April 21, 1936. S. CHAPMAN 2,037,760

AIR CONDITIONER

Filed May 8, 1935

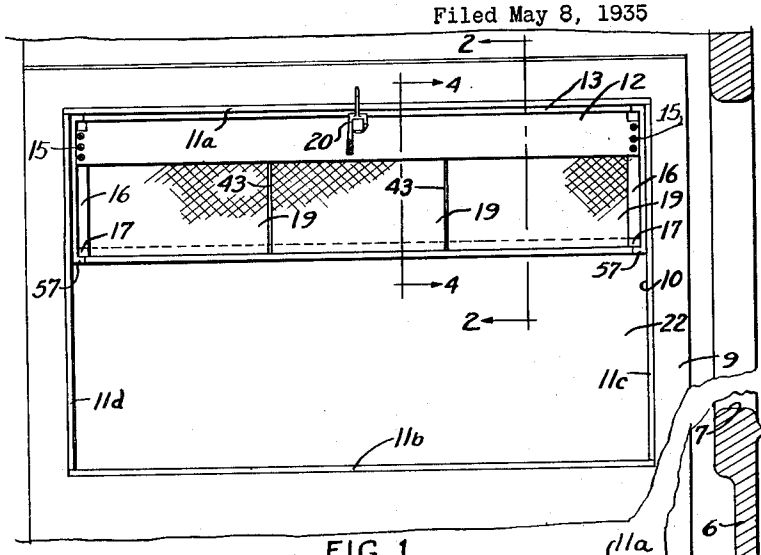


FIG. 1

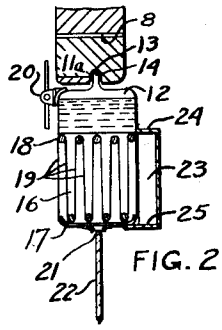


FIG. 2

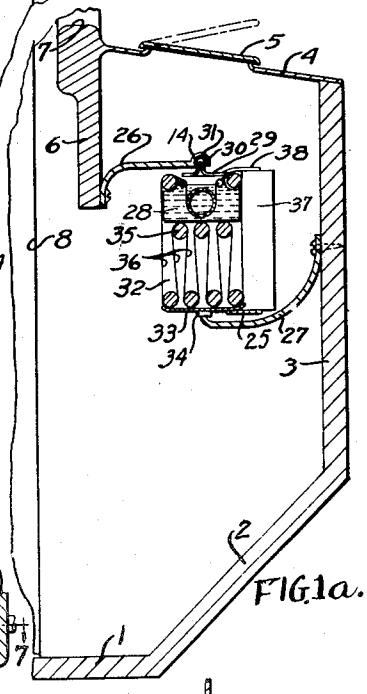


FIG. 1a

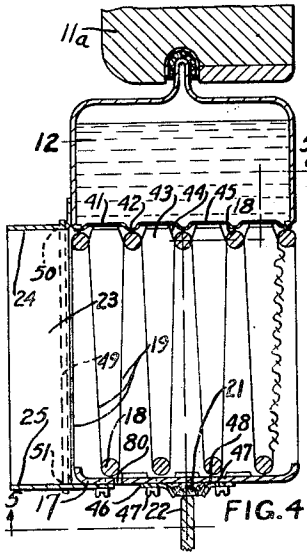


FIG. 4

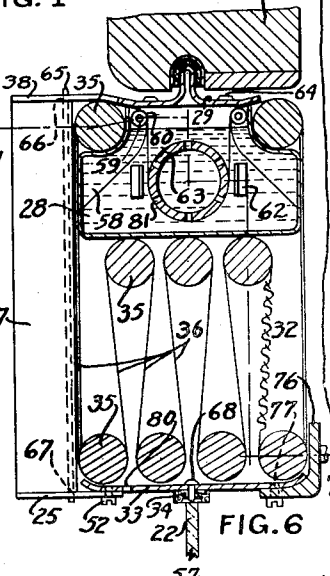


FIG. 6

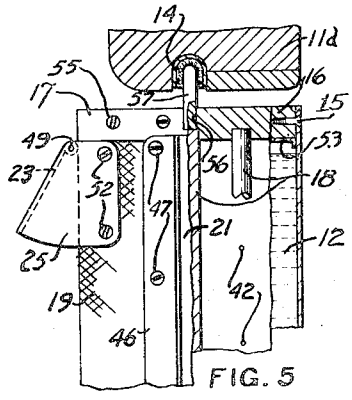


FIG. 5

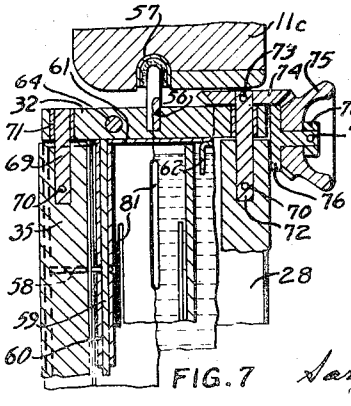


FIG. 7

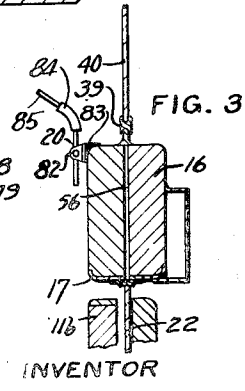


FIG. 3

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Patented Apr. 21, 1936 2,037,760

UNITED STATES PATENT OFFICE

2,037,760

AIR CONDITIONER

Sargent Chapman, Dayton, Ohio

Application May 8, 1935, Serial No. 20,422

11 Claims. (Cl. 261—102)

My invention relates to an air conditioner adapted to cooperate with an opening provided in a closed vehicle for vision or ventilation. It is equally adaptable to window frames provided with sliding glass or to cowling ventilators.

It is an object of my invention to combine in an air conditioner having a reasonable temperature control range, simplicity of construction with compactness of form.

It is a further object of my invention, through structural compactness, to provide an air conditioner, which will offer minimum visual obstruction when applied to the window frame of an automobile.

A still further object of my invention is to provide an air conditioner which may be applied to a ventilator conduit without reduction of that space normally allocated to vehicle occupants.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists of certain new and novel improvements in air conditioners, which will be hereinafter more fully illustrated and described in the accompanying drawing and more particularly pointed out in the appended claims.

Referring to the drawing, in which numerals of like character designate similar parts throughout the several views:

Fig. 1 shows my invention positioned in a window frame of the driving compartment of an automobile;

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 shows the device mounted above the bottom side of the window frame.

