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Hunter

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[54] **ANTI-FOGGING DEVICE FOR EYE SHIELDS**

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[51] **Int. Cl.** **A61f 9/00**
[58] **Field of Search** ..... 2/14 N, 14 K, 9, 8, 171

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[57] **ABSTRACT**

For use with a ski goggle or the like, an anti-fogging device including a housing adapted to be positioned and retained between the top transverse portion of a conventional goggle frame and a wearer's forehead, and defining a passage for conducting air from the exterior into the space between the goggle lens and the wearer's face so that the air is directed toward the inner surface of the lens. A fan, having a motor carried by the housing, is mounted in the passage for forcing air therethrough. Power may be supplied to the motor from batteries carried in a case secured to the wearer's clothing.

6 Claims, 7 Drawing Figures

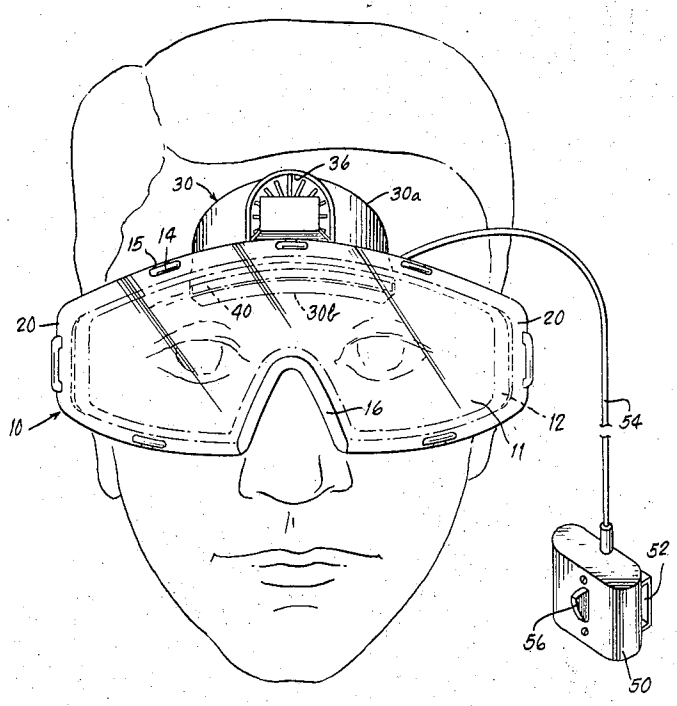


Fig. 1.

