

Dec. 5, 1933.

J. R. REPLOGLE

1,937,669

HEAT INTERCHANGE DEVICE

Filed Sept. 28, 1931

3 Sheets-Sheet 3

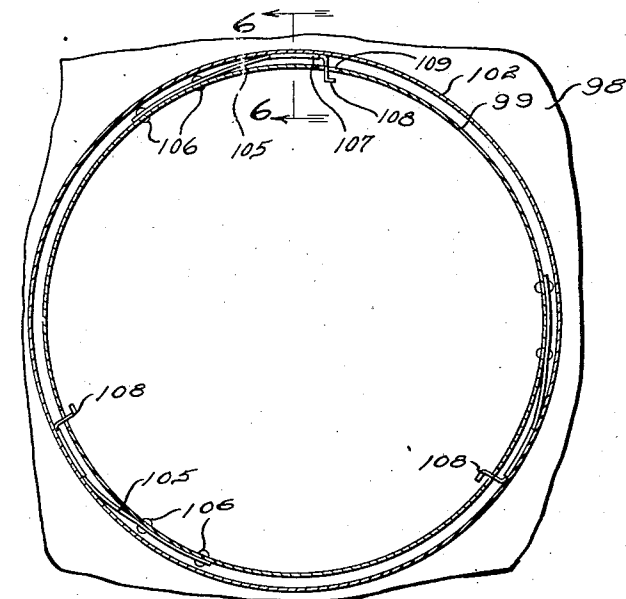


FIG. 1.

FIG. 2.

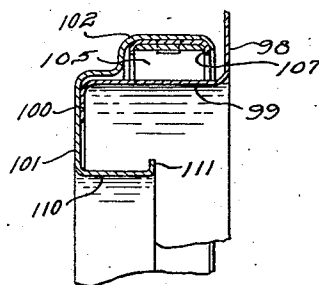


FIG. 2.

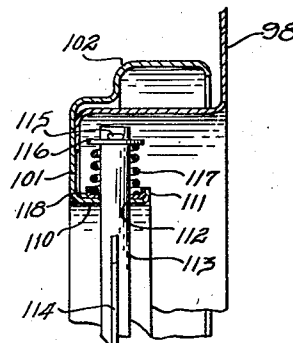


FIG. 3.

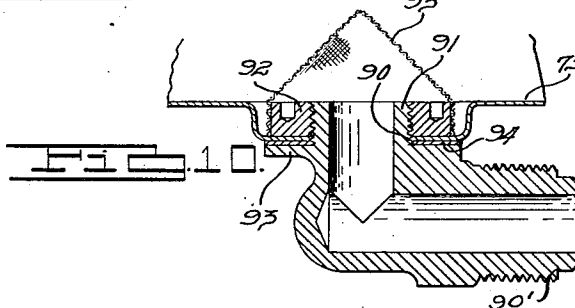


FIG. 4.

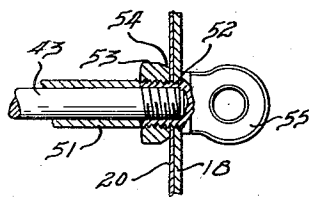


FIG. 5.

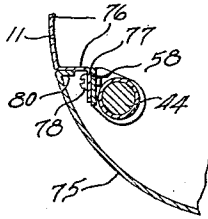


FIG. 6.

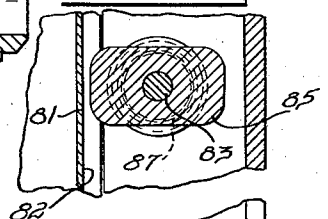
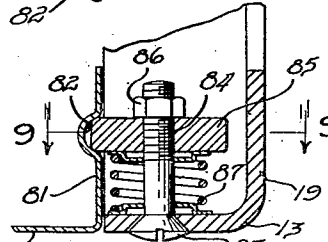


FIG. 8.

INVENTOR
John R. Replogle.

BY
Harnes, Slicker, Pinner & Hann
ATTORNEYS.

