

May 22, 1945.

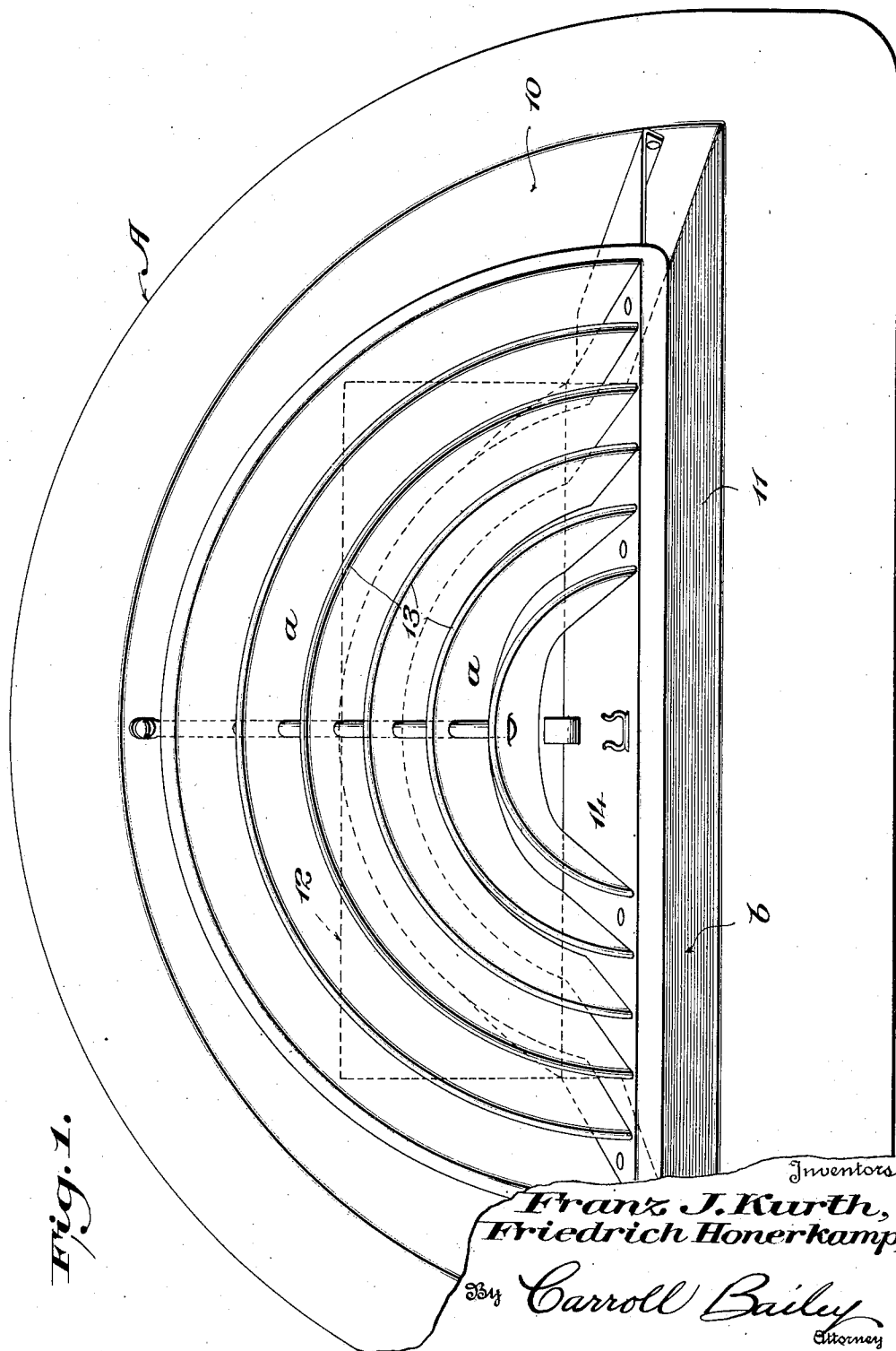
F. J. KURTH ET AL

2,376,705

AIR OUTLET DEVICE

Filed Sept. 22, 1943

3 Sheets-Sheet 1



May 22, 1945.

