

Jan. 17, 1939.

R. M. STIKELEATHER

2,144,466

HEAT EXCHANGE UNIT

Filed March 13, 1937

3 Sheets-Sheet 1

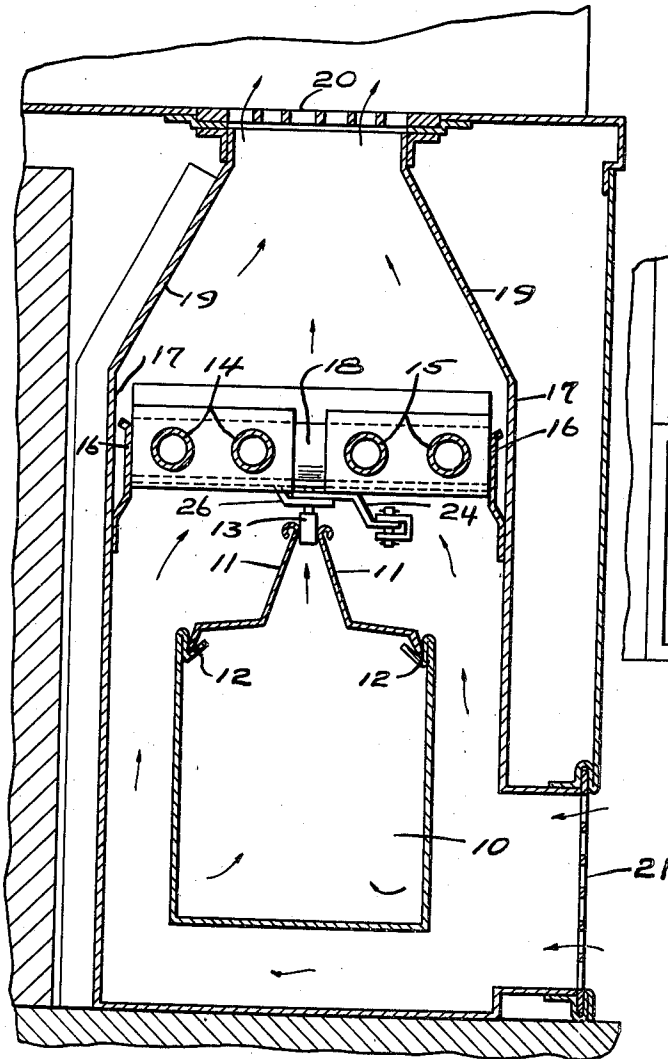


Fig. 1.

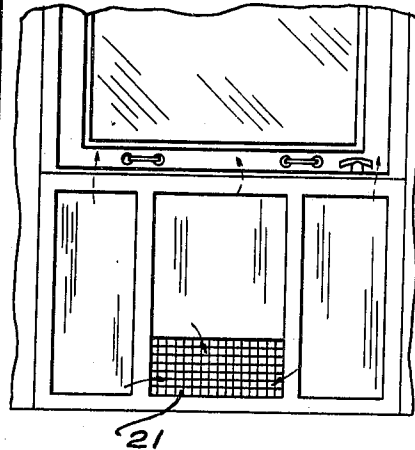


Fig. 2.

