air is drawn in through inlet holes (25) and returned clean to the room by way of an outlet (38). Inside the casing, the air passes through a purification device consisting in a plurality of hollow cylinders (11) affording pierced walls (12, 13), mounted rotatably about respective horizontal axes internally of a compartment (18) into which the air is taken via the inlet holes (25) and caused to penetrate the cylinders (11) radially ; the air then emerges from compartment, purified, by way of openings (31) coinciding with the ends of the cylinders. The cylinders (11) are partially immersed in a cleaning liquid (24) and set in rotation by a mechanical drive train (27, 28, 29) coupled to a motor (30) such that the pierced walls (12, 13) will be bathed continuously with a film of the cleaning liquid, which serves both to retain the pollutant particles entrained in the flow of air and to wash the cylinders (11).

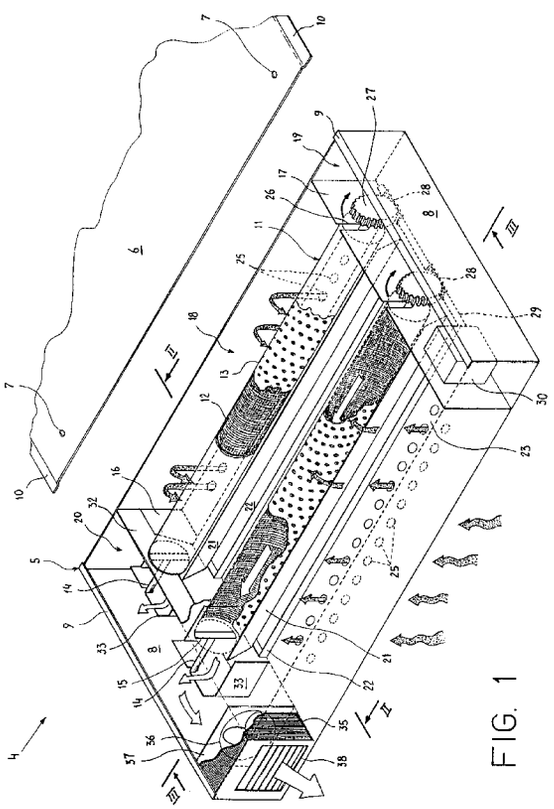

FIG. 1

EP 0 567 200 A2

The present invention relates to a recirculating hood by which air is extracted from a room, subjected to a depolluting treatment and returned purified to the room.

In particular, though not exclusively, the invention relates to a hood for the household kitchen, designed for fitment to the bottom face of a wall unit in a position directly above a cooker hob, in such a way as to draw in and clean the flow of air polluted by the products of combustion and by greases released from foods in cooking.

Recirculating hoods do not require additional tubes or pipes to exhaust air to the external environment, but must incorporate a highly efficient purification system.

The most widespread purification system makes use of filtration panels fitted removably to the air intake of the hood.

The panels in question consist generally in a metal or plastics mesh serving to ensure that the more consistent particles of grease are neither returned to the room nor deposited on the body of the fan unit or the internal surfaces of the hood.

One drawback betrayed by such filtration panels is that frequent washing and servicing operations are required, due to the fact that the filter action is concentrated disadvantageously on an area adjacent to the fan inlet.

In addition, the removal of the filtration panels is a somewhat complicated operation, such as can be carried out only by persons having reasonable dexterity and with the aid of proper tools.

There are also purification systems in which the simple mesh panel is associated with a number of further panels fashioned from other materials (e.g. rock fibre) to the end of increasing the filtration capacity of the hood.

Even with solutions of this type, however, users remain committed to frequent cleaning and/or replacement of the filter elements.

Moreover, the multiplication of the filtration surfaces results in the need for extremely powerful electric fan units, which in turn are noisier in operation and tend to create excessive draught in the surrounding environment.

Recirculating hoods also utilize filtration panels with activated carbon granules. Such filters have the capacity to adsorb vapour given off in the process of cooking, but will also release the vapour when invested by dry air; furthermore, the effectiveness of the adsorbing action is inversely proportionate to the increase in temperature and velocity of the flow of polluted air directed through the activated carbon.