Fig. 4 is an enlarged cross-sectional view taken on the line 4—4 of Fig. 1; and

Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 4.

Fig. 1*a* shows a cross-sectional view of a second embodiment of my invention positioned beneath a ventilator of the driving compartment of an automobile;

Fig. 6 is an enlarged cross-sectional view of the above embodiment installed immediately beneath the top side 11*a* of the window frame 10; and

Fig. 7 is a cross-sectional view taken on the line 7—7 of Fig. 6.

Fig. 1 shows the upper portion of a door 9 located upon the left-hand side of the driving compartment of an automobile. The door 9 is provided with a window frame 10 consisting of top and bottom sides 11*a* and 11*b* and front and rear sides 11*c* and 11*d*. A cross section of the top side 11*a* and an adjacent portion of a door frame 8 is shown in Fig. 2. A liquid tank 12, slightly less in length than the width of the window frame 10, is provided at its top mid-portion with a tongue 13 adapted to seat within a U-shaped felt 14 embedded in the top side 11*a*. Projecting ends of the tank 12 are secured to the upper side portions of spacer blocks 16 by means of screws 15. A drip plate 17 is secured to the bottom of the spacer blocks 16 by means of screws 55, shown in Fig. 5. Longitudinally disposed rods 18 are embedded in top and bottom inner surfaces of the spacer blocks 16 to form a series of supports for three foraminous sheets 19. The inner central portion of the tank 12 is provided with a cock 20 for regulating predetermined fluid inlet, while a longitudinally disposed felt strip 21 is fixed to the under mid-portion of the drip plate 17 for sealing of the top edge of the window glass 22 thereagainst. A plurality of deflector vanes 23 are secured at their upper ends to the lower outer edge of the tank 12 by means of a plurality of brackets 24 and at their lower ends to the bottom of the outer edge of the drip plate 17 by means of a like plurality of brackets 25. Interrelationship and attachment of the aforementioned parts are referred to later in the description of Figs. 4 and 5.