UNITED STATES PATENT OFFICE

1,937,669

HEAT INTERCHANGE DEVICE

John R. Replogle, Detroit, Mich., assignor to
Copeland Products, Inc., a corporation of
Michigan

Application September 28, 1931
Serial No. 565,451

21 Claims. (Cl. 62—134)

The invention relates to heat interchanging mechanisms and it has particular relation to a mechanism for cooling compartments such as the rooms of buildings.

6 The principal objects of the invention are to provide a mechanism for cooling compartments or rooms of buildings which can readily be controlled for securing maximum cooling effect and for obtaining a flow of cooled air in substantially
10 any direction desired; to provide a mechanism of the above mentioned character in which the amount of cooled air and the size of the stream or streams thereof can be varied at will; to provide a mechanism of this character having a
15 cooling unit which is so constructed that it has maximum heat absorbing characteristics; to provide a heat interchange mechanism of the cooling type in which a novel construction of moisture receiving receptacle is provided; to provide a temperature reducing mechanism having
20 a shutter which may be utilized for directing a current of cooled air in substantially any direction and wherein it is connected to a casing for the mechanism in a quickly releasable manner; to provide a method of constructing a cooling
25 unit for a mechanism of the above designated character having a coil for the cooling medium, which is unitarily associated with supporting members by means of which the cooling unit can be readily assembled with a casing for the mechanism; and in general to provide a mechanism
30 of the general character previously mentioned in which the various parts of the mechanism are associated in a novel relation, and in such manner that the parts can readily be assembled and disassembled without difficulty.

For a complete understanding of the invention, reference may be had to the accompanying drawings wherein,

40 Figure 1 is a fragmentary plan view of a mechanism constructed according to one form of the invention, wherein certain parts are broken away for the purpose of clarity;

45 Fig. 2 is an end view of the construction shown in Fig. 1, illustrating the shutter arrangement for controlling the flow of air through the mechanism;

50 Fig. 3 is a cross sectional view taken substantially along line 3—3 of Fig. 2;

Fig. 4 is an end view of the construction shown by Fig. 3, taken from the right side thereof;

Fig. 5 is a cross sectional view taken substantially along line 5—5 of Fig. 3;

55 Fig. 6 is a cross sectional view on a larger

scale taken substantially along line 6—6 of Fig. 5;

Fig. 7 is a cross sectional view on a larger scale taken substantially along line 7—7 of Fig. 3;

Fig. 8 is a cross sectional view on a larger scale taken substantially along line 8—8 of Fig. 2;

Fig. 9 is a cross sectional view taken substantially along line 9—9 of Fig. 3;

Fig. 10 is a cross sectional view on a larger scale taken substantially along line 10—10 of Fig. 2;

Fig. 11 is a cross sectional view on a larger scale, taken substantially along line 11—11 of Fig. 3;

Fig. 12 is a cross sectional view on a larger scale taken substantially along line 12—12 of Fig. 4;

Referring to Figs. 1, 2 and 3, a casing 10 of substantially rectangular shape is provided which includes spaced relatively heavy end frame and cover members 12 and 13. A thin removable cover section 11 is disposed between the members 12 and 13, and while the cover section as a whole is removable with respect to the frame members without disturbing the latter, it is desired now to call attention to the manner of releasably connecting the upper part of the section thereto. At the ends of the section and at the inner side thereof, bracket plates 14 are provided which are secured by screws 15 to the cover section 11 and to the end frame members 12 and 13 respectively. Each bracket has a central inwardly depressed portion 16, which is adapted to receive an inwardly directed flange 17 former at each end of section 11. The manner of further securing the section 11 to the casing will be set forth particularly hereinafter. The member 12 has an inwardly directed flange 18 while similarly the member 13 has a flange 19. A plate 20 is disposed at the inner side of the flange 18, and is maintained thereagainst by means which presently will be described. This plate has a relatively large circular opening 21 through which warm air enters the casing during operation of the cooling mechanism.