Other activated carbon filters are impregnated with chemical reagents by which the pollutant substances are converted into compounds that remain fixed chemically to the activated carbons.

Nonetheless, filters containing this type of activated carbon are necessarily disposable, as replacement becomes necessary once the absorption capacity of the chemical reagents has been used up.

The primary object of the invention is to provide a hood for recirculating and purifying air, suitable for mounting to the wall unit of a modular fitted kitchen, exhibiting compact dimensions and embodied in such a way as to overcome or minimize the drawbacks presented by prior art embodiments.

In particular, it is an object of the present invention to obtain an improved purification of air at low energy consumption and noise levels.

A further object of the invention is to rationalize the cleaning and servicing of the filter elements, limiting the requirement to occasional operations such as can be performed with ease by any given user.

The stated objects are realized in a self-cleaning hood as characterized by the appended claims.

The features and advantages of a hood according to the present invention will be more readily appreciated from the following description and from the two accompanying sheets of drawings, in which:

- fig 1 is an isometric projection of the hood according to the invention;
- fig 2 shows the hood in a cross section through II-II in fig 1;
- fig 3 shows the hood in a longitudinal section through III-III in fig 1.

Identical components are denoted by a common reference number in the above drawings.

With reference to the drawings, 4 denotes a cooker hood consisting essentially in a flat hollow casing 5 of which the side uppermost is enclosed by a cover 6.

The cover 6 is secured to the bottom face of a wall unit or cabinet (not illustrated) or other horizontal structure by means of screw fasteners insertable through a plurality of peripheral fixing holes 7.

The two flanks 8 of the casing 5 are fashioned with the top edges 9 bent at 90 toward the interior of the hood 4 in such a way as to engage slidably with corresponding lowered edge profiles 10 afforded by the cover 6.

To advantage, the casing 5 of the hood 4 according to the present invention houses a self-cleaning device for the purification of polluted air. In particular, such a self-cleaning device comprises two hollow cylindrical elements 11 disposed one beside the other and supported in such a way as to allow rotatation about respective horizontal axes.

More exactly, the peripheral sleeve of each cylinder 11 is composed of an inner wall 12 of mesh construction and a perforated outer wall 13 (fig 1), whilst the end of the cylinder 11 nearer to the source of the draught is open, and affords a respective pivot 14 projecting axially from a supporting diametral cross member 15.

The two cylinders 11 extend between two trans-

versely disposed baffles 16 and 17 by which the space compassed within the casing 5 is divided into a central air intake and purification compartment 18, a lateral compartment 19 housing drive means by which the cylinders 11 are set in rotation, and a lateral compartment 20 from which air is exhausted following purification.

In addition to the cylinders 11, the central intake and purification compartment 18 also houses two respective wetting and washing vessels 21, and two condensate drip trays 22.

Each vessel 21 is positioned beneath a corresponding cylinder 11 with its two ends secured respectively to the two baffles 16, 17.

Viewed in cross section, the single vessel 21 exhibits a substantially trapezoidal profile of which the longer parallel base is open and offered to the cylinder 11, and the shorter parallel base positioned at a given distance both from the periphery of the cylinder 11 and from the bottom wall 23 of the casing 5.

Figs 2 and 3 show the vessels 21 filled partly with a cleaning liquid 24 (e.g. water containing detergents and solvents) with properties capable of ensuring that the two cylinders 11 are both moistened and cleansed during operation of the hood 4.

The two drip trays 22 are positioned one beneath each of the two vessels 21, resting on the bottom wall 23 of the casing 5, in such a manner as to collect the droplets of condensate running off the external surfaces of the vessels 21.

The bottom wall 23 of the casing 5 affords a plurality of openings or holes 25, ordered in rows, through which the polluted air is drawn into the hood.