In Fig. 4 the bottom of the tank 12 is covered by a corrugated sheet 41, provided with a series of longitudinally disposed drip holes 42. Two baffle plates 43, in conjunction with the spacer blocks 16 and the drip plate 17 of Fig. 1, form three relatively similar, lateral passageways. The plates 43 are provided with notches 44 and lugs 45, which act, respectively, as mid-supports for the rods 18 and corrugated sheet 41. Assuming the brackets 25 to be temporarily removed, the three foraminous sheets 19 are installed as follows: One extremity of each sheet 19, as well as the left-hand edge of the felt strip 21, is fixed to the bottom of the drip plate 17 in the longitudinal relationship of Fig. 1, by means of a retaining strip 46 and screws 47. The loose ends of the three sheets are then passed around the left end of the drip plate 17 and progressively over a top and under a bottom rod 18. Slack is next removed by tensioning the unsecured sheet ends, which are thereupon passed around the right bottom edge of the drip plate 17 and fixed in conjunction with the right-hand edge of the felt strip 21 to the bottom of the drip plate 17 by means of a retaining strip 48 and screws 47. It will be noted that the deflector vanes 23 are provided with hinge pins 49. The upper end of pin 49 having been inserted within hole 50 of bracket 24 and

the lower end thereof within hole 51 of bracket 25, the latter bracket is then fixed to the drip plate 17 by means of screws 52. The deflector vanes 23 are adapted to be "set" by hand through an angular range of 180 degrees, though approximately carried at or less than the angle indicated in Fig. 5, when functioning as "scoops".

Fig. 5 shows an "upside down", as well as multisectional, view of the extreme rear of the air conditioner embodied in Fig. 4. The end of the liquid portion of the tank 12 is sealed by a plate 53, while the projecting ends thereof are fixed to the spacer block 16 by means of screws 15. The manner of embedding the rods 18 in the spacer block 16 is clearly shown, as is also attachment of the drip plate 17 by means of screws 55. The spacer block 16 is provided with a groove 56 into which freely slides a tongue 57. The outer edge of the tongue 57 is adapted to slidingly engage the U-shaped felt 14 embedded in the rear side 11*d*, tongue installation being made just prior to raising of the window glass 22 into the position shown in Fig. 1.

The operation of the above embodiment of my invention is as follows. The body portion of the cock 20 is removed, the tank 12 filled to the liquid level shown, the body portion replaced and the handle thereof regulated to that degree of air inlet which will induce desired liquid outlet through drip holes 42 in the bottom of tank 12. It should be noted that the upper extremity of the cock 20 is adapted to receive coupling hose 84 and piping 85 for connection to a remotely located liquid supply source (not shown), if desired. Both rates of air or liquid inlet which will induce desired liquid outlet through drip holes 42 in the bottom of the tank 12 are similarly regulated by predetermined tilting of the handle of the body portion of the cock 20. Upon completion of tank filling, the window glass 22 is completely lowered, the air conditioner raised into engagement with the U-shaped felt 14 embedded in the top side 11*a*, the two tongues 57 inserted between grooves 56 of the spacer blocks 16 and the U-shaped felts 14 embedded in front and rear sides 11*c* and 11*d*, and the window glass raised until its upper edge firmly contacts the felt strip 21 of the drip plate 17. The deflector vanes 37 are set to "scoop" in the direction of vehicle travel. The rate of air flow through the "conditioner" is regulated by increase or decrease of "scoop angle", while liquid flow is regulated by increase or decrease of vent opening or in the event of a remotely located liquid supply source, by increased or decreased source flow.