As shown by Fig. 4, an angle bar 22 is connected by means of screws 23 to the flange 18 on the part 12 of the casing, and to the outer peripheral part of the plate 20, and extends between the lower side wall of this part of the casing and the right vertically projecting part thereof. A similar angle bar 25 is connected by means of screws 26 to the flange 18 and the plate 20 and extends between the lower side and the left side of the end part 12 of the casing. A 110

frame work 27 disposed within the opening 21 in plate 20, has arms 28 and 29 respectively secured by screws 30 to the intermediate portions of the angle bars 22 and 25 and to the plate 20, and a vertically projecting arm 31 which is secured by a screw 32 to the plate 20 and to a triangular plate 33 secured by screws 34 to the flange 18 and outer peripheral part of plate 20 at the inner side of the casing. The triangular plate 33 may also constitute a means for securing adjacent ends of the end part 12 of the casing if the latter is manufactured from an elongated piece of metal, subsequently bent into the rectangular shape previously mentioned. The frame work 27 centrally thereof supports a motor 35 having a fan 36 secured to its shaft. From this description it is apparent that the opening 21 in the plate 20 permits the fan 36 to draw air from the compartment or room, into one end of the casing. Circular straps 37 extending about the outer periphery of the frame 27 are provided for preventing a person from moving his hand into a position wherein it might be engaged and injured by the rotating fan.

As best shown by Figs. 1, 2 and 3, four tie rods 40, 41, 43 and 44 respectively extend longitudinally through the casing adjacent the corners thereof, through the end flanges 18 and 19 and the ends of the rods projecting beyond the end part 13 of the casing are provided with hexagonal heads 45 that may be integral with the rods or subsequently threaded thereon. Each of the upper rods 41 and 43 interiorly of the casing and adjacent the end flange 19 is provided with a short sleeve 46 which abuts a collar 47 on the rod at the inner end of the sleeve, and the collar in turn abuts one end of a cylindrically rolled flange 48 of a vertically extending plate 49 disposed interiorly of the casing. The flange 48 encircles the intermediate part of the rod and at its outer end abuts a similar collar 50 also mounted on the rod and the latter collar in turn abuts one end of a sleeve 51 which extends to a point in proximity to the flange 18 on the end part 12 of the casing. As shown by Fig. 12, a threaded sleeve 52 projecting through the end flange 18 and the plate 20 in alignment with each rod and having an interior thread which engages the threaded end of the rod, abuts the end of sleeve 51 and also has a threaded outer periphery. A nut 53 on the sleeve, having a conical surface 54, clamps the end flange 18 and plate 20 on the sleeve. The outer end of the sleeve is provided with an eye portion 55 serving as means for receiving members (not shown) for supporting the device to a wall or the like in service. From this it follows that the end parts 12 and 13 of the casing are rigidly secured together by the upper rods 41 and 43 and also that the vertical plates 49 within the casing having the cylindrically flanged portions 48 engaging intermediate portions of the rods, are maintained in definite positions relative to the end parts.

Also referring to Fig. 3, each of the lower rods 40 and 44 is similarly provided with a short sleeve 46 adjacent the end flange 19 of the casing but at the inner end of the sleeve, a collar 57 is disposed on the end which forms an integral part of a bracket 58 extending longitudinally of the rod to a point in proximity to the end wall 12 of the casing. Inwardly of the collar 57 of the bracket 58, the rod receives a cylindrically flanged portion 59 formed on the lower end of the vertical plates 49 in the same manner that

the flange 48 is formed at the upper ends of the plates. At the opposite end of the flange 59, a collar 60 is mounted on the rod for maintaining the flange in position, and at the opposite side of the collar one of the sleeves 51 is disposed on the rod. The opposite end of the bracket 58 terminates in another collar portion 61 which receives the rod between the outer end of sleeve 51 and one of the conical nuts 53 mounted on the outer end of the rod in the same manner that has previously been described in connection with the upper pair of rods. A sleeve 52 such as shown by Fig. 12, is provided on each of the lower rods 40 and 44, and the outer end of the sleeve terminates in an eye portion 55.

