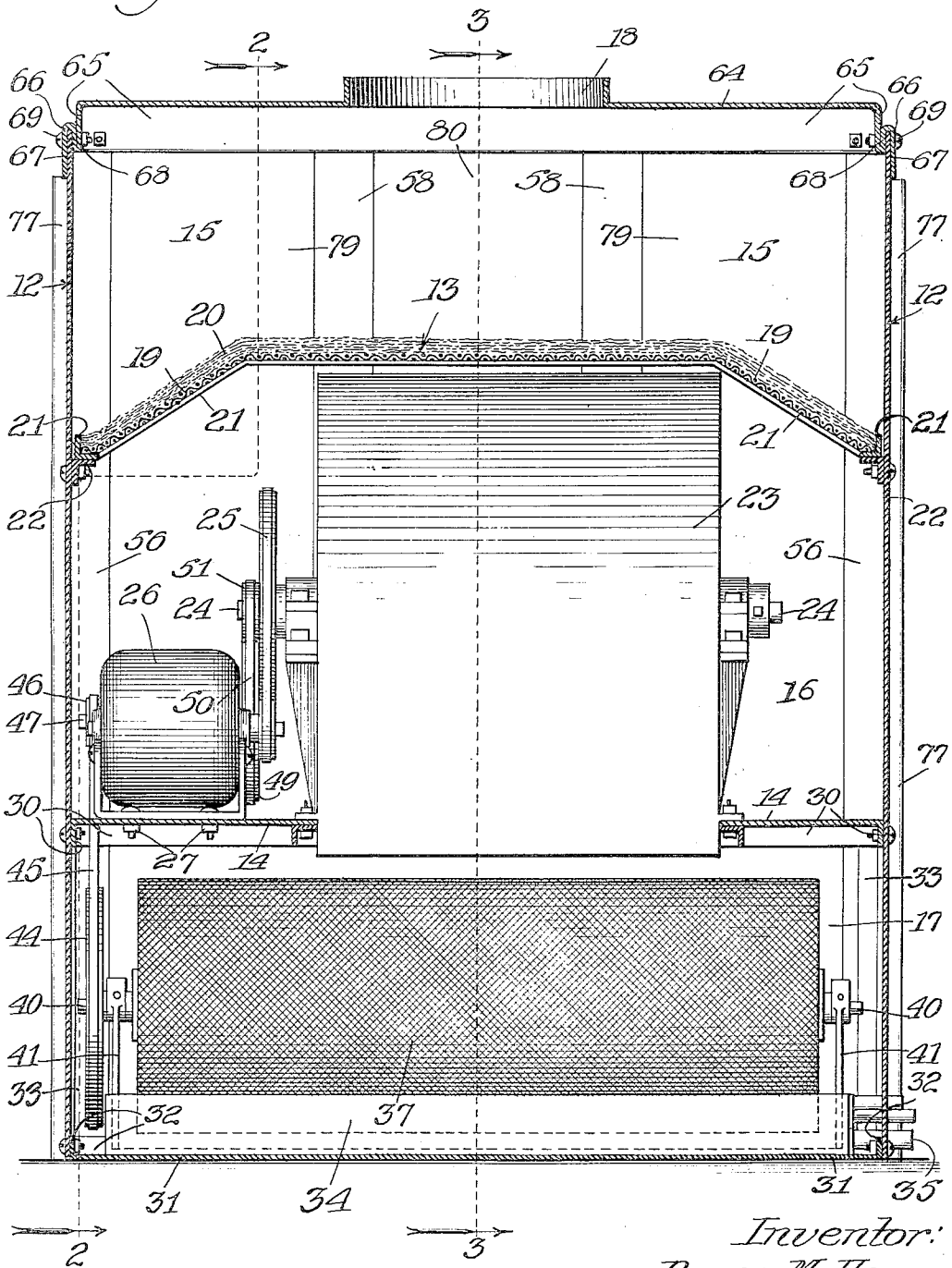
May 8, 1934. B. M. HESS 1,958,164

AIR CONDITIONING APPARATUS

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Fig. 1.