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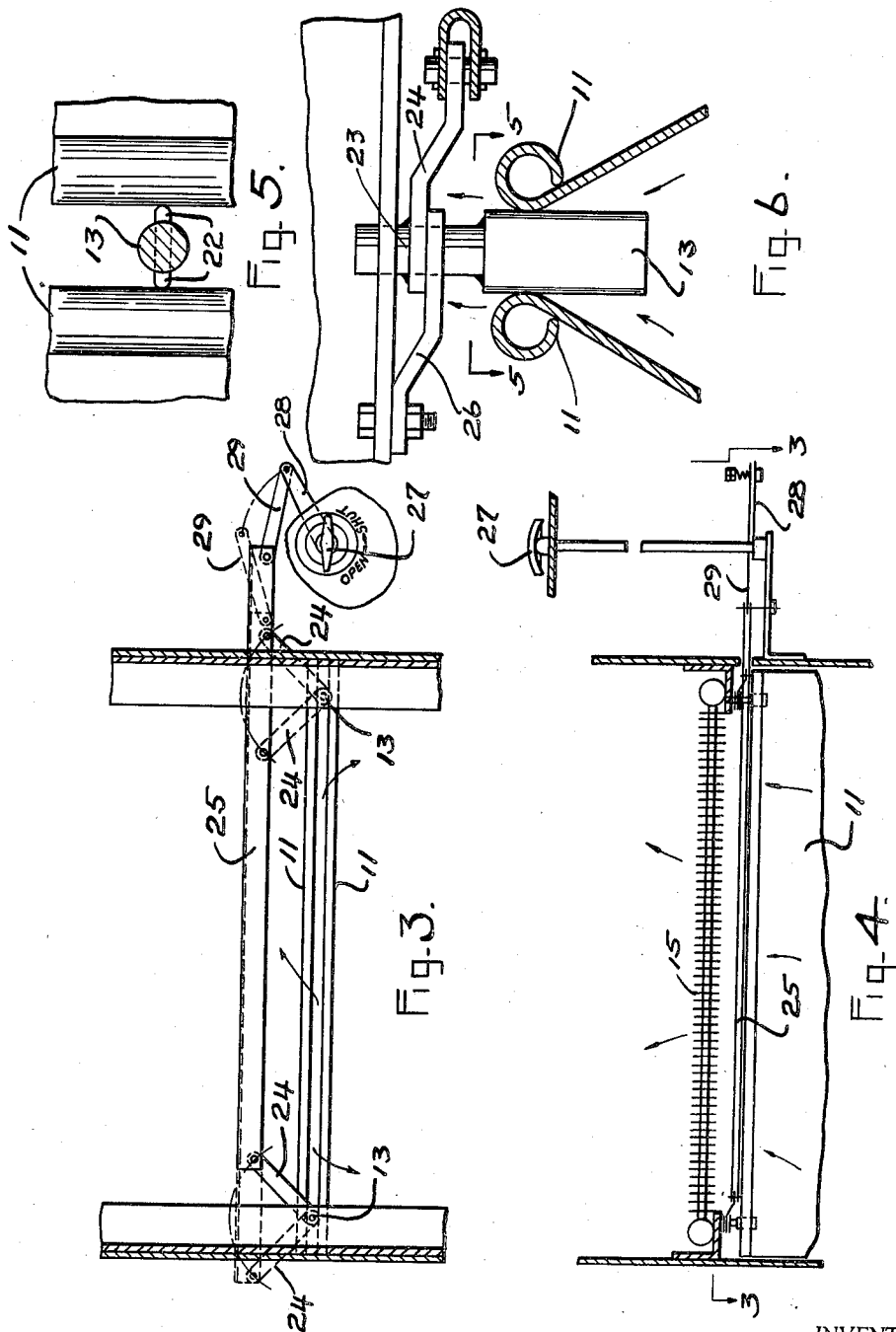
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3 Sheets-Sheet 2



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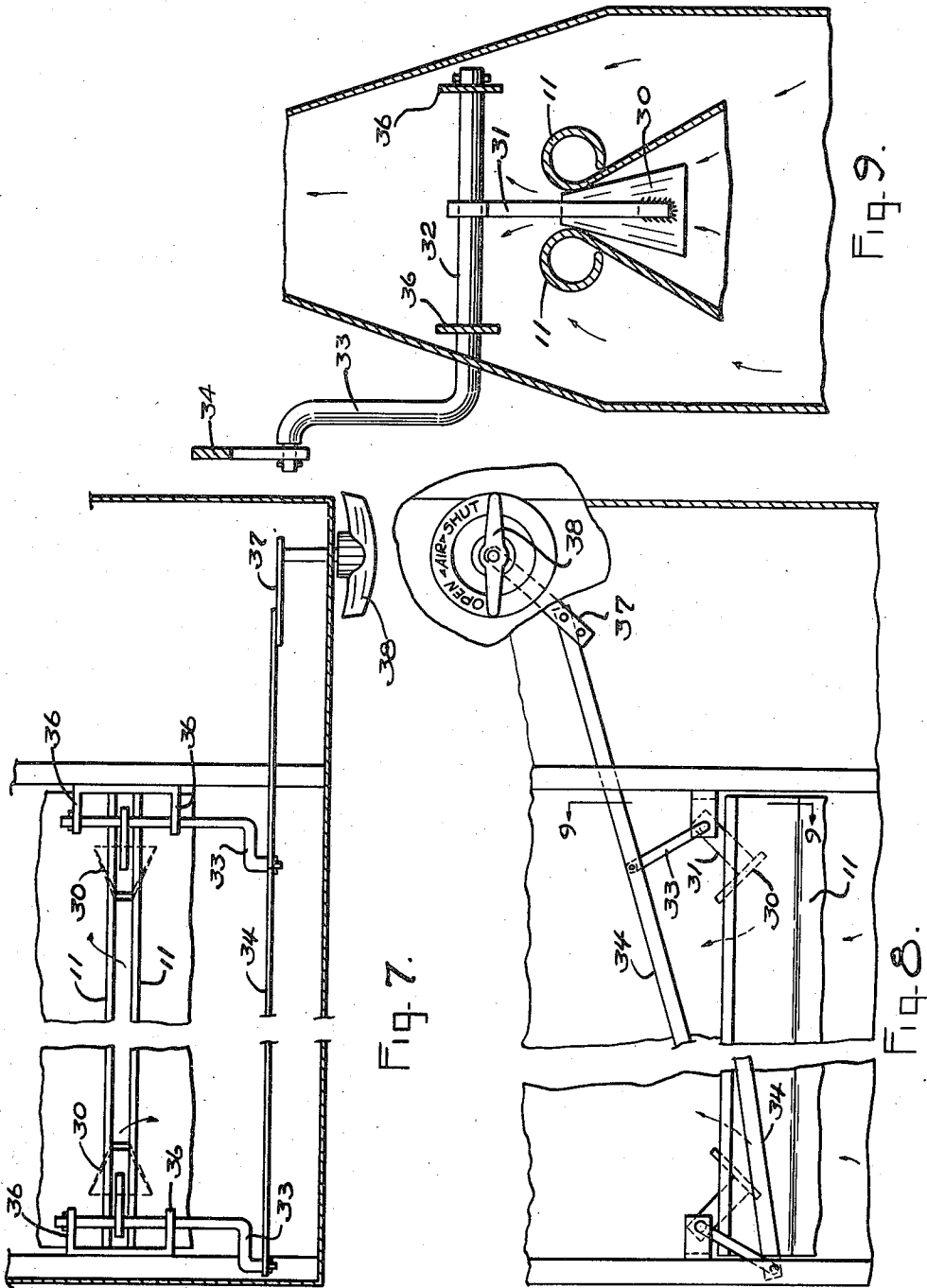
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HEAT EXCHANGE UNIT