In Fig. 3 my invention is shown mounted immediately above the bottom side 11*b* of the window frame 10. The window glass 22 shown in Figs. 1 and 2 is fully lowered, an auxiliary window glass 40 is positioned in the window frame 10 with its upper edge seated in the U-shaped felt 14 embedded in the top side 11*a* and the top channel of a retainer strip 39 of H-shaped cross-section is installed entirely across the lower edge of the auxiliary window glass 40. The tongue 13 is then seated within the bottom channel of the retainer strip 39 and the upper edge of the window glass 22 raised into engagement with the felt strip 21. It is thus optional with the occupant or occupants of an automobile whether vision be elected "over" or "under" the above embodiment of my invention.

Fig. 1*a* shows the extreme forward portion of the driving compartment of Fig. 1. It is provided with a floor 1, a foot rest 2 and a forward wall 3. The wall 3 is surmounted by a cowling 4 having a ventilator 5. To the rear of the cowling 4 are located an instrument panel 6, a windshield frame 7, and a door frame 8. Baffle plates 26 and 27 extend completely across the ventilator conduit formed by the wall 3, the cowling 4 and the instrument panel 6 to completely seal the aforesaid conduit with the exception of an elongated opening identical in dimensions and character to the opening formed by the top edge of the window glass 22 and the upper side and top portions of the window frame 10 as shown in Fig. 1. A liquid tank 28, identical in over-all length to the tank 12, is provided with a cover plate 29. The top mid-portion of the cover plate 29 is provided with a tongue 30 adapted to seat within the felt 14 of the inverted U-shaped portion 31 of the baffle plate 26. Projecting ends of the tank 28 are screwed fast to the upper side portions of spacer blocks 32. A drip plate 33, screwed fast to the bottom of the spacer blocks 32, is provided at its under mid-portion with a longitudinally disposed felt strip 34 for seating of the upturned rear edge of the baffle plate 27 thereagainst. Longitudinally disposed rollers 35 are journalled to top, middle and bottom portions of the spacer blocks 32 to form a series of rotatable supports for an endless foraminous sheet 36. A plurality of deflector vanes 37 are secured at their upper ends by bracket-like projections 38 of the cover plate 29 and at their lower ends to the bottom of the rear edge of the drip plate 33 by means of a like plurality of brackets 25.

In Figs. 6 and 7, one of a plurality of laterally disposed gusset plates 58 is shown, by means of which the semi-upper outer edges of the tank 28 are reinforced. The upper end of each gusset plate 58 further acts as a support for one or the other of two pins 59, acting as journals for a pluraiity of longitudinally disposed rollers 60. The ends of the liquid portion of the tank 28 are sealed by plates 61, which act as end supports for the pins 59, while the projecting ends thereof are screwed fast to the upper portions of the spacer blocks 32 in a manner identical to tank 12 attachment to spacer block 16, Fig. 5. Brackets 62 project inwardly from each plate 61 to act as vertical guides for a weighted roller 63. Dowels 64 secure the cover plate 29 against sliding movement with reference to the tank 28. It will be noted that the deflector vanes 37 are provided with hinge pins 65. The upper ends of the pins 65 are adapted to be inserted within holes 66 of the bracket-like projections 38 of the cover plate 29. The lower ends of the pins 65 are adapted to be inserted within holes 67 of the brackets 25, which are fixed to the under portion of the drip plate 33 by means of screws 52. It will also be noted that the longitudinally disposed felt 34 is fixed to the under mid-portion of the drip plate 33 by means of rivet-washer assemblies 68.

In Fig. 7 the longitudinally disposed rollers 35 are provided with journal pins 69 and lock pins 70. Each pin 69 freely rotates within a bearing 71, fixed to spacer blocks 32. It will be noted that an over-length journal pin 72 is provided for the forward end of the lower right-hand roller 35 of Fig. 7. A second lock pin 73 secures a bevel gear 74 to the outer end thereof, which is adapted to engage a second bevel gear 75 carried by a bracket 76 fixed to the bottom outer edge of the drip plate 33 by means of screws 77. The bevel gear 75 is retained by a collar 78 and

lock pin 79, its maximum diameter being knurled for hand grasping. It is, of course, obvious that the aforementioned "knob" may be replaced by a conventional crank handle. In Fig. 6 the foraminous sheet 36 is of "roller towel" type and the manner of its installation self evident.