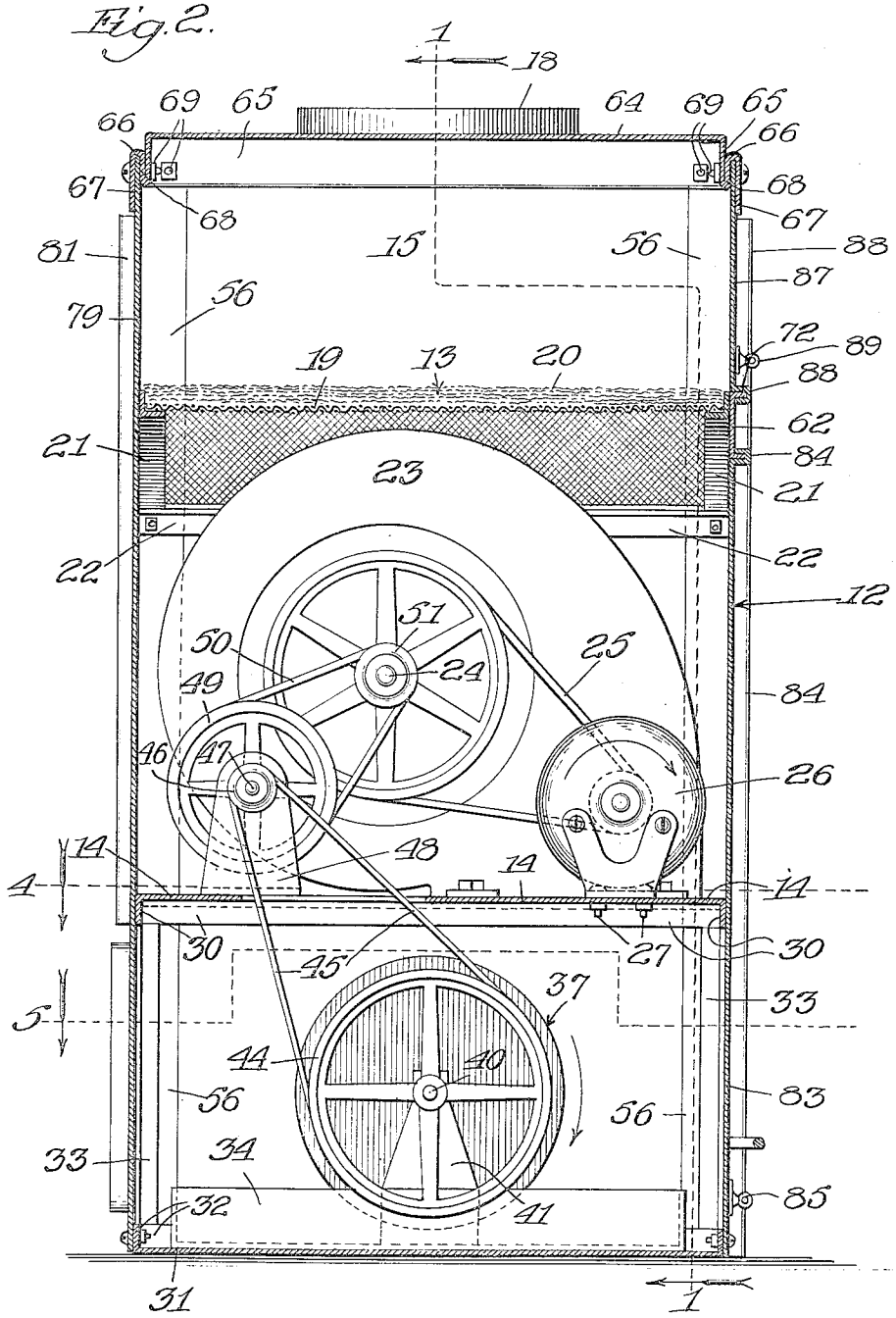
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AIR CONDITIONING APPARATUS

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Fig. 2.



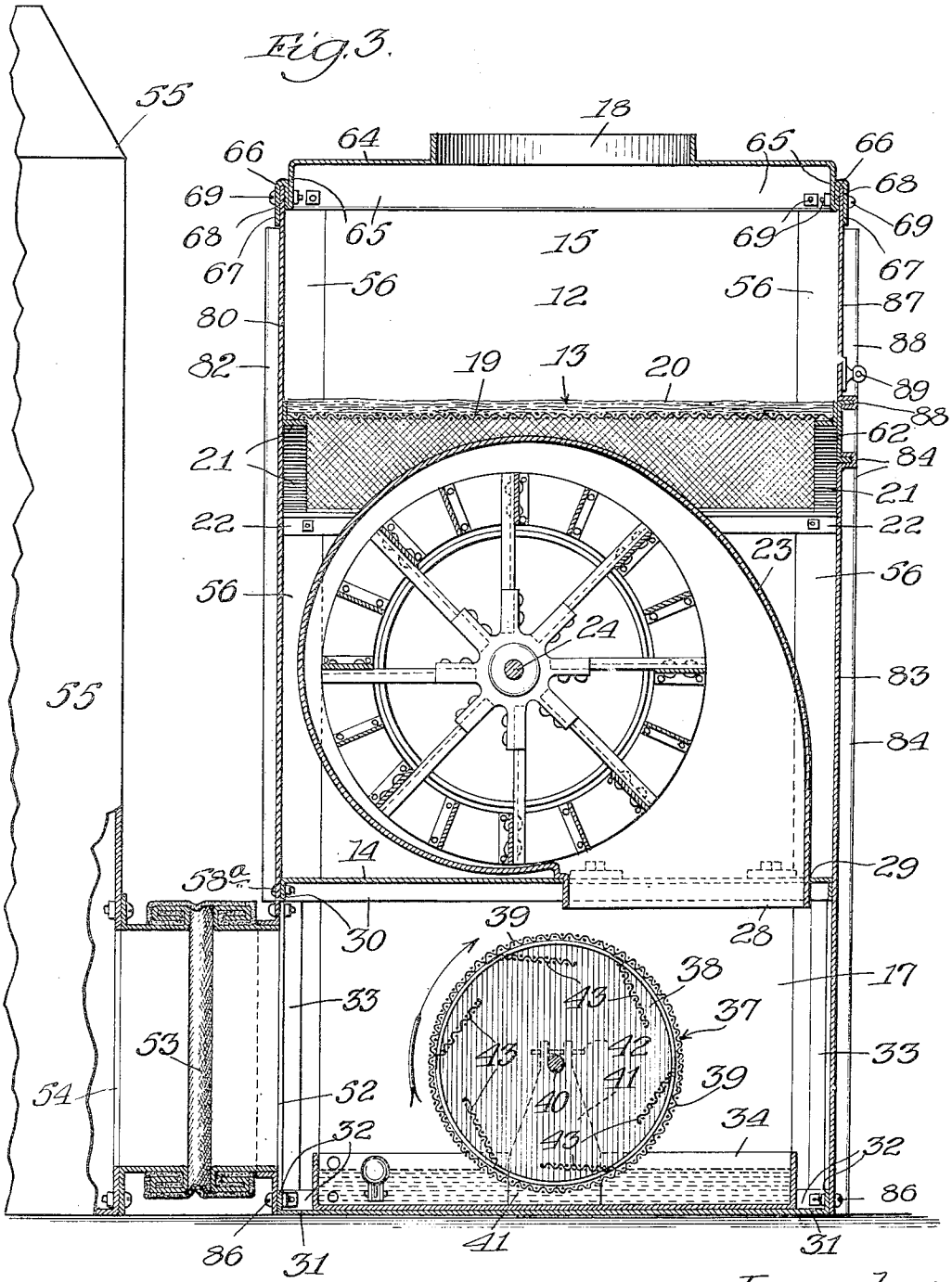
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AIR CONDITIONING APPARATUS

