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NOZZLE FOR DIRECTING HEATED AIR TO WINDSHIELDS

Original Filed Nov. 4, 1944

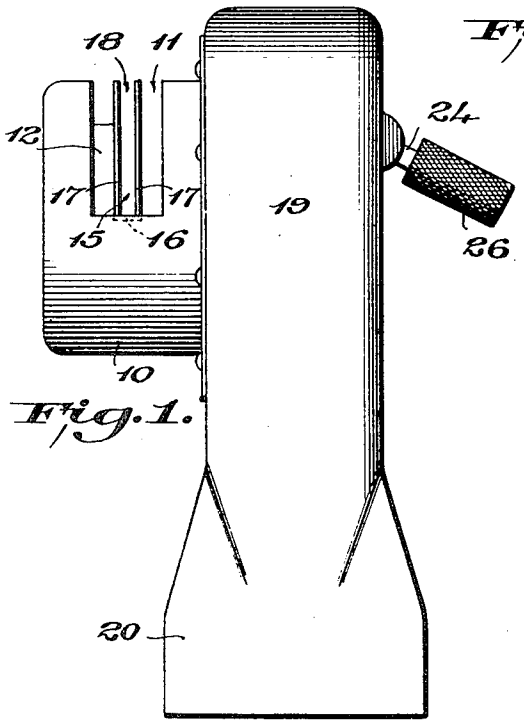


Fig. 1.

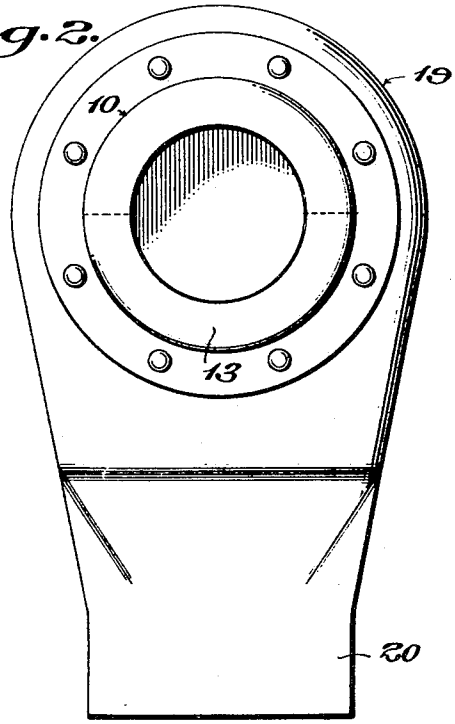


Fig. 2.

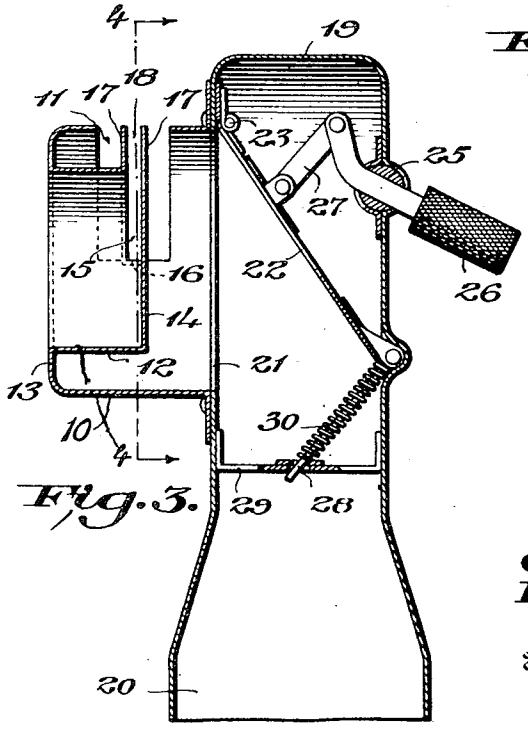


Fig. 3.

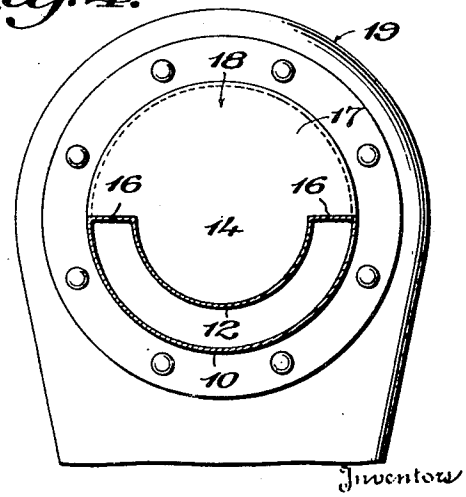


Fig. 4.