As best shown by Figs. 1 and 2, each of the vertical plates 49 is provided with a series of circular openings 63, each of which is adapted to receive a tube 64 forming a part of a refrigerant evaporating unit indicated generally at 65. In assembling the tubes with the plates 49, initially a plurality of straight tubes are extended through the openings in the plates and then a tubular joint 66 substantially of U shape, is telescoped over the projecting ends of each pair of adjacent tubes and soldered or otherwise secured thereto in any permanent manner. Hence between the plates the evaporator unit consists of spaced tubes while beyond the ends of the plates, the tubes are interconnected by U-shaped tubular joints. Preferably the diameter of the joints are slightly larger than the circular openings in the plates for the purpose of firmly securing the tubes in assembled relation with the plates. The ends of the straight portions of the tubes are so connected by the tubular joints 66, that the tubes are arranged in series and constitute a single evaporator coil.

One end of the coil which constitutes one end of one of the tubes, between the plates is connected to an expansion valve 67 (shown in Figs. 1, 2 and 3) of conventional construction, and the expansion valve in turn is connected to a conduit 68 which extends through an opening formed in plate 20 at the motor end of the casing and then is connected to a suitable refrigerant receiver (not shown) in turn connected to a refrigerant compressor (not shown). The expansion valve 67 is supported on the plate 49 adjacent thereto.

As best shown by Fig. 4 the conduit 68 connected to the expansion valve, is supported by a bracket type of clamp 70 having one portion secured to the angle bar 22. The bracket clamp 70 also supports a second conduit 71 which extends outwardly through the end of the casing and is connected to the intake side of the compressor previously mentioned. Inwardly of the casing, the conduit 71 is connected to the opposite end of the evaporator coil as indicated at 73. Hence the evaporator coil is connected in series with the intake side of the compressor and the refrigerant receiver and condenser associated with the exhaust side of the compressor.

For receiving moisture dripping from the evaporator coil, a receptacle or drip pan 75 is provided at the lower side of the casing, which in effect constitutes a part of the central part 11 of the casing. As best shown by Fig. 11, the central part 11 of the casing terminates at opposite sides and adjacent the rods 40 and 44, and is provided with an inwardly directed flange 76 which terminates in a vertical flange 77 secured by screws 78 to the bracket 58 mounted on each of the rods. The moisture receiving receptacle or drip pan 75 terminates at its upper

edges in inwardly directed flanges 80 complementary to the lower surfaces of flanges 76 on the part 11 of the casing and which normally are maintained in abutting relation to such flanges. As best shown by Figs. 8 and 9 the ends of the pan 75 terminate in inwardly directed flanges 81 having depressed portions providing grooves 82 in the end surfaces of the flanges. A screw 83 extending through each of the end portions 12 and 13 of the casing is provided inwardly of the casing with a threaded end 84 which engages an elongated nut 85, the end portions of which are adapted to cooperate with the groove 82 in the flange 81 on the drip pan for the purpose of supporting it in position. A nut 86 on the inner threaded end of the screw 83 locks the elongated nut 85 on the screw and consequently when the screw is turned the nut 85 turns therewith. A spring 87, disposed between the elongated nut 85 and the outer wall of the casing serves as a means for resiliently supporting the drip pan and also for normally maintaining the elongated nut 85 in alignment with the groove 82. When the screw 83 is turned it is apparent that the end portion of the nut disposed in the groove may be moved out of the groove, and then the drip pan may be removed from the casing.

In this connection it will be observed that the central part 11 of the casing can readily be removed, by removing the drip pan, and then removing the screws 78 shown by Fig. 11, and the screws 15 (Fig. 1) connecting this part of the casing to bracket plates 14. All of such screws can be removed exteriorly of the apparatus, screws 78 being accessible after the drip pan is removed. Removal of this part of the casing exposes substantially all of the operating parts of the mechanism, from which it follows that repairs, changes, etc. can readily be made.

As best shown by Fig. 10, the lower wall of the drip pan has an opening 90 therein and a pipe 90' for draining the water from the drip pan to a suitably remote point, includes a threaded projection 91 extending through the opening 90 and a threaded collar 92 on the threaded portion 91, which clamps the drip pan against a shoulder 93 formed on the exterior portion of the pipe. A suitable sealing element 94 is disposed between the shoulder 93 and the drip pan for preventing leakage of water around the connection. A screen 95 connected to the outer periphery of the collar 92 on the inside of the drip pan, is employed for keeping the pipe free of foreign substances which might otherwise flow into the pipe.