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Fig. 3.



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AIR CONDITIONING APPARATUS

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Fig. 4.

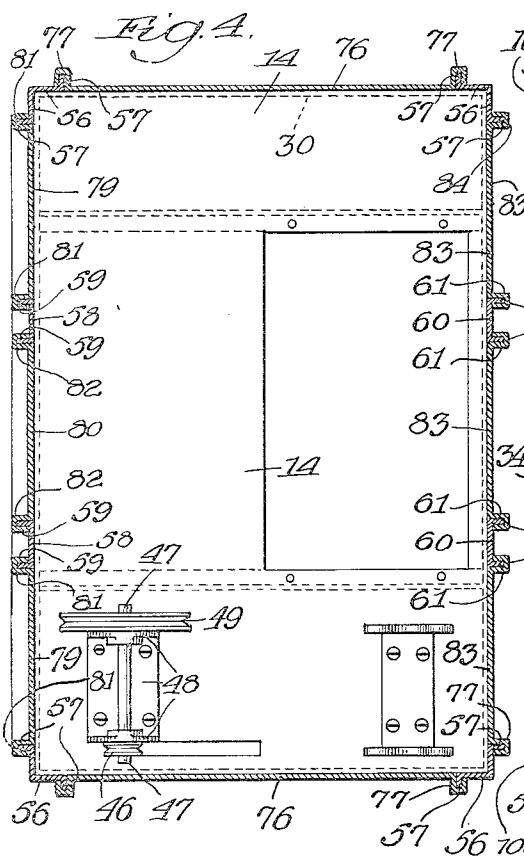


Fig. 5.

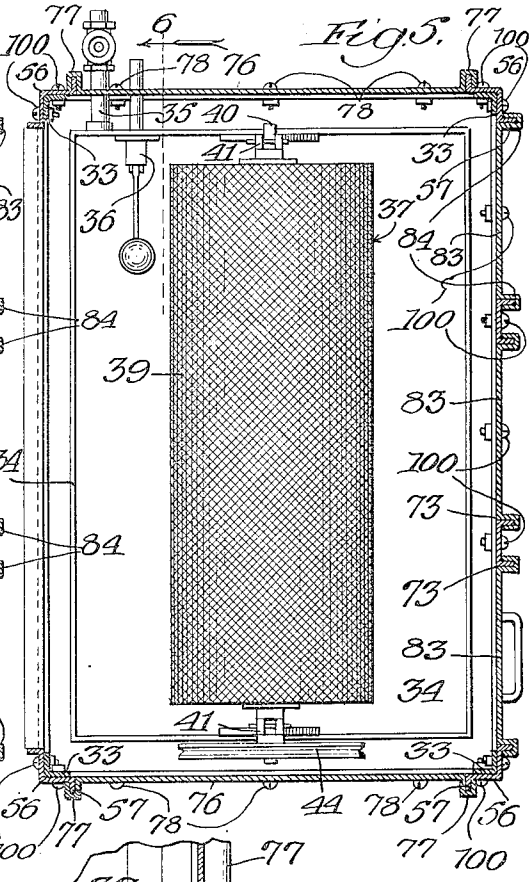
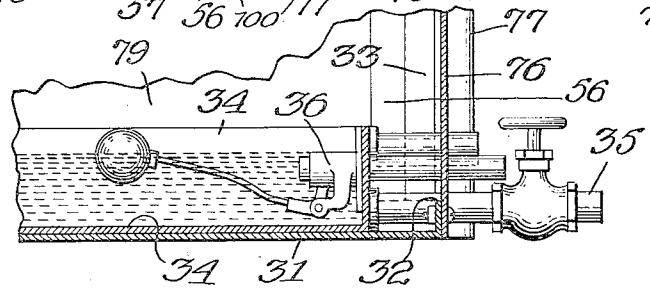