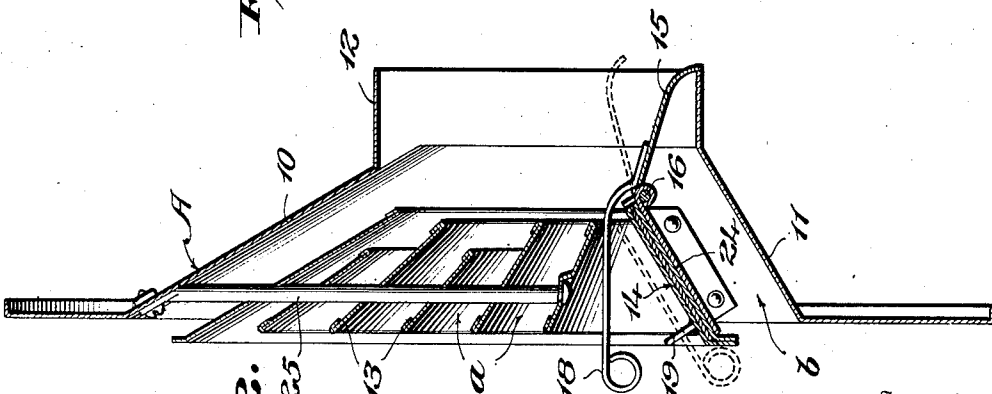
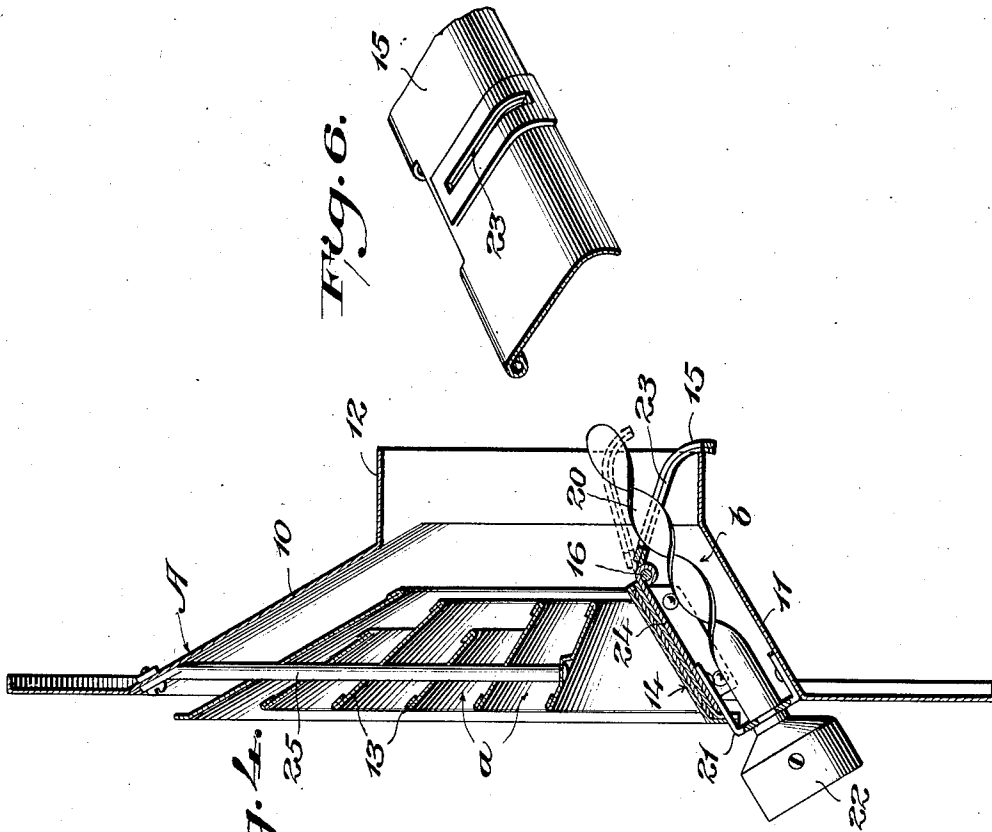
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3 Sheets-Sheet 2