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,144,466

HEAT EXCHANGE UNIT

Robert M. Stikeleather, Dedham, Mass., assignor
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Application March 13, 1937, Serial No. 130,734

4 Claims. (Cl. 98—38)

This invention relates to heat exchange units and relates more particularly to air blender units which receive conditioned air from a central source and mix it at points of distribution, with recirculated air.

In office buildings, hotels and the like, where it is desirable to supply a number of rooms with conditioned air from a central source, it has been the practice to use what are known as air blender units or local recirculation units which receive the conditioned air, mix it in the units with recirculated air, and discharge the mixture into the rooms. It has also been the practice to supply the conditioned air under pressure to the units and to pass it through nozzles in the units which by injector action induce the flow of recirculated air.

According to a feature of this invention the injector nozzle in each unit discharges into an open space between spaced tempering coils, while the recirculated air flows past and in contact with the tempering coils.

According to another feature of this invention the nozzles are adjustable from the exterior of the unit for varying their effect upon the flow of recirculated air.

An object of the invention is to provide an efficient, effective heat exchange unit utilizing the injector effect of primary air projected through a nozzle for inducing the flow of recirculated air and for mixing the primary air and recirculated air and for discharging it into the space to be served.

Another object of the invention is to provide satisfactory controls for adjusting the injector effect of primary air projected within a heat exchange unit for inducing the flow of recirculated air.

Other objects of the invention will be apparent from the following description and explanation taken together with the drawings.

The invention will be described with reference to the drawings, of which:

Fig. 1 is an end sectional view of one embodiment of a heat exchange unit according to this invention;

Fig. 2 is a view showing a complete heat exchange unit according to this invention, arranged as a window box unit;

Fig. 3 is a sectional view along the lines 3—3 of Fig. 4 and is a plan view looking downwardly upon the mechanism for adjusting the nozzles of Fig. 1;

Fig. 4 is a longitudinal section in the vicinity

of the nozzle extremities and tempering coils through the unit of Fig. 1;

Fig. 5 is a sectional view along the lines 5—5 of Fig. 6;

Fig. 6 is an enlarged view of the nozzle adjusting mechanism of the unit of Fig. 1, looking from one end of the unit;

Fig. 7 is a plan view looking downwardly upon another form of nozzle adjusting mechanism which may be used according to this invention;

Fig. 8 is a side view of the adjusting mechanism of Fig. 7 and

Fig. 9 is an enlarged end view, partially in section of the adjusting mechanism of Figs. 7 and 8.

Referring first to Fig. 1, the heat exchange unit there illustrated includes the primary air compartment which is supplied with conditioned air as explained in Patent No. 2,000,597 issued May 7, 1935 to Robert E. Keyes. Conditioned air from the compartment 10 discharges between the upper extremities or tips of the nozzle lips 11. The nozzle lips 11 are hinged at 12 to the casing of the compartment 10 so that the distance between the tips of the nozzle lips may be varied by adjustment of cam member 13 as will be explained in detail with reference to Figs. 3—6 inclusive.

