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I. W. KNIGHT

1,961,612

UNIT HEATER

Filed March 28, 1931

Fig. 1

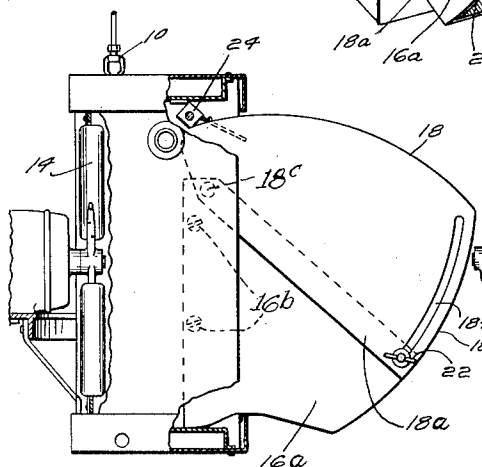
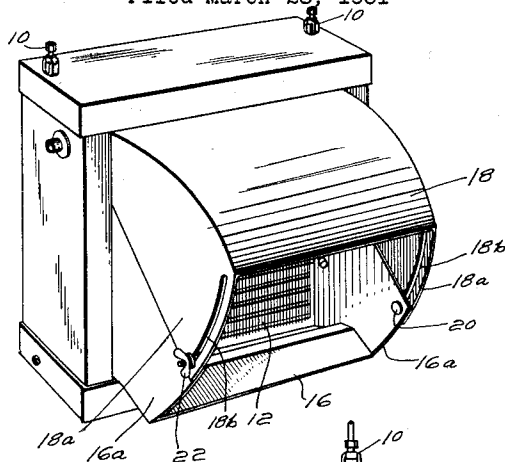


Fig. 2

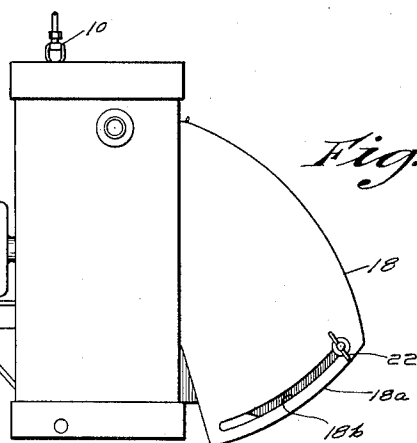


Fig. 3

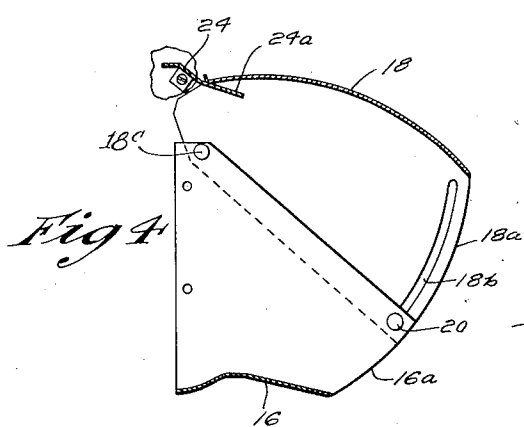


Fig. 4

Fig. 5

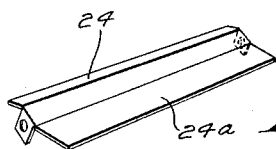
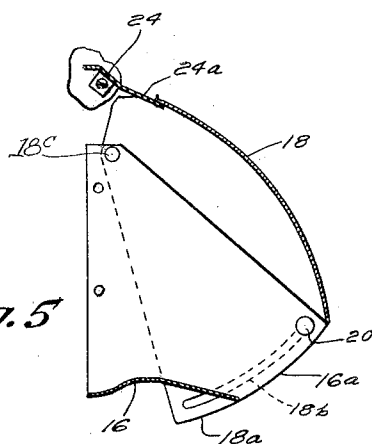


Fig. 6

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UNITED STATES PATENT OFFICE

1,961,612

UNIT HEATER

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4 Claims. (Cl. 98—40)

This invention relates to improvements in unit heaters. More especially it has to do with an adjustable nozzle by means of which the velocity and direction of discharge from such a heater may be controlled.