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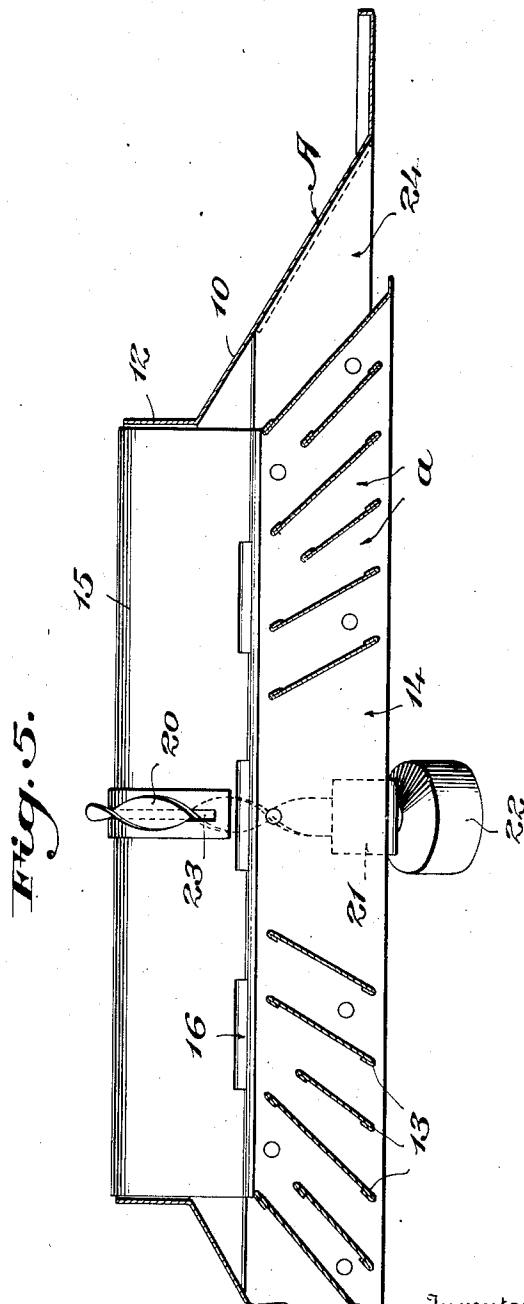
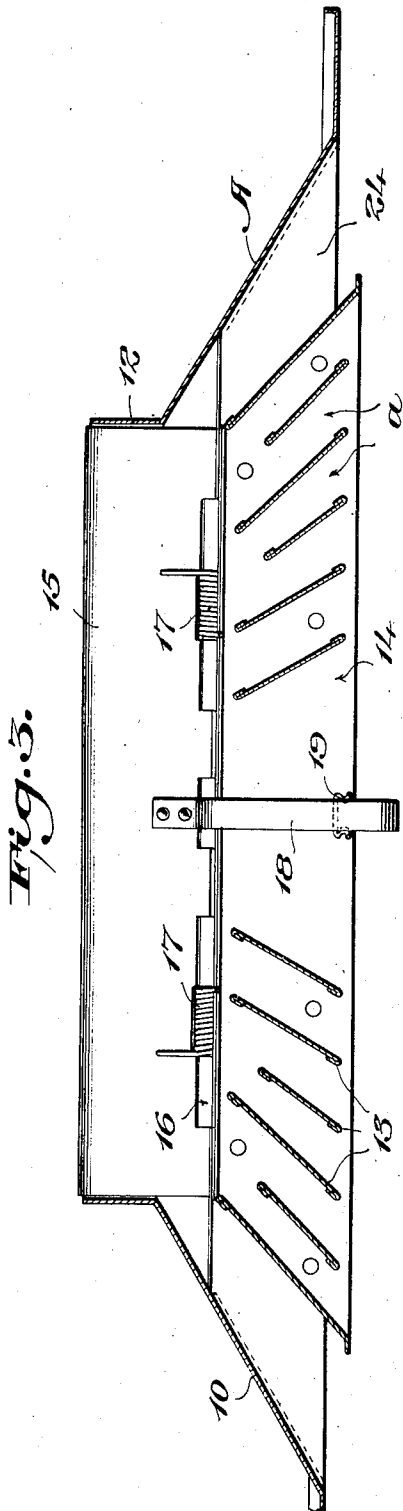
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AIR OUTLET DEVICE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,376,705

AIR OUTLET DEVICE

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Application September 22, 1943, Serial No. 503,430

2 Claims. (Cl. 98—40)

This invention relates to air outlet devices for ventilating apparatus, and has particular reference to improvements in air outlet devices of the general type described and claimed in prior Franz J. Kurth Patents Nos. 2,142,134 of January 3, 1939, and 2,300,049 of October 27, 1942.

While air outlet devices of the type mentioned ordinarily are employed to divide all of any given volume of supplied air into a plurality of separate streams to effect its delivery in diffused, substantially draftless form into enclosures, there are times, in certain installations of such devices, when it may be desirable to have a considerable portion of the supplied air delivered in the form of a single sheet and more or less in blast form, rather than in plural-stream, diffused form. For example, such devices may be employed for the delivery of warm air to the enclosures occupied by the gunners of military aircraft, and under ordinary or non-combat conditions it may be desirable to have all of the supplied air divided into separate streams and thereby delivered to such an enclosure in diffused, substantially draftless form; whereas, under combat conditions, when the aperture through which a gun is operated is open, it may be desirable to direct a sheet of warm air between the gunner and the aperture to shield the gunner from the cold air which may enter the aperture.