The tempering coils or radiator comprising the two pairs 14 and 15 of finned tubes are mounted upon the flanges 16, secured to the side walls 17 of the unit and are so located with respect to the tips of the nozzle lips 11 that the nozzle discharges in the slot 18 in the centre of the radiator between the two sets of coils 14 and 15. An advantage of this is that both sides of the primary air jet from the nozzle act to effectively induce the flow of recirculated air. Another advantage is that a unit with a relatively short distance between the inlet and outlet grilles may be provided where this is desirable.

Above the radiator the two converging side walls 19 provide a converging air passage which terminates in its upper portion in the outlet grille 20. The converging air discharge passage acts to change the pressure energy of the mixed air into velocity energy in order that the air discharged from the unit have as high a velocity as possible so as to be projected a maximum distance into the room.

In the lower portion of the front longitudinal side of the unit is arranged the recirculated air grille 21 through which air from the room is drawn into the unit by the injector action of the primary air.

One embodiment of the nozzle adjusting mech-

anism will now be described with reference to Figs. 3 to 6 inclusive. Between the tips of the nozzle lips 11 are placed the cams 13 which have circular central portions and which have the extended portions 22. In the position shown by Figs. 5 and 6 the cam 13 is turned so that the extended portions 22 extend cross-wise the slot between the nozzle lips 11, to force the lips 11 a maximum distance apart. Conversely when the cam 13 is adjusted so that its circular central portion is in contact with the lips 11 with the portion 22 extending lengthwise the slot between the lips, or turned at ninety degrees from the position shown by Figs. 5 and 6, the slot between the nozzle lips is at its minimum width. The slot between the nozzle lips is adjusted between its maximum and minimum width by rotation of the cam 13 through an angle of ninety degrees by the mechanism which will now be described.

Attached fixedly to the upper portion 22 of each cam 13 is the one end of the lever 24. The other end of the lever 24 is rotatably attached to the bar 25. The cams are held against displacement by the members 26 which are secured at one end to the casing of the unit and which have circular openings in their other ends in which the cylindrical extension 23 of the cams 13 rotate.

The bar 25 is moved longitudinally by the control member 27 to which is fixedly attached one end of the lever 28. The other end of the lever 28 is rotatably attached to one end of the lever 29 and the other end of the lever 29 is rotatably attached to the bar 25. Adjustment of the control member 27 from one extreme to the other moves the bar 25 longitudinally and this rotates through the lever 24, the cams 13. The dashed lines of Fig. 3 illustrate the position of the bar 25 and lever 24 when the cam 13 is rotated to adjust the slot between the nozzle lips to its narrowest width. The full lines of Fig. 3 illustrate the other extreme position of the bar 25 and the lever 24 at which position the cam 13 is adjusted as shown by Figs. 5 and 6 to move the nozzle lips the maximum distance apart.

In the embodiment of the control mechanism illustrated by Figs. 7 to 9 inclusive, the width of the nozzle slot is adjusted by rotation of wedge shaped members 30 between the lips 11 of the nozzle as will now be described.

The wedge shaped members 30 are rotatably attached by the levers 31 to the shafts 32 which latter rotate within circular openings in the sup-

ports 36 which in turn are fixedly attached to the casing of the unit. The crank arm extension 33 of the shafts 32 are rotatably attached to the lever 34 which in turn is rotatably attached at one end to one end of the lever 37, the other end of the lever 37 being fixedly attached to the control marker 38.

Upon rotation of the control marker 38 the levers 37 and 34 are moved to rotate through the crank arms 33, the shafts 32 and the wedge shaped members 30.

Rotation of the wedge shaped members 30 causes them to contact the inner surfaces of the tips of the nozzle lips 11 with different widths to accordingly vary the width of the slot between the tips of the nozzle lips.

While several embodiments of the invention claimed have been described for the purpose of illustration, it should be understood that the invention is not limited to the particular arrangements illustrated since many departures may be made therefrom by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. An adjustable nozzle for an air conditioner comprising a pair of members having a slot therebetween for the discharge of air, and means rotatable in said slot in contact with the inner surfaces of said members for varying the width of said slot.
2. A nozzle for an air conditioner comprising a pair of members having a slot therebetween for the discharge of air, means having a variable width rotatable in said slot in contact with the inner surfaces of said members for varying the width of said slot, and means for rotating said last mentioned means.
3. A nozzle for an air conditioner comprising a pair of members having a slot therebetween for the discharge of air, an irregularly shaped cam rotatable in said slot in contact with the inner surfaces of said members for varying the width of said slot, and means for rotating said cam.
4. A nozzle for an air conditioner comprising a pair of members having a slot therebetween for the discharge of air, a wedge shaped member rotatable in said slot in contact with the inner surfaces of said members for varying the width of said slot, and means for rotating said wedge shaped member.

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