With reference to Figs. 4 and 6, exterior drain holes 80 may be added to drip plates 17 and 33, if desired, as may also elongated slots 81 to the weighted roller 63. If found desirable "anti-leak" strips may be added to the under surface of the cover plate 29 in the vicinity of the rollers 60.

In Fig. 3 it will also be noted that the cock 20 is composed of a body portion 82, performing the joint function of a fluid inlet regulator and liquid filler cap, and of a flange portion 83 fixed to the tank 12, performing the joint function of a body support and liquid filler hole. The body portion 82 and flange portion 83 are provided with conventional threaded engagement and leak-proof gasket (not shown).

The operation of the second embodiment of my invention is as follows: The cover plate 29 is removed, the tank 28 filled to the liquid level shown and the cover plate 29 replaced, care being taken to properly align hinges 65 with holes 66 provided in the projections 38 of cover plate 29. Window and ventilator installations are identical to those of the first embodiment of my invention. Air flow regulation through the "conditioner" is likewise identical. The rate of moistening the foraminous sheet 36, however, depends upon the frequency and amount of turn of the knob portion of the bevel gear 75. If required, the outer surface of the roller 35 fixed to the bevel gear 75 can be roughened sufficiently to eliminate slippage between that surface and the inner surface of the moistened sheet 36. It is obvious that part or all of the sheet 36 may be passed under the weighted roller at any one time and that appropriate markings may be placed upon the outer surface of the sheet to denote the amount of sheet travel. It is likewise obvious that the bevel gear 75 can be driven at a given low rate of turn by auxiliary power means.

For installation of the second embodiment of my invention beneath the ventilator 5 shown in Fig. 1*a*, the deflector vanes 23 are set normal to the rods 18 (same as vanes 37 of Fig. 1), after which the tongue 13 and the felt strip 21 of the air conditioner are "sprung" into engagement with the U-shaped felt 14 embedded in portion 31 of the baffle plate 26 and the upturned edge of the baffle plate 27. In conclusion, the two tongues 57 are inserted between grooves 56 of the spacer blocks 16 and two U-shaped felts 14 embedded in vertically disposed portions 31 of the baffle plate 26, which terminate slightly above the top surface of the upturned portion of baffle plate 27. For the above installation the rate of air flow through the "conditioner" is regulated solely by increase or decrease of ventilator hood "opening".

I claim:—

1. An air conditioner of framelike form comprising, a liquid filled tank, a drip plate of like plan form, two spacer blocks fixed normal to said tank and said drip plate in over-all continuation thereof, a foraminous sheet having a portion thereof disposed in multi-folds crosswise of the rectangular opening defined by said tank, said drip plate, and said spacer blocks such that the four edges of at least two of said folds substantially contact the sides of said opening, and intercommunication means between the contents of said tank and said foraminous sheet.

2. An air conditioner of framelike form comprising, a liquid filled tank, a drip plate of like plan form, two spacer blocks fixed normal to said tank and said drip plate in over-all continuation thereof, a foraminous sheet having a portion thereof disposed in multi-folds crosswise of the rectangular opening defined by said tank, said drip plate, and said spacer blocks such that the four edges of at least two of said folds substantially contact the sides of said opening, air flow deflecting means secured to one side of said tank and said drip plate, and intercommunication means between the contents of said tank and said foraminous sheet.

3. An air conditioner of framelike form comprising, a liquid filled tank forming the upper portion of said frame, a drip plate of like plan forming the lower portion of said frame, two spacer blocks fixed normal to said tank and said drip plate forming the side portions of said frame, a foraminous sheet having a portion thereof disposed in multi-folds crosswise of the rectangularly-walled passageway formed by said tank, said drip plate, and said spacer blocks such that the outer edges of at least two of said folds substantially contact the sides of said passageway, and intercommunication means between the contents of said tank and said foraminous sheet.