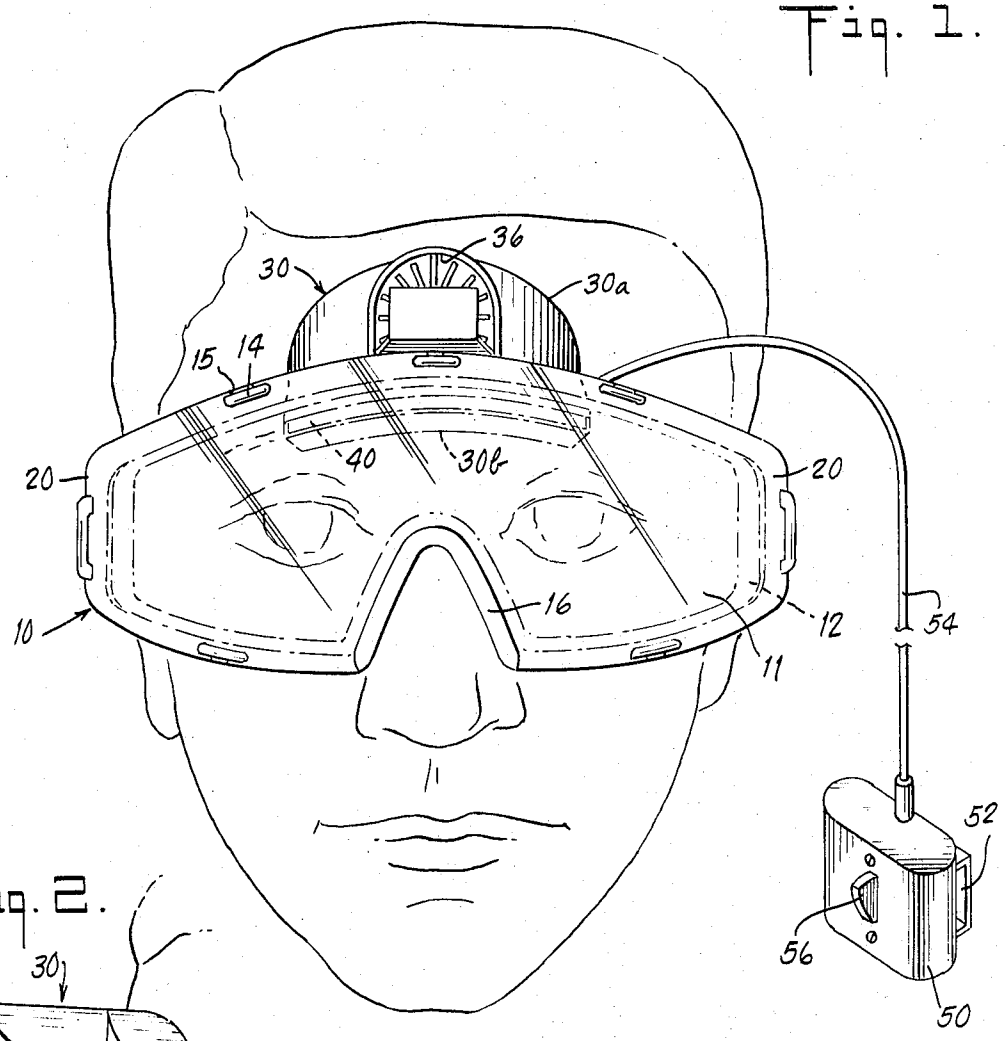


Fig. 2.

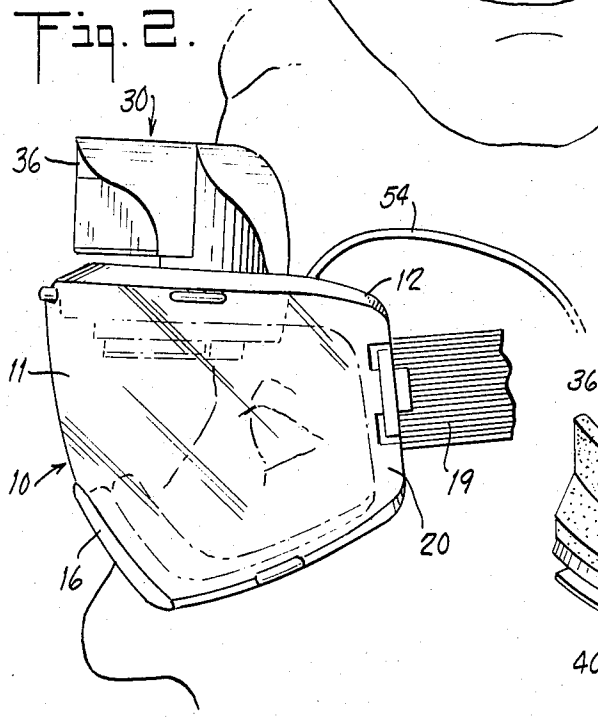


Fig. 3.

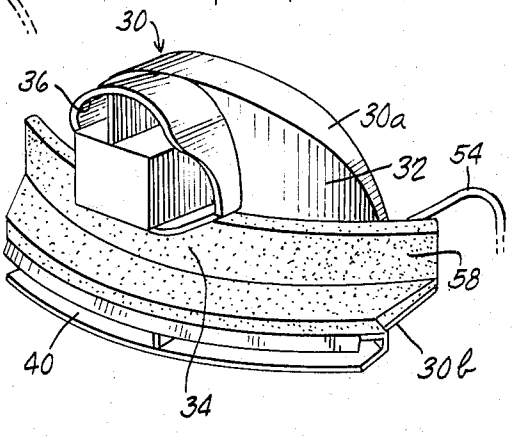


Fig. 4.

