

Sept. 28, 1943.

L. A. WILLIAMS, JR

2,330,322

HEATING APPARATUS

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Fig. 1.

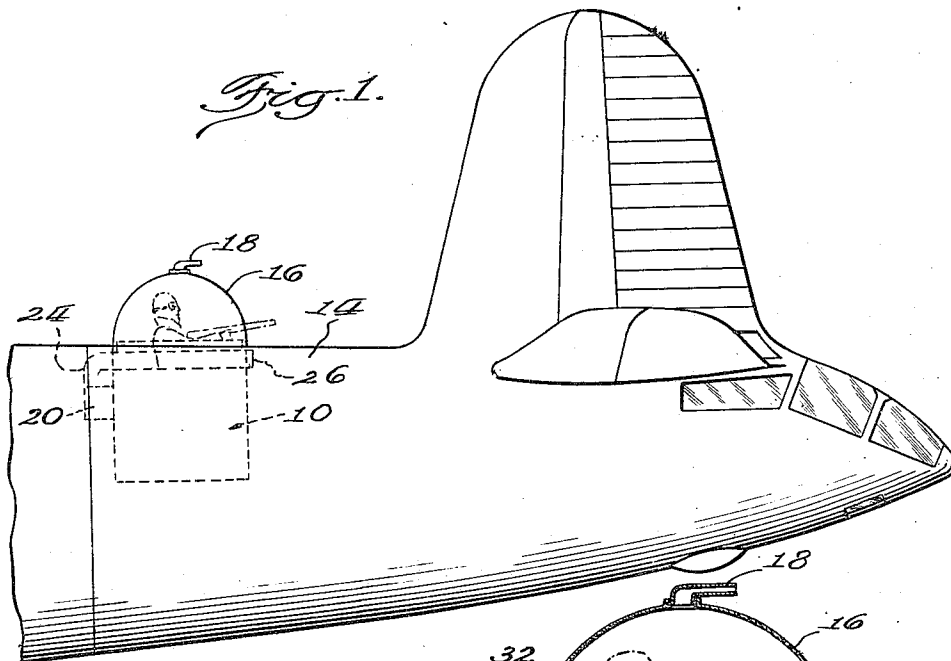


Fig. 2.

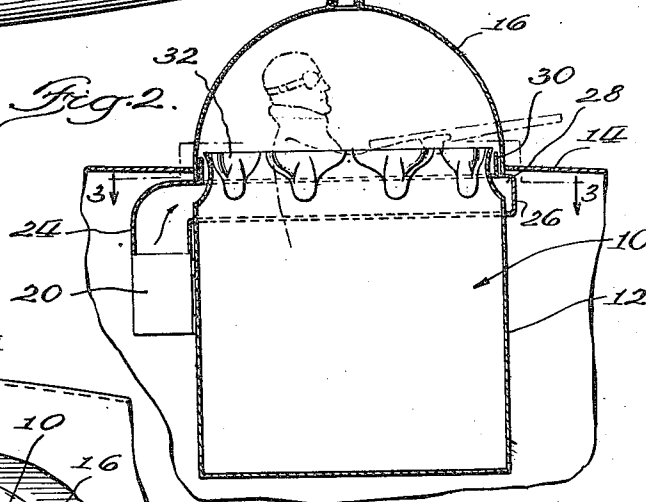
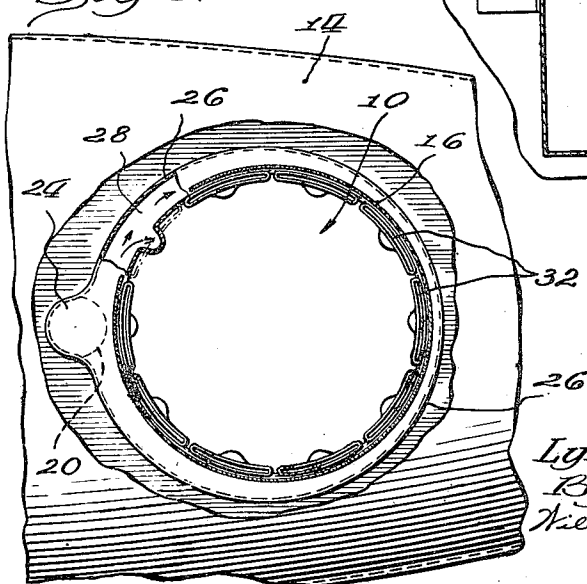


Fig. 3.



Inventor:
Lynn A. Williams Jr.
By
Williams, Bradbury & Hinkle
Attys.

UNITED STATES PATENT OFFICE

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HEATING APPARATUS

Lynn A. Williams, Jr., Northfield, Ill., assignor to
Stewart-Warner Corporation, Chicago, Ill., a
corporation of Virginia

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5 Claims. (Cl. 98—1)

My invention relates generally to aircraft heating apparatus, and more particularly to means for heating the gun turrets of bombers.

Considerable difficulty has been encountered in the heating of gun turrets of bombers in which a hemispherical transparent plastic dome is mounted for rotation with the gun and gunner's seat. This is due partially to the fact that at high velocities considerable leakage of cold air into the turret takes place because of the necessary clearance between the turret dome and the fuselage of the plane to permit rotation of the former. Furthermore, frosting of the dome, impairing the view of the gunner, presents a serious problem. Due to the high rate of heat dissipation from the surface of the dome, it is nearly impossible to supply sufficient heat to the turret to maintain the entire space within the turret at a high temperature, particularly when the plane is flying at high altitudes where the temperature may be in the order of -60° F.