Fig. 6.



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Fig. 7.

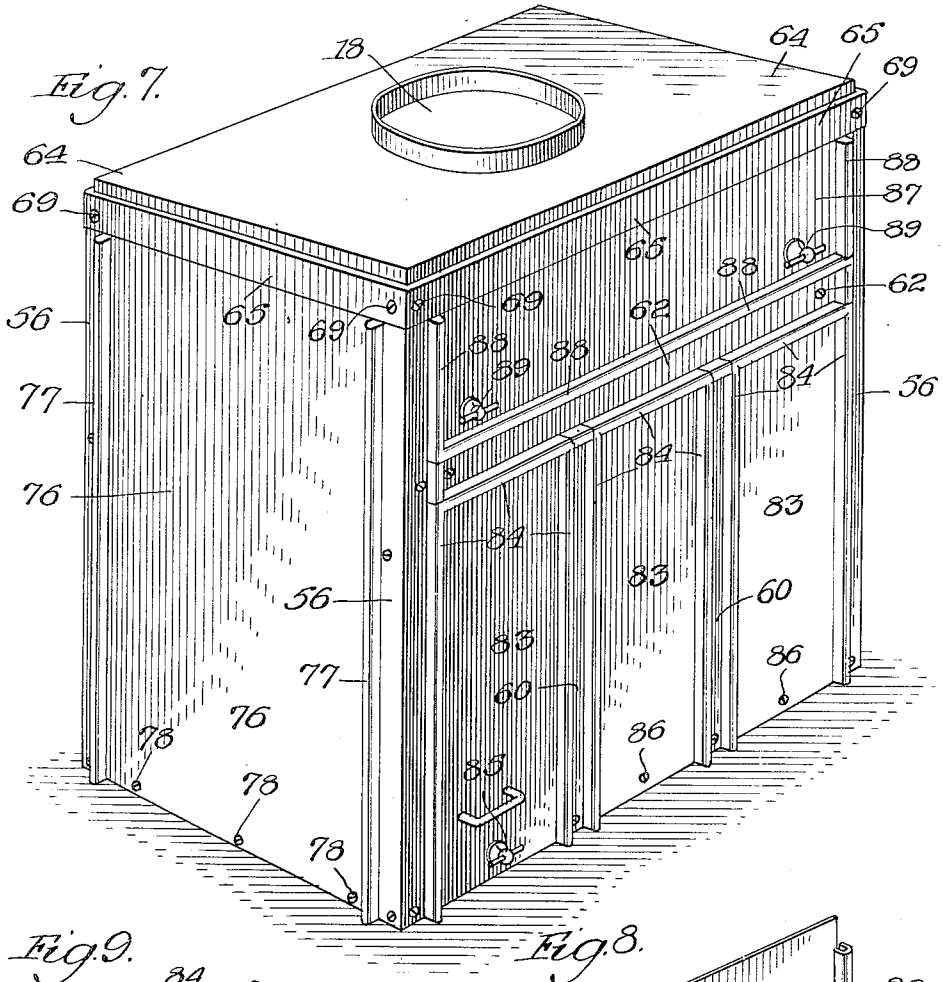


Fig. 9.

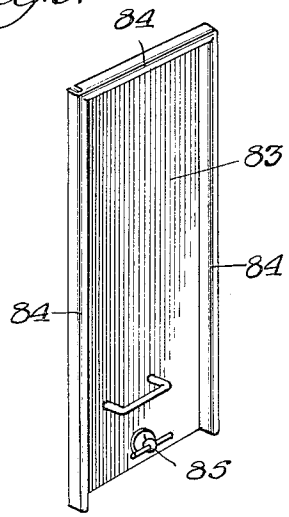
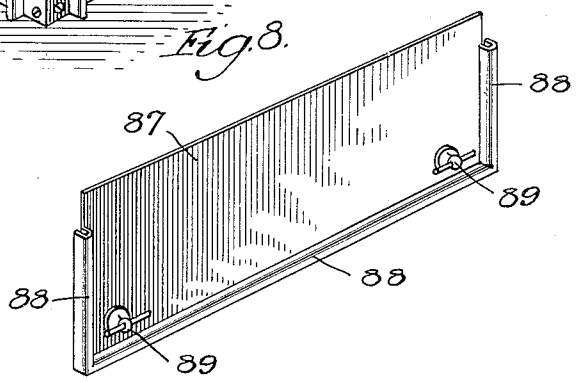


Fig. 8.