The baffle 17 compassing the lateral compartment 19 from which the cylinders 11 are driven is embodied with two vertical slots 26 serving to accommodate and support further respective pivots 14 extending from the adjacent ends of the two cylinders 11, which in this instance are enclosed. Each of the two pivots 14 supported by this same baffle 17 carries a respective gear wheel 27, keyed to the projecting end of the pivot and engaged in meshing contact with a corresponding portion of a worm 28 rigidly associated with a rod 29 set in rotation about its own axis by a drive unit 30 (a geared motor, for example).

The baffle 16 compassing the lateral compartment 20 from which purified air is exhausted affords two circular openings 31 of which the passage matches the external cross sectional profile of the two relative cylinders 11 at the open ends. More exactly, the baffle 16 comprises a movable portion 32 comparable to a guillotine, of which the lower edge incorporates two semi-circular profiles constituting the top halves of the circular openings 31.

With the guillotine portion 32 of the baffle raised, the cylinders 11 can be removed from the casing 5 if need be, for inspection and maintenance purposes.

The same lateral compartment 20 also houses two box elements 33, each having the top open to the space above and one side open to the adjoining baffle 16. One top edge of each such element 33 affords a vertical slot 34 serving to accommodate and support the pivot 14 extending from the open end of the corresponding cylinder 11.

35 denotes an axial flow fan unit installed in the forwardmost part of the exhaust compartment 20, of which the inlet side communicates with the space encompassed by the compartment 20 by way of a circular port 36 fashioned in a relative mounting flange 37. The outlet side of the fan unit 35 communicates with the surrounding environment by way of a quadrangular opening 38 created in the front wall of the casing 5.

The operation of the hood 4 according to the invention will now be described.

Having poured a quantity of cleaning liquid into the vessels 21 sufficient to ensure the full immersion of at least a portion of the inner and outer walls 12 and 13 of each cylinder 11 (fig 2), the fan unit 35 and the geared motor 30 are connected to the electrical power supply by way of a circuit and a relative switch (conventional in embodiment and therefore not illustrated).

Rotation is now transmitted from the geared motor 30 through the rod 29 and the worm portions 28 to the two gears 27, thence to the cylinders 11.

The cylinders 11 rotate about their respective axes at an angular velocity (between 5 and 8 rev/min) such that the peripheral surface of each one is bathed constantly by a thin film of the cleaning liquid 24. At the same time, polluted air is drawn by the fan unit 35 through the holes 25 in the bottom wall 23 of the casing 5 into the central compartment 18 and forced to pass through the perforated outer wall 13 and the mesh inner wall 12 of the cylinders 11, thereby entering into contact with the film of cleaning liquid.

It has been demonstrated by practical trials that the contact brought about between the polluted air and the film of cleaning liquid causes pollutant particulate matter to be retained by the walls of the cylinders 11.

Thereafter, the particulate matter is washed from the wall of the cylinder 11 by passing through the bath of cleaning liquid 24 and made to settle at the bottom of the relative vessel 21.

The air thus purified is conveyed axially along the two cylinders 11, directed through the open ends into the relative lateral compartment 20, and returned ultimately by the fan unit 35 to the room via the opening 38 in the front of the hood 4.

As discernible from the foregoing, the stated objects of improving purification and minimizing the drawbacks of the prior art are fully realized in the hood 4 according to the invention.

In effect, tests conducted by the applicant have shown that the hood 4 disclosed affords a greater

purification capacity at lower energy consumption and noise levels than is obtainable with hoods of existing design.

To advantage, with the self-cleaning feature afforded by the air purification device, servicing operations are reduced to an occasional inspection and/or renewal of the cleaning liquid 24 contained in the vessels 21. Moreover, the removal of the casing 5 from the cover 6 fixed to the kitchen wall unit or other horizontal structure is within the capability of any user, likewise the removal of the cylinders 11 from their supports in the casing 5 in order to effect such operations as may be necessary to keep the hood 4 in correct working order and hygienically safe.

Needless to say, the ultimate embodiment of the hood 4 might be dissimilar in some measure to that disclosed, without prejudice to the bounds of protection afforded by the appended claims.