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NOZZLE FOR DIRECTING HEATED AIR TO WINDSHIELDS

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3 Claims. (Cl. 299—140)

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This invention relates to nozzles, particularly for directing heated air over window surfaces to remove frost and ice therefrom and to prevent the formation of frost and ice thereon, and has for its general object to provide, for these and analogous purposes, a simple, practical nozzle which is especially adapted for disposition with respect to a window or other surface to direct a layer of heated air substantially uniformly over an extensive area thereof so as to accomplish its purpose expeditiously and efficiently.

More particularly, the present invention relates to nozzles of the type illustrated, described and claimed in our co-pending application, Serial No. 562,027, filed November 4, 1944, of which the present application is a division, and has primarily in view to provide a nozzle of the type stated embodying a simple, practical construction whereby atmospheric air is intermixed with the heated air to reduce the temperature of the heated air in instances where the heated air may be so hot as possibly to harm windows of certain types.

With the foregoing and other objects in view, which will become more fully apparent as the nature of the invention is better understood, the same consists in a nozzle embodying the novel features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawings, and defined in the appended claims.

In the accompanying drawings, wherein like characters of reference denote corresponding parts in the different views:

Figure 1 is a side elevation of a nozzle constructed in accordance with one practical embodiment of the invention.

Figure 2 is a front elevation of the nozzle.

Figure 3 is a central, vertical, longitudinal section through the nozzle; and

Figure 4 is a transverse section on the line 4—4 of Figure 3.

Referring to the drawings in detail, it will be observed that the present nozzle comprises an outer tubular element 10 which is open at its rear end for supply of heated air thereto and provided in its side wall, intermediate its ends, with an arcuate slot 11 for discharge of heated air fan-wise laterally therefrom. It will further be observed that an inner tubular element 12 of lesser diameter than the outer tubular element 10 and open at its front end, is disposed within said outer tubular element, coaxially therewith, and is connected at its front end to the front end of said outer tubular element by a wall 13, whereby the space between said elements is closed at its front end against escape of heated air therefrom. It will additionally be observed that the inner tubular element 12 is closed at its rear end by a wall 14 against entrance of heated air into the same from the outer tubular element 10 and is provided in its side wall with an arcuate slot 15 for escape therefrom of atmospheric air which may enter the same through its open, front end.

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The slot 15 is narrower than the slot 11, but is co-extensive angularly therewith and located in the central plane thereof. Extending across the space between the tubular elements 10 and 12 at the sides of the slot 15 are walls 16, while extending across said space at the sides of said slot are walls 17. Thus, between the walls 17 is a narrow, arcuate passageway or slot 18 which is open at its outer end and in communication at its inner end with the interior of the inner tubular member 12 through the slot 15. The side portions of the slot 11 are located to either side of the passageway or slot 18, and the walls 16 and 17 not only prevent heated air from entering said passageway or slot from the tubular element 10, but cause heated air to be discharged from said tubular element 10 through the side portions of the slot 11 in two narrow, fan-like, separate parallel streams, one to either side of the passageway or slot 18. These streams create a negative pressure therebetween at the outer end of the passageway or slot 18 and thereby induce flow of atmospheric air from the hollow element 12 through said passageway or slot 18 with the result that the atmospheric air becomes intermixed with and lowers the temperature of the discharged heated air.

The nozzle is intended to be mounted so that air discharged fan-wise therefrom will be dispersed over a window surface for defrosting or frost preventing purposes. In this connection, the heated air supplied to the nozzle may be from a source of supply of heated air for other purposes and the air may be so hot as possibly to harm windows of certain types unless its temperature is reduced. For example, airplanes may have a source of supply of heated air for cabin heating or other purposes and the air may be too hot to be directed safely against laminate or plastic windows with which the airplane may be equipped. In any such instance, the present nozzle affords a practical means of reducing the temperature of the heated air and dispersing it over a window surface for defrosting or frost

preventing purposes without danger of harming the window.

While the open, rear end of the tubular element 10 may be connected in any suitable manner with a source of supply of heated air, it is preferred to provide, as a part of the nozzle, a hollow air supply head 19 to serve both as a support for said element 10 and as a housing for valve means to control supply of heated air to the nozzle.

While the head 19 may be of any suitable design, it preferably is of flat, peripherally rounded form at one end and develops toward its other end into a cylindrical neck 20 for connection with a hot air supply duct. The element 10 is suitably joined at its open, rear end to one flat side of the first mentioned end of said head and in the said flat side of said head is an opening 21 for flow of air from said head to said element 10.

In the head 19 is a valve in the form of a disk 22 for controlling flow of heated air from said head to the tubular member 10. This valve is of a size to cover the opening 21 and is pivotally mounted, as indicated at 23, upon the front wall of the head 19 for swinging movements between open and closed positions relative to the opening 21.