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Fig. 10.

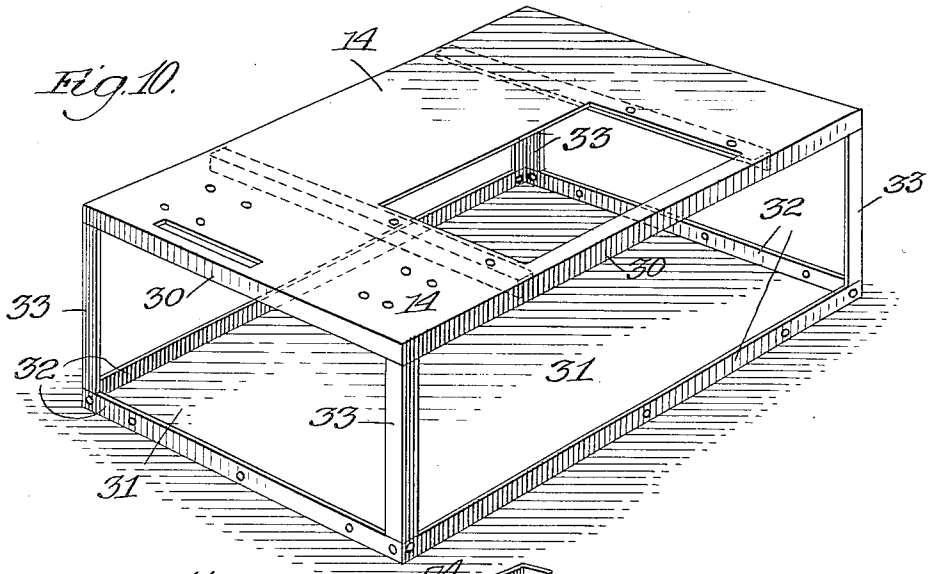
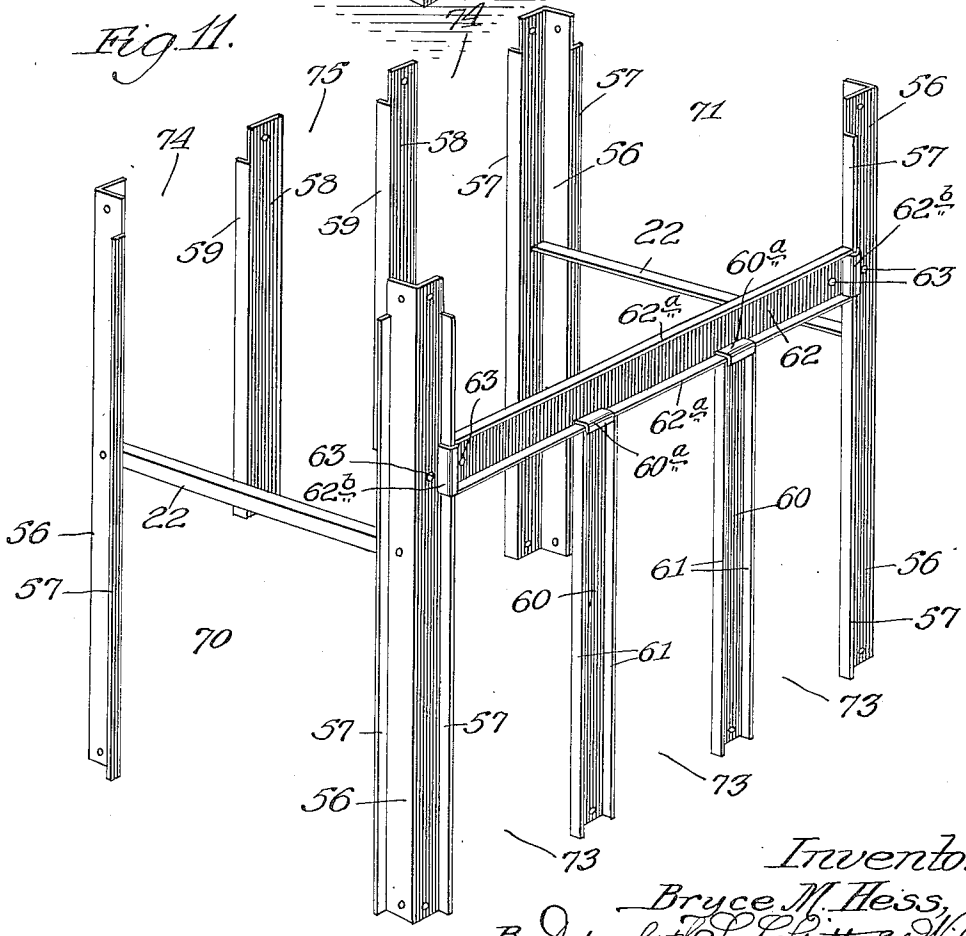


Fig. 11.