For example, the cylinders 11 might be more in number than the two described and illustrated, and the device by which the cylinders are set in motion might consist in a rack and pinion drive, in which case the rack would be reciprocated, causing the pinions and cylinders to rotate back and forth in alternation.

Lastly, the same consideration applies to the removable means by which the cylinders 11 are retained, also the inlet holes 25 and the outlet opening 38, which might be embodied in a manner different to that described and illustrated.

Claims

1) A hood for recirculating and purifying air, by which polluted air is extracted from a room, subjected to a purification treatment and restored purified to the room, in particular a hood (4) for use in household kitchens comprising a casing (5), and internally of the casing, a fan unit (35) by which air is drawn through inlet holes (25), conveyed through purifying means (11) and returned to the room by way of an outlet opening (38),
characterized,

- in that the means by which polluted air is purified are self-cleaning and comprise hollow cylindrical elements (11) with pierced peripheral walls (12, 13), supported with freedom to rotate about respective horizontal axes, disposed one beside the other and accommodated removably within a compartment (18) into which polluted air is drawn by way of the inlet holes (25), penetrating the cylindrical elements (11) radially and emerging purified by way of openings (31) positioned to coincide with open ends of the cylindrical elements (11); and,
- in that the cylindrical elements (11) are part immersed in a cleaning liquid (24), contained in vessels (21) positioned beneath, and set in rotation by a motor (30) coupled to relative drive means (27, 28, 29) in such a manner that the pierced peripheral walls (12, 13) are bathed continuously in a film of the cleaning liquid by which pollutant substances entrained in the air directed radially into the cylindrical elements are held initially before being collected in the vessels (21) beneath.

2) A hood as in claim 1, wherein the peripheral sleeve of each cylindrical element (11) comprises an inner wall (12) of mesh embodiment and an outer wall (13) affording perforations.

3) A hood as in claims 1 and 2, comprising a casing (5) of flat hollow embodiment with a top cover (6) such as can be secured to the bottom face of a wall unit or other horizontal structure positioned above a cooker, wherein the casing (5) is associated removably with the cover (6) by way of flanks (8) having the top edges (9) bent at right angles toward the interior of the hood (4) in such as way as to create profiles capable of engaging slidably with corresponding lowered profiles afforded by the side edges (10) of the cover (6).

4) A hood as in preceding claims, wherein the cylindrical elements (11) extend between two transversely disposed baffles (16, 17) by which the space encompassed within the casing (5) is divided into a central compartment (18) affording inlet holes (25) to admit the polluted air and housing the cylinders (11) together with the vessels (21) and with condensate drip trays (22) located beneath the vessels, also a lateral compartment (19) from which the cylindrical eleents (11) are driven in rotation, housing the motor (30) and the relative drive means (27, 28, 29), and a lateral compartment (20) by way of which the open ends of the cylindrical elements (11) communicate with the fan unit (35) and with the outlet opening (38) from which purified air is exhausted.

5) A hood as in preceding claims, wherein the end of the cylindrical element (11) affords a pivot (14) projecting axially from a supporting diametral cross member (15).

6) A hood as in preceding claims, wherein the baffle (17) compassing the lateral compartment (19) from which the cylindrical elements (11) are driven affords vertical slots (26) serving to accommodate and support the pivots (14) projecting from the cylindrical elements (11).

7) A hood as in preceding claims, wherein the lateral compartment (20) from which purified air is exhausted houses supporting box elements (33) having one side open to the space above and one side open to the adjoining baffle (16), of which the top edges afford vertical slots (34) serving to accommodate and support the pivots (14) projecting from the cylindrical elements (11).

8) A hood as in preceding claims, wherein drive means by which the cylindrical elements (11) are set

in rotation comprise gear wheels (27) keyed to the projecting ends of the pivots (14) afforded by the cylindrical elements (11) and engaged in meshing contact with corresponding worm portions (28) afforded by a rod (29) set in rotation by the motor (30).