Accordingly, the general object of the present invention is to provide an air outlet device of the type mentioned embodying a construction such that it may be employed either to divide all of the air supplied thereto into a plurality of separate streams for delivery therefrom in diffused, substantially draftless form or, alternatively, to divide only part of the air supplied thereto into a plurality of separate streams for diffusion and draft avoiding purposes and to direct the remainder of the supplied air therefrom in the form of a single, relatively wide sheet for shielding or other purposes.

The invention also has in view to provide an air outlet device of the type mentioned embodying a simple, practical means whereby the purpose mentioned may readily be accomplished. In addition, it is an object of the invention to provide a simple, practical means for the purpose stated which is readily operable to regulate the amounts of the total volume of the supplied air which are delivered from the device in diffused and sheet form, respectively.

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 an air outlet device of the type mentioned 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 related views:

Figure 1 is a front elevation of an air outlet device constructed in accordance with one practical embodiment of the invention.

Figure 2 is a central, vertical, longitudinal section through the device.

Figure 3 is a horizontal section through the device.

Figure 4 is a view similar to Fig. 2 illustrating an alternative construction.

Figure 5 is a view similar to Fig. 3 of the alternative construction illustrated in Fig. 4; and

Figure 6 is a fragmentary perspective view of the valve element of the alternative construction illustrated in Figs. 4 and 5.

Referring to the drawings in detail, A designates generally an open-ended, forwardly flaring casing of substantially inverted U-shape in end elevation which includes an upper arched, forwardly flaring wall 10 and a flat bottom wall 11 which preferably, though not necessarily, is inclined downwardly and forwardly as shown. This casing is adapted to be connected at its smaller or rear end to an air supply duct (not shown) and for that purpose it may be provided at its rear end with any suitable means such, for example, as a neck 12.

Within the casing A is a series of successively smaller, open-ended, hollow, forwardly flaring members 13 of substantially inverted U-shape in end elevation which are spaced successively inwardly of one another and the outermost of which is spaced inwardly from the casing wall 10, thereby providing a series of separate, forwardly flaring passageways *a* of substantially inverted U-shape in end elevation through which part of the supplied air flows.

Extending transversely of the device at the bottoms of the series of flaring members 13 and closing the bottoms of the passageways *a* is a horizontal wall means 14 which preferably is flat and which, like the bottom wall 11 of the casing A, preferably, though not necessarily, is inclined downwardly and forwardly, as shown. In any event, said wall means 14 is spaced upwardly from the casing bottom wall 11 to provide, below the series of passageways *a*, a bottom, horizontal

passageway *b* which may be of any suitable height and which may extend transversely of the device only beneath the series of flaring members 12 and the passageways *a* or entirely from side to side of the casing A as desired, depending upon whether said wall means 14 does not exceed in length the width of the larger flaring member 13 or whether it extends from side to side of the casing A, which is optional.

A valve 15 in the form of a plate substantially corresponding in length to the width of the rear end of the bottom passageway *b*, is hinged at its front end to the rear end of the wall means 14, as indicated at 16, and is vertically swingable between open and closed positions with respect to the rear end of said passageway *b*, thus either to permit or to deny flow of supplied air through said passageway *b*. If said valve is swung to an open position, as shown by dotted lines in Fig. 2, some of the supplied air will flow through the passageways *a* and the remainder will flow through the passageway *b* and be delivered from the device in the form of a single wide sheet which may be employed as a shield or for any other purpose desired. If, on the other hand, said valve is swung to its closed position, as illustrated by full lines in Fig. 2, all of the supplied air will be required to flow through the passageways *a* and thereby will be caused to be delivered from the device in diffused, substantially draftless form.

Any suitable means may be employed for actuating the valve 15. In this connection and as illustrated in Figs. 1 to 3, one or more torsion or other suitable springs 17 may be employed to urge said valve closed and a handle 18 of any suitable type may extend from said valve through the smaller of the passageways *a* to the front of the device where it may readily be grasped and swung to open said valve, a suitable catch 19 being provided for cooperation with said handle to hold said valve open. Alternatively, the spring, or springs, 17 may be dispensed with, if desired, and any suitable means may be provided to hold the valve either fully open, fully closed or in any desired partly open position to vary the relative amounts of the supplied air which flow through the passageways *a* and *b*.