It is usually convenient to install unit heaters in the upper region of the space to be heated, and there are several advantages in doing so. One disadvantage, however, from such positioning is that the heated air is primarily directed into the upper region and since its own tendency is to rise the heating of the lower regions is somewhat delayed after the heaters are started and in any event must depend upon more or less indirect circulation for the ultimate heating effect.

It is a primary object of this invention to provide for controlling the direction of discharge from a unit heater to the end that this discharge may be initially in a downward direction. It is a further object to simultaneously increase the velocity of discharge and concentrate its flow as its direction of travel becomes more nearly downward, thus enhancing the desired propagation of the heated stream and counteracting its natural tendency to rise.

The best mode in which I have contemplated applying the principles of this invention is illustrated in the accompanying drawing, but it is intended that the patent shall cover by suitable expression in the appended claims whatever features of patentable novelty exist in the invention disclosed.

In the drawing,

Figure 1 is a perspective of a heater embodying the control nozzle;

Figure 2 is a side elevation, partly in section, showing the nozzle in its wide-open position;

Figure 3 is also a side elevation showing the nozzle in its closed position;

Figures 4 and 5 are similar sectional elevations of the nozzle alone; and

Figure 6 is a perspective of a so-called adapter.

Referring more especially to the drawing, the heater shown is of that type disclosed in Letters Patent #1,792,090 granted February 10, 1931 to Karl W. Haupt. This heater is particularly adapted to be supported from a ceiling, or other means located in the upper region of the space to be heated, by ties engaging the hangers 10. A heat-giving medium such as steam or hot water is delivered to a header for circulation through a series of finned tubes which constitute a radiator 12 extending vertically across the horizontal passage through the heater. At the entrance to this passage is a fan 14 for driving air through the

radiator. Ordinarily this air would leave the heater in a horizontal direction and immediately begin to rise since it is of course lighter than the atmosphere into which it is driven. As a consequence the lower region, which is the particular space normally occupied by humans, is the last to be heated. Since this lower portion is always the coolest due to natural circulation, it would be preferable to direct the heated air into this lower region initially for by so doing the aforesaid natural circulation would then assist rather than hinder a general diffusion of the heated air.

To accomplish this desired result the invention provides a nozzle at the discharge end of the passage through the heater. This nozzle in the particular embodiment illustrated comprises a fixed part and a movable part. The former has a flat horizontal underlip 16 which extends forward and slightly downward and at its side edges are upstanding vertical flanges 16a. This fixed part is secured to the heater casing by screw bolts 16b. The movable part has a horizontal upperlip 18 which extends forward and in a downward curving direction and at its side edges are depending vertical flanges 18a which coact with the fixed upstanding vertical flanges 16a to close the sides of the nozzle. This movable part turns about pivot pins 18c which engage the upper portion of the fixed flanges 16a. Attached to these upstanding side flanges are bolts 20 whose shanks project through arcuate slots 18b in the depending side flanges, there being thumb nuts 22 for clamping the flanges together and thus fastening the upper lip at any desired position. At the upper edge of the heater casing is a so-called adapter 24. This has a forwardly extending lip 24a which underlies the rear upper edge of the movable lip, being pressed gently against the latter by its own resiliency. As the upper or movable lip is adjusted the space between its rear edge and the heater casing is always closed by the adapter thus preventing any loss of the heated air through this space.

When first starting the heater, say in the morning, for bringing the space to be heated up to working temperature, the upper lip 18 would be adjusted to its lowermost position as seen in Figures 3 and 5. This would have a triple effect on the heated air. First it would direct the air downward directly into the cooler region and thus enable this region to gain the full and direct benefit of the hot air. Second, it would narrow the outlet for the heated air and thus cause the air stream to be more concentrated. This in itself would compel the heated air to

penetrate the atmosphere of the lower region and thus induce delivery of the heated air at a low level. But this result is insured by the third effect produced by the nozzle, namely the increase of the velocity of the discharging air. Since the fan may be deemed to rotate at a constant speed and cause a definite quantity of air to pass through the heater it follows that if this quantity is forced to pass out through a smaller or restricted outlet, as is the case when the nozzle is closed, it will necessarily flow through this outlet at a higher velocity than it would if the outlet were wide-open.