4. An air conditioner of framelike form comprising, a liquid filled tank forming the upper portion of said frame, a drip plate of like plan forming the lower portion of said frame, two spacer blocks fixed normal to said tank and said drip plate forming the side portions of said frame, crosswise rods secured normal to the inner surfaces of said spacer blocks adjacent to the bottom surface of said tank and the top surface of said drip plate, a foraminous sheet having a portion thereof stretched alternately over a top and under a bottom crosswise rod such that the outer edges of at least two of the resulting folds substantially contact the inner surfaces of the rectangularly-walled passageway formed by said tank, said drip plate, and said spacer blocks, means for holding the two outer folds of said foraminous sheet in stretched engagement over the ends of said passageway, and intercommunication means between the contents of said tank and said foraminous sheet.

5. An air conditioner of framelike form comprising, a liquid filled tank forming the upper portion of said frame, said tank having its bottom provided with two or more crosswise rows of apertures of predetermined longitudinal spacing and size, a drip plate of like plan forming the lower portion of said frame, two spacer blocks fixed normal to said tank and said drip plate forming the side portions of said frame, crosswise rods secured normal to the inner surfaces of said spacer blocks adjacent to the bottom surface of said tank in like plurality with and each immediately beneath a row of said tank apertures, crosswise rods numbering one less than said rows of tank apertures secured normal to the inner surfaces of said spacer blocks and adjacent to the top surface of said drip plate, a foraminous sheet having a portion thereof stretched alternately over a top and under a bottom crosswise rod such that the outer edges of at least two of the resulting folds substantially contact the sides of said passageway, and means for holding the two outer folds of said foraminous sheet in stretched engagement over the ends of said passageway.

6. An air conditioner of framelike form comprising, a liquid filled tank forming the upper portion of said frame, said tank being provided with a cock for regulating fluid inlet and having its bottom further provided with two or more crosswise rows of apertures of predetermined longitudinal spacing and size, a drip plate of like plan forming the lower portion of said frame, two spacer blocks fixed normal to said tank and said drip plate forming the side portions of said frame, crosswise rods secured normal to the inner surfaces of said spacer blocks and adjacent to the bottom surface of said tank in like plurality with and each immediately beneath a row of said tank apertures, crosswise rods numbering one less than said rows of tank apertures secured normal to the inner surfaces of said spacer blocks and adjacent to the top surface of said drip plate, a foraminous sheet having a portion thereof stretched alternately over a top and under a bottom crosswise rod such that the outer edges of at least two of the resulting folds substantially contact the inner surfaces of the rectangularly-walled passage way formed by said tank, said drip plate, and said spacer blocks, means for holding the two outer folds of said foraminous sheet in stretched engagement over the ends of said passage way, and vertically disposed deflector vanes pivotally secured at their upper ends to a side of said tank and similarly secured at their lower ends to the same side of said drip plate.

7. An air conditioner for closed vehicle bodies adapted to be secured between the upper edge of a vertically sliding window and the top of the window frame comprising, an elongated liquid filled tank having a tongue adapted to engage the upper window frame groove, an elongated drip plate having a felt strip adapted to seat upon the upper edge of said window, vertically disposed spacer blocks fixed normal to said tank and said drip plate in over-all continuation thereof, a foraminous sheet having a portion thereof disposed in multi-folds crosswise of the rectangularly-walled passageway formed by said tank, said drip plate, and said spacer blocks such that the outer edges of at least two of said folds substantially contact the sides of said passageway, means secured to said tank and said drip plate for selectively deflecting air flow adjacent said closed vehicle through said passageway, and intercommunication means between the contents of said tank and said foraminous sheet.