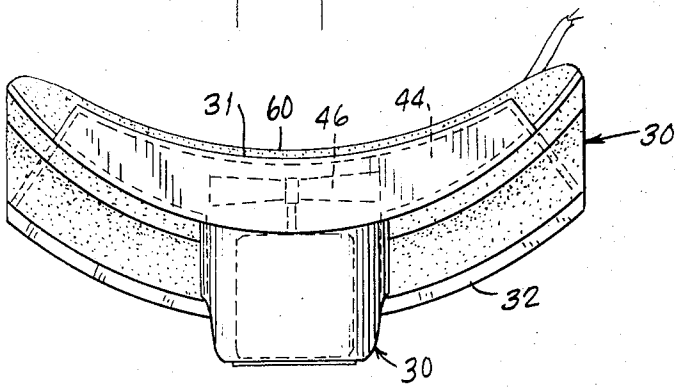


Fig. 5.

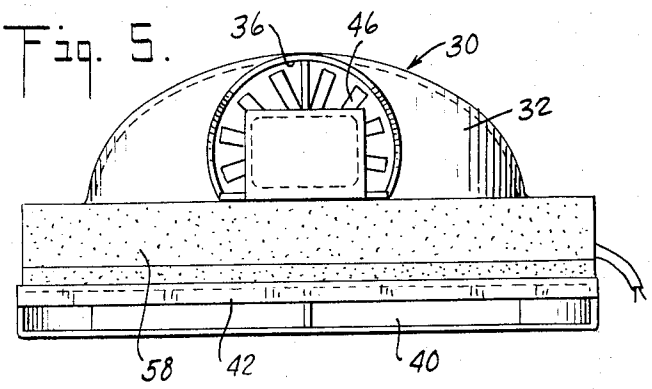
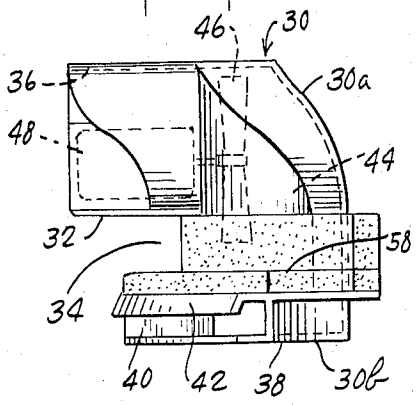


Fig. 6.



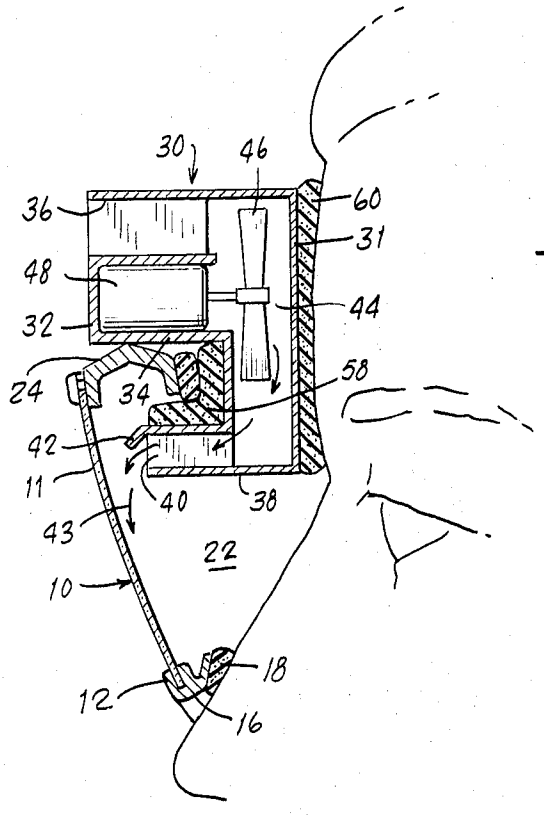


Fig. 7.