Accordingly then the nozzle not only directs the heated air to the lower regions but causes it to pursue its course of travel at a higher velocity and initially in a more concentrated stream. It has been noted in practice that with the nozzle closed the hot air current will travel clear to the floor and thence continue along the floor for an appreciable distance. Obviously this propagation of the hot air to the lowermost portion of the space to be heated results in a very prompt heating of the space as a whole for once the air is delivered to the lower levels its natural tendency to rise soon effects its diffusion throughout the entire space.

As the temperature of the atmosphere generally rises the upper lip can be raised to any degree within its range, thus allowing the heated air to leave the heater in a more elevated direction and in a less concentrated stream at reduced velocity. Thus, in the particular example described, it is possible to control the heating effect by adjustment of the nozzle alone. Other examples will readily occur to one's mind where the control of the heater discharge as herein provided for can be employed to advantage. One such is where a large door, a garage door, is being frequently opened. With a heater placed above the top level of the door and its discharge directed downward toward the door opening by the means herein described, the ingress of cold air is greatly prevented and such as does enter and tends to flow along the floor is at once met by the concentrated hot air current and promptly heated.

I claim:

1. The combination in an air distributor for unit heaters having means for driving air there-through, of a nozzle on the discharge side of said heater having a fixed lip attached to one edge of the heater opening; a curved lip pivotably attached to the opposite edge of said opening and capable of being swung to vary the size of the nozzle opening, and an adapter attached to the last mentioned edge of the heater opening for maintaining closed the space between said last mentioned edge and the said curved lip.

2. The combination in an air distributor for unit heaters having means for driving air there-through in a generally horizontal direction, of means for simultaneously changing the direction and increasing the velocity of flow of said air

comprising a nozzle on the discharged side of said heater having a fixed lip comprising a flat bottom portion and upstanding vertical flanges at the side edges thereof and a movable lip comprising a downward curving horizontal lip and depending vertical flanges at the side edges thereof arranged to coact with the first said vertical flanges to close the sides of the nozzle, the said movable lip being capable of adjustment toward and from the fixed lip, whereby the opening of said nozzle may be decreased to effect increase in velocity and whereby the discharge may be directed downward in direction approaching the vertical.

3. The combination in an air distributor for a unit heater having a casing with its discharge opening arranged for horizontal delivery of the heated air and means for driving air through said casing at a predetermined velocity, of a nozzle at the discharge end of said casing comprising a fixed lip extending forward and slightly downward from the lower edge of said casing having upstanding vertical flanges extending forward from the side edges of said casing and a movable lip pivotally mounted on the said upstanding flanges near the upper end and having a downward curving lip extending forward from the top edge of said casing and depending side flanges arranged to contact with the said upstanding flanges to close the sides of the nozzle, the said movable lip being adapted to be set toward said fixed lip to reduce the vertical extent of the nozzle opening and thereby increase the velocity of the discharging air; said movable lip being shaped to cause said discharging air to change its direction of flow and leave the nozzle in a downward direction.

4. The combination in an air distributor for a unit heater having a casing with a vertical opening and means for driving air therethrough in a generally horizontal direction, of a nozzle on the discharge side of said opening forming a chamber comprising a fixed wall and a movable wall with nozzle opening therebetween; the fixed wall having a flat lip extending forward from the lower edge of the casing opening and upstanding vertical flanges extending forward from the side edges of the casing opening; the movable wall having an upper lip extending forward from the upper edge of the casing opening and having depending vertical flanges pivotally mounted on the fixed upstanding vertical flanges and arranged to coact therewith to maintain the sides of said nozzle closed; the said movable wall being rotatable about said pivotal mountings to vary the size of the nozzle opening and thereby change the velocity of discharge therethrough and to change the location of the opening with respect to said chamber whereby the direction of flow is affected; the said opening being changed in location and size simultaneously to produce discharge in a downward direction at increased velocity.

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