According to the form of the invention illustrated in Figs. 4 to 6 and which differs from the Figs. 1 to 3 form of the invention only in respect to the actuating means per se for the valve 15, a screw member 20 is journaled in a bracket 21 fastened between the casing bottom wall 11 and the wall means 14 and at its rear end has a suitable threaded connection with the valve 15. Thus, by rotating said screw member, the valve 15 may be fully or partly opened or closed. Moreover, said screw member is effective to hold the valve open or closed or partly open as is apparent. At the front end of said screw member is a handle 22 which is exposed at the front of the device where it may readily be grasped to effect rotation of said screw member. The screw member itself may be of any suitable form and may have any suitable connection with the valve 15. In this connection and as illustrated in the present instance, said screw member comprises a flat strip of metal twisted into helical form and operatively connected with the valve by being extended through a slot 23 therein.

The flaring members 13 with the bottom wall means 14 may be provided as a unit for unitary assembly with or disassembly from the casing A in any suitable manner, or they may be of

unitary construction with said casing. In fact, the device may readily be constructed by utilizing existing devices such as disclosed in Kurth Patent #2,300,049 to provide the series of flaring members 13 and the wall means 14 and by providing casings A to accommodate said existing devices, any suitable means being provided for mounting the existing devices in said casings. Alternatively, the casing A may be entirely eliminated and only a secondary bottom wall, such as the casing bottom wall 11, need only be provided beneath the wall means 14 to afford the passageway *b*, in which event the neck 12 may extend rearwardly from the outermost of the series of flaring members 13 and from the rear edge of the secondary bottom wall.

Regarding the flaring members 13, these may be of any desired form in accordance with the teachings of Kurth Patents Nos. 2,142,134 and 2,300,049 to effect diffusion of the supplied air in any desired manner.

According to the specific embodiments of the invention illustrated in the present instance, the flaring members 13 are mounted upon a supporting plate 24 which extends transversely of the casing A and which is fastened at its ends to the side walls of said casing, this plate either constituting the wall means 14 or part of said wall means. In addition, a strut 25 of any suitable type may extend through the series of flaring members 13 and may be secured to the casing member 10 to afford an additional means of securely mounting said series of flaring members in the casing A as well as of fastening the members 13 in operative relationship to each other. Obviously, however, the members 13 may be fastened together and in the casing A in any other desired manner.

From the foregoing description considered in connection with the accompanying drawings it will be apparent, that the invention, in its broader aspects, comprises an open-ended casing of the shape shown or of any other desired shape and flared or not flared, as desired, for connection at one end with an air supply duct; wall means dividing said casing into two open-ended compartments; and valve means for controlling flow of supplied air through one of said compartments, means such as the members 13 or of any other suitable form preferably but not necessarily being provided to cause air supplied from the duct through the other of said compartments to be delivered therefrom in diffused form. Accordingly, it will be equally apparent that the invention may be embodied in devices of various different structural forms to include these main features and such other features as have been herein referred to or which may be desirable, all within its spirit and scope as defined in the appended claims.

We claim:

1. An air outlet device comprising a series of successively smaller open-ended, hollow flaring members of substantially inverted U-shape in end elevation spaced successively inwardly of one another and having their smaller ends disposed toward the rear or air inlet end of the device to provide therebetween a series of forwardly flaring air passageways of substantially inverted U-shape in end elevation, a forwardly and downwardly inclined wall closing the bottoms of said passageways, an open-ended casing of substantially inverted U-shape in end elevation enclosing said series of flaring members and including an upper arched forwardly flaring wall spaced outwardly

from the outermost of said series of flaring members and a forwardly and downwardly inclined bottom wall spaced downwardly from the wall which closes the bottoms of said flaring passageways and thereby providing a forwardly and downwardly inclined bottom air passageway open at its front and rear ends and extending transversely of the device below said series of flaring passageways, said casing including a neck at its rear end for connection with an air supply duct, said neck including a bottom wall extending rearwardly beyond the rear end of the wall which closes the bottoms of said flaring passageways, and valve means for opening and closing said bottom air passageway, said valve means comprising a plate hinged at its front to the rear of and extending rearwardly from the wall which closes the bottoms of said flaring passageways for downward swinging movement into engagement with the bottom wall of said neck to close said bottom

passageway and for upward swinging movement away from the bottom wall of said neck to open said bottom passageway.

2. An air outlet device comprising a casing having at its rear end a neck for supply of air thereto and further having upper and lower passageways for delivery of air therefrom in upward and downward directions, respectively, a wall separating said passageways, said neck including a bottom wall, and a valve plate hinged at its front to the rear of and extending rearwardly from said separating wall for downward swinging movement into engagement with the bottom wall of said neck to close said lower passageway and for upward swinging movement away from the bottom wall of said neck to open said lower passageway.

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