9) A hood as in preceding claims, wherein the transverse baffle (16) compassing the lateral compartment (20) from which purified air is exhausted affords circular openings (31) of which the passage matches the cross sectional profile of the rotating cylindrical elements (11), and a movable portion (32) functioning substantially in the manner of a guillotine and embodied with semi-circular profiles constituting the top halves of the circular openings (31), such that the cylindrical elements (11) can be removed from the casing (5) by displacing the guillotine portion (32).

A self-cleaning hood substantially as described and illustrated and as intended for the stated objects.

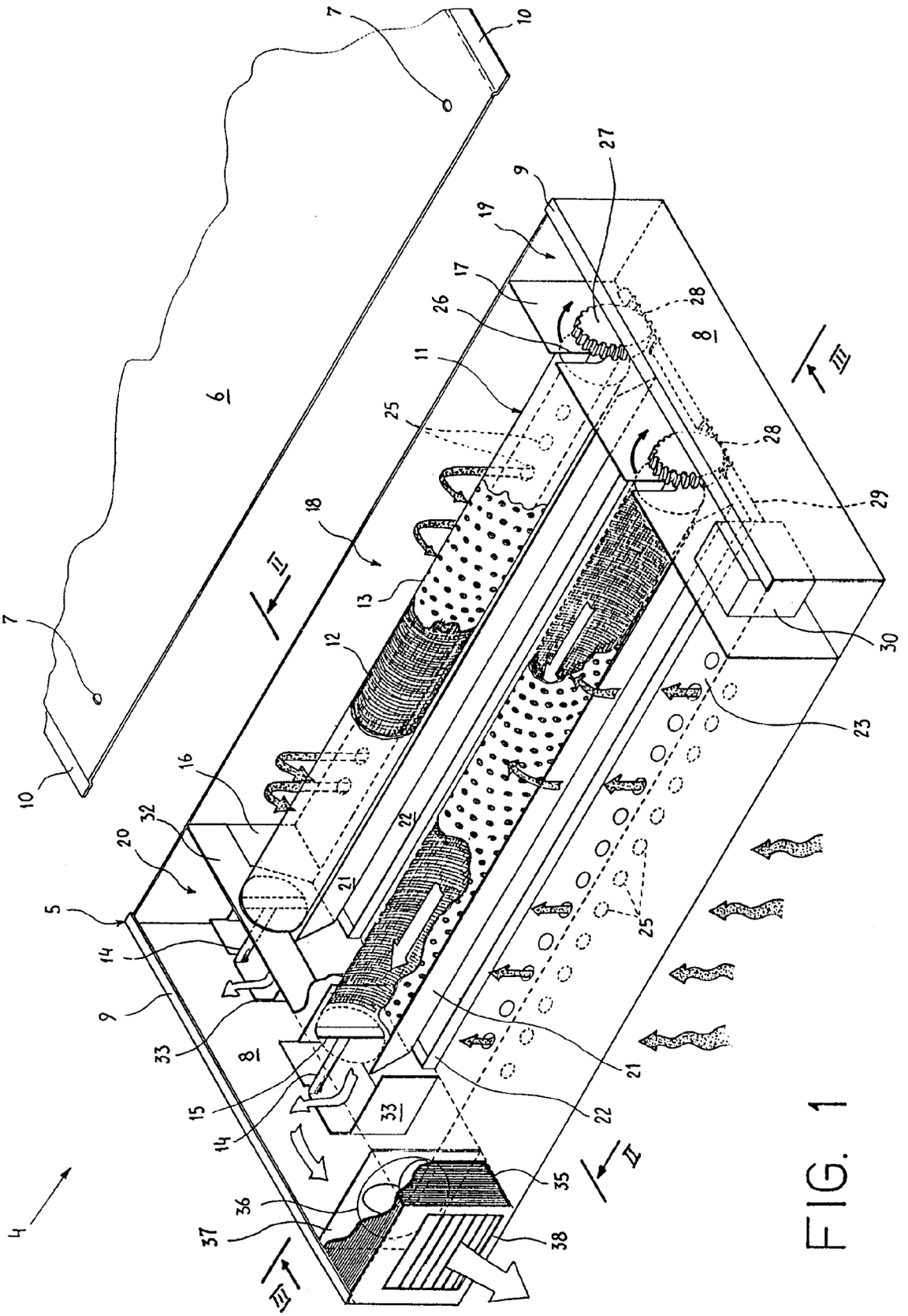
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FIG. 1