For insuring proper drainage of moisture from the evaporator coil and for accelerating the heat absorbing action thereof, the tubes of the evaporator between the plates 49, project through a series of vertically disposed thin plates or fins 96, best shown by Figs. 1 and 3 and which are soldered or otherwise associated in thermal contact therewith. These fins not only cause the moisture condensing on the evaporator to drain directly down into the drip pan and prevent collection of water thereon and which might otherwise be blown out of the device, but also serve as a means for increasing the heat absorbing characteristics of the evaporator.

As shown particularly by Fig. 3, each of the plates or fins 96 in the end row adjacent that end of the casing opposite the motor 35, has its lower corner portion rounded or arcuate, as indicated at 96', for the purpose of avoiding a sharp corner

at the lower edge of the blade. This construction is desirable because a sharp corner instead of a rounded edge on the blades, tends to collect beads of water which might be blown out of the casing into the room. Having blades with lower rounded edges adjacent the discharge side of the casing avoids such undesirable collection of the water.

Referring now to Figs. 3 and 6, it will be noted that rods 40, 41, 43 and 44 support an annular plate 98 having a horizontal portion 99 extending beyond the end of the casing, and which terminates in an inwardly directed flange 100. A shutter supporting ring 101 substantially contacts with the end flange 100 of the plate 98, and has a channel portion 102 which is spaced a substantial distance from the horizontal portion 99 of the plate, with the opening in the channel exposed to this part of the plate.

As best shown in Fig. 5, the horizontal portion 99 of plate 98, is provided at spaced points with spring arms 105, connected by means of rivets 106 to this part of the plate, which at their free ends have inverted channel portions or shoes 107 substantially complementary to the inner surface of the channel portion 102 on the shutter ring 101. The resiliency of the the arms 105 maintain the channel portions 107 within the channel 102, but do not prevent turning of the shutter elements about the outer periphery of the plate 98. The ends of each of the arms 105 terminates in a lip 108 which projects through an opening 109 formed in the horizontal portion 99 of plate 98 so as to enable it to be grasped by the fingers, from which it follows that the channel portion 107 of the arm may be moved inwardly and out of engagement with the channel 102 on the shutter ring 101, thereby permitting the shutter ring to be bodily moved away from the end of the casing and separated therefrom.

As best shown by Fig. 7 the shutter ring 101 terminates at its inner edge in a horizontally and inwardly directed flange portion 110 and the latter at its inner edge terminates in an outwardly directed flange 111. The inwardly directed flange portion 110 is provided with peripherally spaced openings 112 which constitute bearing supports for projecting ends of shafts 113 at the ends of shutters 114. Outwardly of the flange 110, each of the shafts 113, is provided with a cotter pin 115 which maintains a collar 116 against a helical spring 117 disposed under compression between the collar and a channel shaped washer 118 encircling the shaft and engaging the outer surface of the flange 110. The springs 117 constitute resilient mountings for the ends of each shutter blade and when the latter is turned to any adjusted position, it is resiliently maintained in the adjusted position.

By turning the shutter ring 101, it is apparent that the blades 114 may be disposed in a horizontal, vertical, or in any position between the horizontal and the vertical, and that the ring may be completely rotated if this is desired. By means of this arrangement, cooled air passing from the interior of the casing through the shutter may be directed in a stream or streams to any part of the room or compartment in which the unit is disposed, and the quantity of air controlled by closing or partially closing any one of the shutters or manipulating the shutter blades in any other manner found suitable. Likewise, the shutters being independently rotatable, they may be adjusted to direct the air passing through them either to one side or the other of the axis of the ring, or to both

sides of the axis in equal or varying amounts.

In assembling the mechanism, the evaporator coil is first constructed in conjunction with the fins or plates 96 and the supporting plates 49.