While any suitable means may be provided for actuating the valve 22, snap action means preferably is provided for this purpose. This means may comprise a lever 24 pivoted intermediate its ends, as indicated at 25, to the rear wall of the head 19 and having its front end disposed within said head and its rear end disposed rearwardly of said head and provided with a suitable handle 26 for effecting rocking movement thereof. The front end of said lever may be connected by a link 27 with the valve 22 so that by rocking said lever in one direction said valve is closed and by rocking said lever in the opposite direction said valve is opened. Moreover, a rod 28 may be pivoted to the free end portion of the valve 22 and may extend through an opening in a member 29 mounted within the head 19, and an expansion helical spring 30 may surround said rod between the valve and said member. The opening 29 may be located beyond the free end of the valve 22 at a point approximately midway between projections of the plane of the valve when it is in its open and its closed positions. Thus, if the valve is swung beyond its midway position toward either its closed or its open position, the spring 30 will act to snap it to and hold it in its closed or open position, as the case may be.

When the valve 22 is closed, flow of heated air to the tubular member 10 is denied and the nozzle is, of course, inoperative. When, however, the valve 22 is opened, as shown in Figure 3 of the drawings, heated air flows from the head 19 through the opening 21 into the tubular member 10 and from the latter through the portions of the slot 11 to either side of the passageway 18, thereby inducing flow of atmospheric air through said passageway with the result that the atmospheric air becomes intermixed with and reduces the temperature of the heated air.

The nozzle may be mounted in any suitable manner at the side, bottom or top of a window so that air delivered fan-wise from the nozzle will be projected over the window substantially parallel thereto.

From the foregoing description considered in connection with the accompanying drawings, it

is believed that the construction and operation of the present nozzle will be clearly understood and its advantages appreciated, it is desired to point out, however, that while only a single, specific structural embodiment of the invention has been illustrated and described, the same is readily capable of various other specifically different structural forms within its spirit and scope as defined in the appended claims.

We claim:

1. A nozzle comprising a tubular element open at its rear end for supply of air thereto and having in its side wall and arcuate slot for discharge of air therefrom, a smaller tubular element within and spaced from said first mentioned tubular element and open at its front end for supply of atmospheric air thereto, means closing the front end of the space between said elements against escape of air therethrough from said first mentioned element, means closing the rear end of said smaller tubular element, said smaller tubular element having therein an arcuate slot substantially coextensive angularly with the slot in said first mentioned tubular element, and walls extending outwardly from said second mentioned tubular element at the sides and the ends of the slot therein across the space between said tubular elements to provide an elongated narrow-width passageway for atmospheric air communicating at its inner end with said second mentioned tubular element through the slot therein and open at its outer end for discharge of atmospheric air therefrom, the outer portions of said walls being located between and being spaced from the sides of the slot in said first mentioned tubular element so that air may be discharged from said first mentioned tubular element through the slot therein to either side of the outer open end of said passageway and thereby will act to draw atmospheric air through said passageway for intermixture therewith.

2. A nozzle comprising a hollow cylindrical element open at its rear end for supply of air thereto and having in its side wall an arcuate slot for discharge of air therefrom, a smaller hollow cylindrical element within and spaced from said first mentioned element and open at its front end for supply of atmospheric air thereto, means closing the front end of the space between said elements against escape of air therethrough from said first mentioned element, means closing the rear end of said smaller element, said smaller element having in its side wall an arcuate slot substantially coextensive angularly with the slot in said first mentioned element, and walls extending from said second mentioned element across the space between said elements at the sides and ends of the slot in said smaller element and defining an arcuate passageway communicating at its inner end with said smaller element and open at its outer end for discharge of atmospheric air therefrom, the outer portions of said walls being located between and being spaced from the sides of the slot in said first mentioned element and having their outer edges conforming substantially to the curvature of the side wall of said first mentioned element so that air may be discharged from said first mentioned element through the slot therein to either side of the outer open end of said passageway and thereby will act to draw atmospheric air through said passageway for intermixture therewith.

3. A nozzle comprising a tubular element open at its rear end for supply of air thereto and closed

at its outer end, said element having in its side wall an arcuate slot for discharge of air therefrom, and means providing within said element an open ended atmospheric air passageway extending at one end through the outer end of said element and having its other end portion of narrow-width arcuate shape and substantially coextensive angularly with said slot and disposed within and spaced from the sides of said slot so that air may be discharged from said tubular element through said slot to either side of the said other end portion of said passageway and by its discharge will act to draw atmospheric air through said passageway for intermixture therewith.

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