8. An air conditioner for closed vehicle bodies adapted to be secured between the upper edge of a vertically sliding window and the top of the window frame comprising, an elongated liquid filled tank having a tongue adapted to engage the upper window frame groove, an elongated drip plate having a felt strip adapted to seat upon the upper edge of said window, vertically disposed spacer blocks fixed normal to said tank and said drip plate in over-all continuation thereof and having vertical grooves disposed in opposite and spaced relationship to the side window frame grooves, tongues adapted to slidingly engage the aforesaid pair of oppositely disposed grooves, a foraminous sheet having a portion thereof disposed in multi-folds crosswise of the rectangularly-walled passageway formed by said tank, said drip plate, and said spacer blocks such that the outer edges of at least two of said folds substantially contact the sides of said passageway, means secured to said tank and said drip plate for selectively deflecting air flow adjacent said closed vehicle through said passageway, and intercommunication means between the contents of said tank and said foraminous sheet.

9. An air conditioner of framelike form comprising, a liquid filled tank forming the upper portion of said frame, a drip plate of like plan forming the lower portion of said frame, two spacer blocks fixed normal to said tank and said drip plate forming the side portions of said frame, crosswise rollers journaled normal to the inner surfaces of said spacer blocks adjacent to the bottom surface of said tank and the top surface of said drip plate, an endless foraminous sheet having a portion thereof stretched alternately under a bottom and over a top crosswise roller such that the outer edges of at least two of the resulting folds substantially contact the inner surfaces of the rectangularly-walled passageway formed by said tank, said drip plate, and said spacer blocks, means for holding the two outer folds of said endless foraminous sheet in stretched engagement over the ends of said passageway, and intercommunication means between the contents of said tank and all portions of said endless foraminous sheet.

10. An air conditioner of framelike form comprising, an elongated liquid filled tank forming the upper portion of said frame and having open top and recessed upper side portions, a plate adapted to cover said open top such as to provide two oppositely disposed narrow side openings, a drip plate of like plan forming the lower portion of said frame, two spacer blocks fixed normal to said tank and said drip plate forming the side portions of said frame, crosswise rollers with top surfaces adjacent to and slightly above said narrow side openings having their ends journaled normal to the inner surfaces of said spacer blocks, crosswise rollers journaled normal to the inner surfaces of said spacer blocks adjacent to the bottom surface of said tank and the top surface of said drip plate, and endless foraminous sheet having a portion thereof stretched alternately under a bottom and over a top crosswise roller such that the outer edges of at least two of the resulting folds substantially contact the inner surfaces of the rectangularly-walled passageway formed by said tank, said drip plate, and said spacer blocks, means for holding the two outer folds of said endless foraminous sheet in stretched engagement over the outermost bottom and recessed uppermost rollers, and means for inducing progressive ingress and egress of successive portions of said endless formaninous sheet through said liquid filled tank.

11. An air conditioner of framelike form comprising, an elongated liquid filled tank having open top and recessed upper side portions with crosswise narrow rollers attached to the inner surfaces of said side portions such that roller top surfaces lie flush with the top of said tank, a plate adapted to cover said open top such that a narrow opening is provided between said crosswise narrow rollers and the under outer edges of said cover plate, a drip plate of like plan forming the lower portion of said frame, two spacer blocks fixed normal to said tank and said drip plate forming the side portions of said frame, crosswise rollers with top surfaces adjacent to and slightly above said narrow side openings having their ends journaled normal to the inner surfaces of said spacer blocks, crosswise rollers journaled normal to the inner surfaces of said spacer blocks adjacent to the bottom surface of said tank and the top surface of said drip plate, an endless foraminous sheet having a portion there-

of stretched alternately under a bottom and over a top crosswise roller such that the outer edges of at least two of the resulting folds substantially contact the inner surfaces of the rectangularly-walled passageway formed by said tank, said drip plate, and said spacer blocks, an elongated weighted roller adapted for ready insertion through the open top of said elongated tank for holding the two outer folds and an uppermost U-shaped fold of said endless foraminous sheet in stretched engagement over the outermost bottom rollers, then the recessed uppermost rollers, then the crosswise narrow rollers, and means for inducing progressive ingress and egress of successive portions of said endless foraminous sheet through said liquid filled tank.

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