- 5 Then the end frame member 13, and the shutter ring supporting plate 98 are mounted on the tie rods until they are adjacent the heads 45 on the latter. Following this, the sleeves 46 are mounted on the tie rods, and then the collars 47 are placed on the upper rods 41 and 43. The brackets 58 are then placed on the lower rods, until the collars 61 on the brackets are adjacent to but beyond the ends of the rods. Then the plates 49 carrying the evaporator coil, are placed on the tie rods, during which manipulation, it may be necessary to deflect the projecting ends of the brackets 58 slightly away from the lower tie rods. Then the collars 50 and 60 and sleeves 51 are placed on the rods.
- 20 Then the assembly on the rods is moved toward the heads 45 on the latter, and the collar portions 61 on brackets 58 placed on the lower rods. Then the rods are threaded into the sleeves 52 secured to end frame member 12, and by turning the heads 45, the end frame members 12 and 13 can be drawn together and the parts on the rods between them, firmly secured in place.

Following the above operations, the cover section 11 is sprung over the frame work until it fits between the members 12 and 13 and then the screws 15 for securing the section to brackets 14 are inserted, and the side edges of the cover are secured to the brackets 58. Then the moisture receptacle is secured in place. The fact that the receptacle and cover section 11 can be readily removed, permits access to the interior of the casing at any time and without difficulty.

- 35 During operation of the mechanism the motor 35 drives the fan 36 which causes warm air from the room or compartment to be forced through the casing and the evaporator. The fins or plates 96 on the evaporator tubes being relatively cold rapidly absorb the heat in the air thus directed into the casing, thereby cooling it, and the cooled air is then forced through the shutter into any part of the room desired. It is apparent that the parts of the mechanism are so constructed that they can be assembled and disassembled easily while at the same time a rigid construction is provided when the unit is in operation.
- 50 Also, it is apparent that the casing part 11 can be easily removed whenever it is desired to expose the parts interiorly of the casing for inspection purposes or for the purpose of making repairs should this be necessary. Moreover, the drip pan, in effect constitutes a part of the casing and may be easily removed whenever this is desired. In general the mechanism provided is extremely efficient in operation for the purpose of cooling rooms and compartments and directing the flow of cooled air to any point therein desired.

Although but one specific embodiment of this invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention, as defined by the following claims.

I claim:

- 70 1. A heat interchange mechanism for cooling rooms and the like comprising a casing, a cooling unit in the casing comprising coils provided with heat absorbing fins disposed in substantially vertical planes, means for directing a flow of air through the unit and casing, a moisture

receptacle beneath the cooling unit, and means for releasably securing the receptacle to the casing.

2. A heat interchange mechanism comprising a casing, spaced plates in the casing, tubes extending between and through the plates, and tubular joint connections between the ends of the tubes at the remote sides of the plates for connecting the tubes in series, the joints being larger than the tubes to hold the plates in position.

3. A heat interchange mechanism for cooling rooms and the like comprising a casing, a lower wall of the casing having an opening therein, and a moisture receiving receptacle releasably secured to the casing and covering the opening.

4. A heat interchange mechanism for cooling rooms and the like comprising a casing having open ends and an opening in its lower side, a fan in one end of the casing, air direction control means at the other end of the casing, a heat interchanging unit in the casing, and a receptacle covering the opening in the lower side of the casing.

5. A heat interchange mechanism comprising a casing having spaced, annular end parts, and an intermediate part operatively and releasably connected to the end parts, the intermediate casing part having spaced ends at one point in the casing whereby the intermediate part of the casing can be quickly removed for obtaining access to the interior of the casing.

6. A heat interchange mechanism comprising a casing having spaced, annular end parts, and an intermediate part operatively and releasably connected to the end parts, the intermediate casing part having spaced ends at one point in the casing whereby the intermediate part of the casing can be quickly removed for obtaining access to the interior of the casing, and a releasable receptacle extending across the space between the ends of the intermediate part of the casing.

7. In a heat interchange mechanism, an evaporator coil comprising a row of vertically spaced tubes, and heat absorbing plates operatively connected to the tubes and projecting beneath the lower tubes for causing moisture collecting on the plates to drain to a point below the tubes, the lower projecting portions of the plates having rounded edges to avoid the undesirable collection of beads of water on the lower parts of the plates.

8. In a heat interchange device, a frame including rods disposed substantially in rectangular relation, a heat interchange unit between the rods and mounted thereon, annularly extending members connecting the ends of the rods at each end of the frame, a multiple part, annular casing extending around and concealing the frame between the end members, and means releasably connecting the parts of the casing operatively to the frame so that the casing may be removed without disturbing the frame arrangement.