ANTI-FOGGING DEVICE FOR EYE SHIELDS

BACKGROUND OF THE INVENTION

This invention relates to anti-fogging devices for eye shields such as ski goggles and the like.

A typical present-day conventional ski goggle comprises a unitary transparent shield or lens, dimensioned to extend across both eyes of a wearer, and mounted in a frame which is in turn held on the wearer's head by resilient means such as a head-surrounding elastic strap. The frame, which at least in its upper portion commonly projects somewhat rearwardly (i.e. toward the face) from the lens, may be cushioned for comfortable contact with the face. Thus there is defined, between the lens and the wearer's face, a more or less fully enclosed air space.

Ski goggles of the described type satisfactorily protect the wearer's eyes against wind, snow and/or glare. However, such goggles are subject to fogging, i.e. condensation of moisture on the inner surface of the lens, and resultant interference with the wearer's vision, indeed to an extent frequently necessitating inconvenient removal and wiping of the goggle. This fogging occurs when air, warmed and humidified by the wearer's face, comes into contact with the relatively cold lens surface in the aforementioned enclosed space in the absence of substantial air circulation therethrough. Similar fogging problems are encountered in use of other types of eye shields as well.

Various expedients have heretofore been proposed for prevention or removal of fogging conditions in ski goggles and other eye shields. In general, these expedients have involved provision of ventilating passages in the goggle frame. Fog-preventing air circulation through the space enclosed by the goggle may thereby be achieved so long as motion of the wearer (e.g. incident to skiing) causes impingement of substantial air currents against the goggle; but when the wearer is stationary or moving at slow speeds, air flow through the ventilating passages is often insufficient to prevent or remove accumulation of fog on the lens.

It has also heretofore been proposed to provide means powered by the wearer's respiration for positively creating air currents through the space between an eye shield lens and the wearer's face, and/or to provide means for heating the lens, again for the purpose of preventing fogging. Apart from the physical exertion required for respiration-powered ventilation, these expedients are disadvantageous in that they (and indeed also the ventilation passage arrangements mentioned above) are capable of embodiment only in special goggle structures; in other words, they are not adaptable to use with an ordinary goggle such as may be already in the wearer's possession.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a new and improved device for preventing and removing accumulation of fog on the lens of a ski goggle or like eye shield independently of movement or other physical exertion by a wearer.

Another and particularly important object is to provide such a device capable of use with existing conventional ski goggles, and requiring no structural modification of the goggle, or permanent mounting operation, for such use.

To these and other ends, the present invention broadly contemplates the provision of an anti-fogging device comprising a housing shaped and dimensioned to be positioned and retained between an edge portion of an eye shield and a wearer's face, and defining a passage for conducting air from the exterior into contact with the inner surface of a lens of the eye shield (i.e. within the enclosed space defined between the goggle and the face); a fan mounted in the passage for forcing air therethrough from the exterior and against the lens surface; a motor mounted in the housing for driving the fan; and means, supportable on the wearer's person, for supplying power to the motor.

As adapted for use with a conventional ski goggle having a top transverse frame portion that projects rearwardly from the lens toward the wearer's forehead, the housing of the device may be adapted to fit between the forehead and the top transverse frame portion, and may include a forward wall defining a horizontally extending C-shaped recess for receiving the top transverse frame portion. It will be understood that the terms "forward" and "rear" or "rearward," as used herein, refer to directions respectively away from and toward the wearer's face.

The fan motor may be an electric motor, and the power supply means may comprise a case for holding one or more batteries, with a loop for attachment to a belt or other portion of the wearer's clothing; means including flexible wires for electrically connecting the battery or batteries to the motor; and a switch, e.g. mounted on the case and operable by manual pressure, for turning the motor on and off.

The air passage may include a plenum extending from the upper portion of the housing to the lower portion thereof, with an opening formed in the upper housing portion for admitting air from the exterior to the plenum, and a vent formed in the lower housing portion for directing air from the plenum onto the inner surface of the goggle lens. The vent may be a forwardly opening, horizontally elongated slit, and its upper edge may be shaped to constitute a downwardly and forwardly sloping baffle for directing the air flow generally downwardly over the lens surface.