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Patented May 8, 1934. 1,958,164

UNITED STATES PATENT OFFICE

1,958,164

AIR CONDITIONING APPARATUS

Bryce M. Hess, Chicago, Ill.

Application April 25, 1932, Serial No. 607,406

3 Claims. (Cl. 261—92)

My invention relates more particularly to apparatus for conditioning air by subjecting it to water as for humidifying and cleansing the air or cooling and cleansing it.

One of my objects is to provide a novel, economical and simple construction of apparatus of the character stated and which will permit of the passage of air therethrough with the minimum of resistance.

Another object is to provide such an apparatus for use in connection with a hot-air furnace and which will operate preferably to effect forced circulation of the air through the furnace to the register-supplying pipe, or pipes, thereof.

Another object is to provide an apparatus for use with a hot-air furnace structure for circulating moist warm air in cold weather and circulating cool air in warm weather.

Another object is to provide a novel and simple construction of means for filtering the air and involving a body of fibrous filtering material, such as felt, which may be readily removed as for cleaning or replacement.

Another object is to provide an air-conditioner apparatus the operating parts of which together with the chassis, or supporting structure therefor, may be built as a unitary structure for shipment, and the casing structure of the conditioner shipped separately from the chassis and the operating parts, and which may be readily protected against damage in transit, and assembled thereafter with the chassis and operating parts.

Referring to the accompanying drawings:

Figure 1 is a view in vertical sectional elevation of an air-conditioning apparatus constructed in accordance with my invention, the section being taken at the irregular line 1—1 on Fig. 2 and viewed in the direction of the arrows.

Figure 2 is a similar view taken at the irregular line 2—2 on Fig. 1 and viewed in the direction of the arrows.

Figure 3 is a similar view taken at the line 3—3 on Fig. 1 and viewed in the direction of the arrows.

Figure 4 is a section taken at the line 4 on Fig. 2 and viewed in the direction of the arrow.

Figure 5 is a section taken at the irregular line 5 on Fig. 2 and viewed in the direction of the arrow.

Figure 6 is a broken vertical sectional detail view taken at the line 6 on Fig. 5 and viewed in the direction of the arrows.

Figure 7 is a perspective view of the casing of the apparatus.

Figure 8 is a similar view of one of the removable panels of the casing.

Figure 9 is a similar view of other removable panels of the casing.

Figure 10 is a similar view of the chassis for the operating parts of the apparatus; and

Figure 11, a similar view of certain of the elements of the casing and on which the panels of the casing are supported.

The particular construction shown comprises a casing 12 divided by a filtering partition 13 and a plate 14 into an upper compartment 15, a lower compartment 17 and an intermediate compartment 16.

The compartment 15 receives the air to be conditioned, as from a return duct (not shown) opening into the rooms to be heated, the air entering the compartment 15 at any desired point. In the particular construction shown the air to be conditioned would enter the compartment 15 through an inlet 18 in the top wall of the compartment 15, but in practice the opening, or openings, through which to admit the air to this compartment may be located at any other desirable point, either in the top, or the sides, of the compartment 15.

The filtering partition 13 is shown as formed of a lower layer 19 of wire screen and a superposed separable layer 20 of any suitable filtering material, as for example, felt. The filtering element 13, which preferably inclines downwardly and outwardly at its opposite ends as shown in Fig. 2, is supported by an angle iron frame 21 shown as supported on angle irons 22 secured to the sides of the casing 12.

Located in the compartment 16 is a suction blower 23, shown as of the centrifugal type, the air which is drawn down through the filtering element 13 entering inlets at the opposite ends of the casing of the blower, and which preferably are of large area as shown.

The rotor 24 of the blower 23 is driven by a belt 25 in turn driven by an electric motor 26 shown as bolted at 27 to the plate 14.

The discharge opening 28 of the blower 23, and which preferably is of large area, opens downwardly into the compartment 17 through an opening 29 in the plate 14.

It may here be stated that the operating parts of the apparatus, including the blower and motor, are supported on a chassis-forming framework, formed separate from the casing 12 and comprising the plate 14 which is provided about its marginal edges with a downturned flange 30, thereby forming an inverted pan structure, a bottom pan member 31 the upwardly extending marginal flanges of which are represented at 32, and corner angle iron posts 33 which are welded to the flanges of these pans and connect them together.

Located in the bottom of the compartment 17 and seated in the pan 31, is a receptacle 34 for water supplied thereto through a pipe 35 equipped with a float-controlled valve 36 for maintaining a predetermined level of water in the receptacle 34.

The apparatus also comprises a rotatable retic-

ulated drum 37 located in the compartment 17 and supported to extend at its lower portion in the water in the receptacle 34. The drum shown, the axis of which parallels the axis of the rotor 24 of the blower 23, is formed of solid end disks 38 and a cylindrical wire mesh portion 39 forming the cylindrical portion of the drum and connecting together the disks 38. The end disks 38 are provided with stub shafts 40 removably journaled on the upper journal-bearing portions of brackets 41 secured to, and rising from, the opposite ends of the receptacle 34, pins 42 holding the drum against accidental upward displacement.