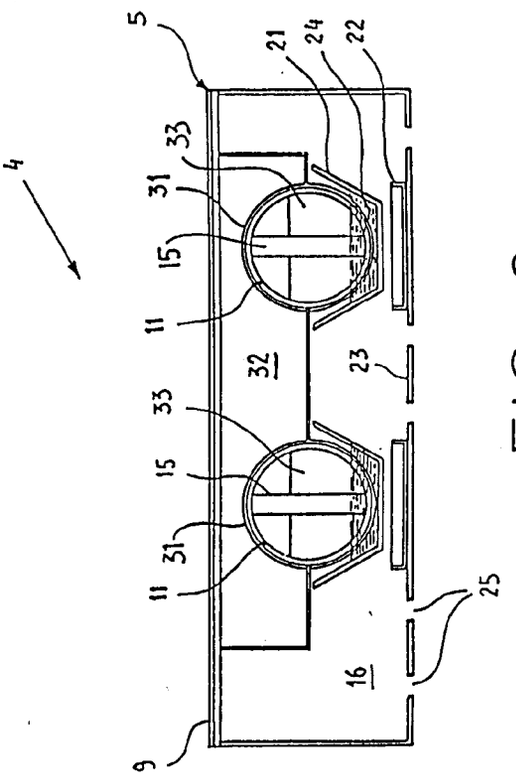
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FIG. 2

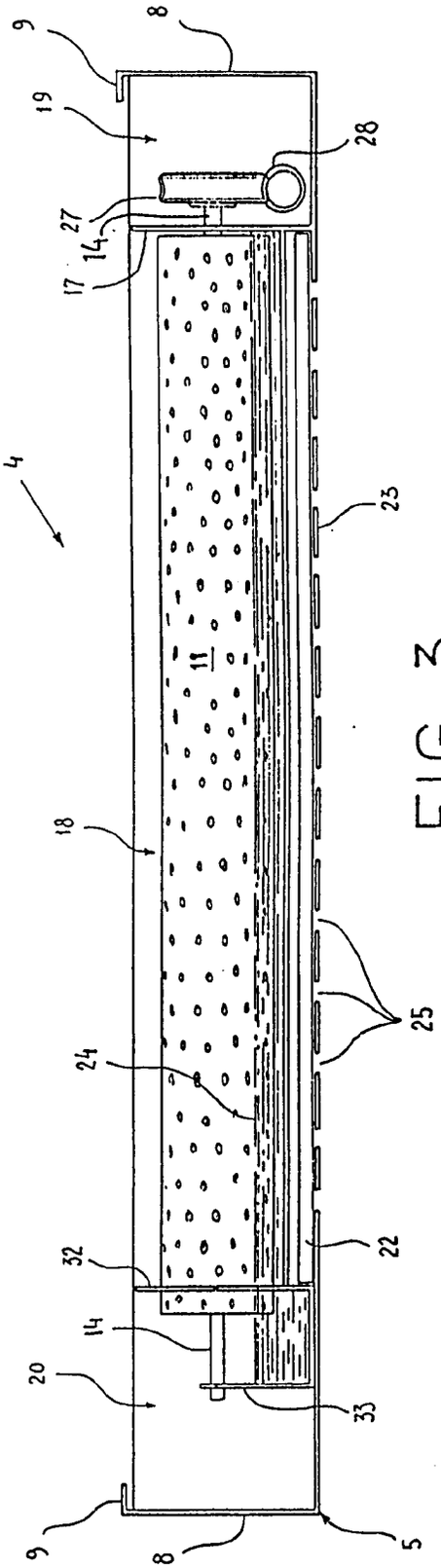
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FIG. 3