To overcome these and other difficulties, I have provided an improved means for distributing heated air over the inner surface of the transparent dome of a gunner's turret whereby the heated air is effective to heat the dome sufficiently to prevent the formation of frost thereon.

It is thus an object of my invention to provide an improved apparatus for heating gunner's turrets on aircraft.

A further object is to provide an improved means for distributing heat supplied to a gunner's turret in a manner to prevent the formation of frost on the transparent dome thereof and to prevent localized cooling of the dome by cold air leaking into the turret.

Other objects will appear from the following description, reference being had to the accompanying drawing, in which:

Fig. 1 is an elevational view of a portion of an airplane showing the gunner's turret;

Fig. 2 is a vertical sectional view of the turret; and

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 2.

As shown, the turret comprises a gunner's compartment 10, which may be cylindrical in shape and the wall structure of which is fixed to the fuselage 14. The gunner's seat and the gun mount are mounted for rotary movement about the vertical axis of the compartment 12. Rotating with the gun mount and gunner's seat is the transparent plastic dome 16. This dome is provided with an air exhaust tube 18, which is freely swiveled at the apex of the dome so as to operate

in the manner of a weather vane and provide a sufficient aspirating effect to assure rapid ventilation of the turret.

Heated air is supplied to the turret by a heater 20, which is suitably secured to the compartment wall 12. This heater is preferably of the internal combustion type, such, for example, as disclosed in prior Patent No. 2,191,178. The heater is provided with a suitable fan or blower causing flow of the heated ventilating air through an elbow 24 into a manifold 26. The manifold 26 provides a circular passageway 28 between it and the upper edge portion of the cylindrical wall 12. The cross-sectional area of the passageway 28 decreases from the elbow 24 to a diametrically opposite point.

The upper edge of the cylindrical wall 12 of the turret is conformed to provide a plurality of nozzles 32 between it and an upwardly extending flange 30 forming part of the manifold 26. These nozzles are of fish-tail shape and their openings are arcuate in plan view, so that they project thin wide arcuate streams of heated air at high velocity against the lower portion of the inner surface of the dome 16. The heated air therefore tends to flow upwardly along the inner surface of the dome 16 toward the discharge elbow 18. The heat supplied by the heater 20 is thus concentrated on the plastic dome 16 and the temperature of the latter maintained sufficiently high to prevent frosting of its external surface or the condensation of moisture or frosting on its inner surface.

The aggregate area of the discharge ports at the ends of the nozzles 32 is preferably considerably less than the cross-sectional area of the elbow 24, with the result that substantially uniform distribution of heated air flow among the several nozzles is obtained. The fact that the nozzle ports form restrictions also results in an increase in the velocity at which the heated air is projected against the inner surface of the dome, with the advantage that there is a more efficient exchange of heat from the heated air to the dome and that the heated air has a mild scouring effect, tending to prevent the formation of, and to remove, any frost or condensation on the inner surface of the dome.

If desired, the nozzles 32 may be separate from the wall 12 and be welded or otherwise secured thereto. However, the construction shown, in which the upper edge of the wall 12 is formed to provide the nozzles 32, constitutes a relatively simple and effective means for securing uniform distribution of the heated air along the entire

lower edge of the inner surface of the dome 16 and causing the heated air to flow upwardly in relatively thin layers along the inner surface of the dome.

Since the sheet-like jets of heated air discharged by the nozzles 32 cut across any air currents resultant from leakage around the base of the dome 16, such leakage currents will not produce localized cold areas on the dome 16, since any such incipient streams of cold air are broken up and heated by the air ejected from the nozzles 32.

While I have shown and described a particular embodiment of my invention, it will be apparent to those skilled in the art that numerous variations and modifications may be made therein without departing from the underlying principles of the invention. I therefore desire, by the following claims, to include within the scope of my invention all such variations and modifications by which substantially the results of my invention may be obtained by the use of substantially the same or equivalent means.

I claim:

1. In an aircraft turret having a movable transparent dome and having a fixed turret compartment wall, the combination of means for supplying a stream of heated air, a manifold connected to receive heat from said means and extending around the upper edge of the turret compartment, said manifold having a portion defining with the upper edge of the turret compartment wall a port for the discharge of a relatively thin sheet of heated air along the lower inner edge surface of the dome.

2. In an aircraft gun turret having a movable

transparent dome provided with an air exhaust port at its top, a relatively fixed turret compartment wall, a heater supported by said wall and having means for discharging a stream of heated air, means forming a manifold receiving heated air from said heater and extending around the top of said compartment wall, and a plurality of nozzles communicating with said manifold and directing the flow of heated air therefrom to the inner lower edge surface of said dome.

3. In an aircraft gun turret having a generally hemispherical dome, a heater having an outlet for the discharge of heated air therefrom, conduit means connected to said outlet and conformed to discharge the heated air near the base of said dome against the inner surface thereof, and means for withdrawing air from the top of said dome.

4. An aircraft gun turret having a transparent dome provided with a central air exhaust opening at its top, a heater having means for supplying heated air under pressure, and means receiving heated air from said heater and discharging it in a sheet-like stream along the bottom of said dome and against the inner surface thereof.

5. In an aircraft gun turret having a wall fixed with respect to the aircraft and having a dome mounted for movement with respect to the aircraft, a heater of the internal combustion type fixed to the aircraft, a manifold receiving heated air from said heater and secured to said wall, and a plurality of heated air outlet nozzles connected to said manifold and directed to project the heated air in thin streams against the inner surface of said dome near the base thereof.

LYNN A. WILLIAMS, JR.