The drum 37 also comprises a circular series of blades, or vanes, 43 of wire mesh which extend inwardly from the wall 39 of the drum in tangential relation thereto and which dip into the water in the receptacle 34, these blades being preferably of the same length as the side wall 39.

The drum 37 is rotated by means of a pulley 44 secured to one of the stub shafts 40, this pulley being driven by a belt 45 connected with a small pulley 46 on a shaft 47 journaled in the arms of a bracket 48 secured to the plate 14, the shaft 47 carrying a large pulley 49 connected by a belt 50 with a pulley 51 on the rotor 24 of the blower 23. The arrangement of drive elements just described constitutes a reduction gearing whereby the drum 37 is rotated relatively slowly.

The lower compartment 17 has an outlet 52 through which the conditioned air is discharged. In the arrangement shown the outlet 52 connects by pipe-coupling means 53 with the air inlet 54 of the hot-air furnace shown at 55.

In accordance with the particular arrangement shown the drum 37 is located substantially midway between the front and rear walls of the casing 12 and the outlet 28 of the blower is so disposed that it extends from a point adjacent the front of the casing 12 only to about the longitudinal center of the drum (Fig. 3). Thus the air forced downwardly by the blower into compartment 17 descends either into engagement with the side wall 39 of the drum 37 or in front thereof and against the water in the receptacle 34, and thus becomes subjected to the action of the water in its movement to, and through, the outlet 52.

The drum in rotating not only continuously carries up water on its side wall 39, the water at many of the openings in the mesh of which this wall is made forming a film spanning the openings, but by reason of the provision of the blades 43 carries up an additional supply of water which the air engages in passing through the openings in the blades, the excess water flowing off the free edges of the blades and producing a showering of water in the drum which also is contacted by the air.

It will be understood from the foregoing that the air forced through the drum and against the water in the receptacle is subjected to the action of the water for cleaning and humidifying the air, and that by reason thereof the apparatus is caused to function in a highly efficient manner to humidify and cleanse the air, the particles removed from the air by the water becoming positioned in the receptacle from which they may be removed in any desirable way.

Furthermore, the arrangement of the several parts of the apparatus provides for the flow of air therethrough with the minimum number of turns, or deflections, and thus the resistance afforded by the apparatus to the passage of the air therethrough is reduced to the minimum with the manifest advantage, one of which is that on a gravity return of the air to the apparatus an appreciable circulation can be obtained preventing stratification of the air in the room.

The apparatus serves to effect the desired circulation of air through the rooms to be heated, or cooled, as the case may be. In the case of the use of the apparatus with a hot air furnace during cold weather, the air for circulation through the rooms, is supplied to the furnace in humidified and cleansed condition, and when used with the furnace in cold condition in the summertime, serves to distribute through the furnace, to the rooms, cooled and cleansed air.

The casing 12 of the apparatus, by preference, is provided separate from the chassis shown in Fig. 10 and the operative parts secured thereto in position for operation, and in accordance with the particular construction shown is constructed as follows:

Each of the four corner portions of the casing comprises an upright 56 of angle shape in cross section and having outwardly extending vertical flanges 57 at its opposite edges. At the back of the casing are narrow vertical members 58 having outwardly extending flanges 59 at their opposite vertical edges, the members 58 extending from substantially the upper edge of the casing to a position slightly below the plate 14 of the chassis.

At the front of the casing are narrow vertical members 60 having outwardly extending flanges 61 at their opposite vertical edges and extending from the bottom of the casing to the lower edge of a horizontal member 62 having outwardly extending upper and lower flanges 62^a and also forming a part of the casing, the angle members 22 hereinbefore referred to connecting at their ends with the corner posts 56.

The ends of the members 62 are connected with the front corner posts 56 as for example by bending the ends of the plate portions of the member 62, as represented at 62^b, to form rearwardly extending channels which snugly receive the adjacent flanges 57 of the corner posts 56, plates (not shown) extending across the joints between the member 62 and the front corner posts 56 and being secured in place as by bolts represented at 63. The upper ends of the uprights 60 are connected with the member 62 as for example by bending the upper ends of the plate portions of the members 60, as represented at 60^a to form rearwardly extending channels into which the lower flange 62^a of the member 62 snugly extends.

In the assembled position of the parts just described the corner posts 56 and uprights 61 are connected with the flange 32 of the pan 31 as for example by bolts represented at 100, and the lower ends of the members 59 are connected with the rear one of the flanges 30 on the plate 14 as by bolts 58^a.

Extending across the upper ends of the corner posts 56 and the members 58 is an inverted pan 64, shown as containing the inlet 18, and having its marginal depending flange 65 reversely bent as shown to provide a continuous downwardly opening channel 66 the continuous front wall 67 of which depends below the continuous rear wall 68 of this channel, the upper ends of the corner posts 56 and the members 58, and short of which the flanges thereon extend as shown, extending upwardly into the channels 66 and being secured in place by bolts certain of which are represented at 69.