9. A heat interchange device comprising a frame, a heat interchange unit within and supported by the frame, a multiple part casing extending around and covering the frame, and means releasably connecting the parts of the casing with respect to the frame so that it may be removed without disturbing the frame or heat interchange unit.

10. A heat interchange device comprising a frame, a heat interchange unit within and supported by the frame, a fan mounted at one end of the frame for directing air therethrough and

over the unit, means at the opposite end of the frame for providing a controllable discharge opening for the air, a multiple part annular casing extending around and covering the frame, and means releasably connecting the casing parts operatively with respect to the frame so that the casing may be removed without disturbing the latter.

annularly extending casing extending between the end casing members and which is of circumferentially segmental construction, and means operatively and releasably connecting the segments to the frame so that it may be removed without removing the end members. 80

11. A heat interchange device comprising a frame including a plurality of rods arranged in polygonal relation, a heat interchange unit within the frame and between the rods, means supporting the unit on the rods for movement longitudinally thereof, and means for securing the unit to a predetermined position longitudinally of the rods. 10 15

17. In a heat interchange device, an annular casing, a heat interchange unit within the casing, a fan mounted at one end of the casing, a shutter ring at the latter end of the casing, and means operatively connecting the ring to the flange for rotary movement of the ring with respect thereto, including spring pressed shoes on one of the last mentioned parts having resilient and frictional engagement with the other part. 85 90

12. A heat interchange device comprising a frame including a plurality of rods arranged in polygonal relation, a heat interchange unit within the frame, means on the rods and movable longitudinally thereof for supporting the heat interchange unit in position, and sleeves on the rods for securing the unit in a predetermined position. 20

18. A heat interchange device comprising a casing, a shutter ring at one end of the casing, and means rotatably mounting the shutter ring on the end of the casing including spring pressed shoes mounted on one part and resiliently projecting into an annularly extending channel in the other part and having frictional engagement therewith. 95

13. A heat interchange device comprising a frame including polygonally arranged rods, a heat interchange unit within the frame, means movable longitudinally on the rods for supporting the unit, annular casing means extending around and covering the frame, and including annular end members mounted on the ends of the rods, and means on the rods for holding the end members in position. 25 30

19. A heat interchange device including a frame, a heat interchange unit within the frame, and a multiple part, annular casing extending around and covering the frame and unit, the segments of the casing having inwardly turned flanges at their ends, and means releasably connecting the segments operatively to the frame. 100 105

14. A heat interchange device comprising a frame including polygonally arranged rods, a heat interchange unit within the frame and between the rods, means movable longitudinally on the rods for supporting the unit, annularly extending casing means enclosing the frame, and including end members mounted on the ends of the rods, means on the rods for holding the end members in position, and means on the rods between the end members for holding the unit in a predetermined position. 35 40

20. A heat interchange device comprising a frame including a plurality of rods disposed in polygonal relation, a casing extending around the frame for enclosing it, air discharge controlling means at one end of the casing, a fan at the other end of the casing, and means mounting all of the parts mentioned on the rods for movement longitudinally thereof so that the entire arrangement may be assembled by assembling them longitudinally in proper order on the rods. 110 115

15. A heat interchange device comprising a frame, a heat interchange unit within the frame and supported thereby, a multiple part, annular casing extending around and covering the frame, and means releasably connecting the parts of the casing operatively to the frame so that the casing may be quickly removed for access to the unit without disturbing the frame. 45 50

21. A heat interchange unit comprising an annular casing having inwardly turned end members, a plurality of polygonally arranged rods extending through openings in such end members, means on the rods and movable longitudinally thereof for supporting a heat interchange unit within the casing, fan means at one end of the casing and operatively supported by the rods, air discharge control means at the other end of the casing and also operatively supported by the rods, and means on the rods for maintaining all of the parts in proper position thereon and in a manner which permits removing all of the parts by moving them longitudinally of the rods. 120 125

16. A heat interchange device comprising end casing members, means extending between the end casing members and connecting them, an 55

JOHN R. REPLOGLE. 130