The structure thus provided presents openings 70 and 71 at its opposite ends, an opening 72 extending across the upper part of the front of the casing, a horizontal series of openings 73 extending across the lower part of the casing front, openings 74 at the opposite sides of the back of the casing, and an intermediate opening 75.

To complete the casing the various openings just referred to are filled by separate panels of suitable size and shape, each of which is formed with reversely bent flanges affording rearwardly opening channels at which the panels snugly fit over the adjacent flanges on the adjacent members bounding the openings referred to.

One of the similar panels for filling the openings 70 and 71, is represented at 76 and is provided along its vertical edges with reversely bent channel forming flanges 77 which fit over the flanges 57 of the corner posts 56 at the ends of the casing, the flanges 77 reaching short of the upper end of the panel whereby the latter may be entered at its upper portion into the downwardly opening channel 66 on the top member 64, the panels 76 being secured to the flange 32 of the pan 31 as by the bolts 78.

The panels for the openings 74 and 75, and represented at 79 and 80, (Fig. 4) are of the same construction as the panels 76 and fit, at channel-forming flanges 81 and 82, respectively, on their opposite vertical edges, the rearwardly extending flanges 58 and 59 at the back of the casing, the flanges on these panels being cut away at the upper ends thereof so that the upper edges of these panels may be inserted into the channel 66 at the back of the casing. The panels 79 for the openings 74 would be bolted at their lower edges to the flange 32 of the pan and the panel for the opening 75 would be bolted to the flange 30 at the rear edge of the plate 14.

The panels for the openings 73 and represented at 83 are provided along their opposite vertical edges and across their upper edges with reversely bent channel-forming flanges 84 as explained of the other panels, at which the panels 83 fit against the adjacent flanges 57 of the corner posts and the lower one of the flanges 62^a of the cross member 62. One of the panels 83 is shown as provided for ready removal to afford access to the interior of the casing, as by providing a rotatable keeper device 85 thereon adapted to interlock with the flange 32 of the pan 31. The others of these panels are shown as secured by bolts 86 to the flange 32.

The panel for the opening 72 and represented at 87, likewise provided for ready removal and replacement, is provided along its vertical edges and across its bottom edge with reversely bent channel-forming sections 88 at which this panel snugly fits over the forward flanges 57 of the corner posts 56 and the upper one of the flanges 62^a of the member 62. The flanges 88 reach short of the top of the panel 87 permitting the upper edge of this panel to be introduced into the channel 66 at the front edge of the top member 64, the lower portion of this panel being provided with rotatable keeper devices 89 adapted to interlock with the cross member 62.

The forming of the casing as shown and described not only presents a desirable construction of casing, but readily adapts the shipping of the chassis with its operating parts as one unitary structure and the shipping of the casing in knocked down condition in a separate package or packages and readily assembled with the chassis and operating parts thereon, at the place of use, this being of particular advantage inasmuch as the several parts forming the casing, and all of which may be made of sheet metal as will be readily understood, may be readily packed in such a way as to avoid the damaging or marring thereof in transit.

Referring further to the feature of the filtering medium 13, it will be noted that the body 20 of fibrous material is backed by a foraminous backing member against which the body 20 is forced in the passage of the air through the apparatus, the pressure of the air thus holding the body 20 in place. The body 20 being formed as a part readily separable from the backing member 19, it may be readily removed from the apparatus, as for example for cleaning, and replaced, or another similar body substituted therefor.

While I have illustrated and described a particular construction embodying my invention, I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. In air-conditioning apparatus, the combination of an air-forcing element, an element for receiving the air from said air-forcing element for changing the condition of the air, a chassis having an upper supporting portion and a lower supporting portion, said air forcing element being supported on said upper supporting portion and said second-named element being supported on said lower supporting portion, said chassis and elements forming a unitary structure, and a casing for said unit provided separate therefrom for assembly with said unit.

2. In air-conditioning apparatus, the combination of an air-forcing element, an element for receiving air from said air-forcing element for changing the condition of the air, a chassis having an upper supporting portion, forming a partition, and a lower supporting portion, one of said elements being supported on said upper supporting portion and the other of said elements supported on said lower supporting portion, said partition containing an opening through which the air flows from said air-forcing element into the space occupied by said second-named element, said chassis and elements forming a unitary structure, and a casing for said unit provided separate therefrom for assembly with said unit.

3. In air-conditioning apparatus, the combination of an air-forcing element, an element for rceiving the air from said air-forcing element for changing the condition of the air, a chassis having an upper supporting portion, forming a partition, and a lower supporting portion, said air-forcing element being supported on said upper supporting portion and said second-named element being supported on said lower supporting portion, said partition containing an opening through which the air flows from said air-forcing element into the space below said partition, said chassis and elements forming a unitary structure, and a casing for said unit provided separate therefrom for assembly with said unit.

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