In use, the device is simply placed on the goggle frame, with the upper transverse frame portion received in the C-shaped recess of the housing, and is effectively clamped and held between the frame and the wearer's forehead by force exerted on the frame by the elastic headband conventionally provided for the goggle. Cushioning or padding material may be mounted within the C-shaped recess and also on the rear wall of the housing, which is preferably curved to conform generally to a wearer's forehead. The device is stably retained in operative position without being fixedly mounted on the goggle, and without structural modification of the goggle. When the wearer is skiing or otherwise in relatively rapid motion, the fan may be turned off; the air passages of the housing, cooperating with lateral gaps inherently defined between the frame and the wearer's face (and/or between the frame and lens) in a conventional goggle, provide effective air circulation through the space between the lens and the face so as to prevent fogging, yet without exposing the face to snow or wind. When the wearer is moving slowly or is stationary, the fan is turned on, producing a fully effective fog-preventing and dissipating flow of air over the lens inner surface. In this way, essentially complete

freedom from fogging is readily and conveniently maintained at all times in a conventional goggle or eye shield.

Further features and advantages of the invention will be apparent from the detailed description hereinbelow set forth, together with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front elevational view of an anti-fogging device embodying the present invention in a particular form, as mounted on a generally conventional ski goggle on a wearer's head;

FIG. **2** is a side elevational view of the device and goggle of FIG. **1**;

FIG. **3** is a perspective view of the device of FIG. **1**, without the goggle;

FIG. **4** is a plan view of the same device;

FIG. **5** is a front elevational view of the device of FIG. **1** without the goggle;

FIG. **6** is a side elevational view thereof; and

FIG. **7** is a side elevational sectional view of the same device as mounted on the goggle.

DETAILED DESCRIPTION

Referring to the drawings, the invention will be described for purposes of illustration as embodied in a device adapted for use with a generally conventional ski goggle shown at **10** in FIGS. **1, 2** and **7**. The goggle **10** includes a unitary transparent curved lens **11** shaped to extend across a portion of the wearer's face, in shielding relation to both the wearer's eyes, and a continuous curved frame **12** which extends entirely around the perimeter of the lens. Both the frame and the lens may be fabricated of suitable, more or less stiffly flexible plastics. In the form shown, the lens is secured to the frame by interengagement of a plurality of projections **14** on the frame with peripheral slots or notches **15** formed on the lens; the frame is contoured to conform generally to the circumocular region of a human face, with the lower frame portion **16** fitting around and resting on the nose. A resiliently compressible pad **18** is mounted on the rearwardly facing surface of the frame for comfortable contact with the face.

The goggle is retained on the wearer's head by means of an elastic headband **19** secured at its ends to opposite side portions **20, 20** of the frame. This band **19**, surrounding the head, resiliently urges the frame against the wearer's face so that the goggle more or less fully encloses an air space **22** between the lens and the face. However, minor lateral air gaps are present between the frame and the face at various localities around the frame, owing to divergences from true conformity of the frame to the facial contours; also, in the illustrated goggle, there may be gaps between the lens and frame. These gaps permit outflow of air from the enclosed space **22**.

The transverse upper portion **24** of the frame, extending generally horizontally forwardly and across the wearer's forehead, is curved or bowed outwardly in general conformity with the forehead. This frame portion **24**, as best seen in FIG. **7**, projects rearwardly of the lens **11** so as to constitute a ledge or shelf on the rearward side of the goggle.

While particular conventional ski goggles may differ in specific details of structure from that shown and described above, the illustrated goggle is exemplary of a wide variety of ski goggles currently commercially available, with respect to those structural features pertinent to the present invention. The goggle itself constitutes no part of the present invention, and, being conventional, its structure and functions are well known to those skilled in the art.

In its illustrated embodiment, adapted for use with the above-described goggle **10**, the device of the invention includes a housing **30**, e.g. molded of a suitable plastic, and shaped to fit between the top transverse frame portion **24** of the goggle and the wearer's forehead, i.e. when the goggle is held by the elastic headband **19** in operative position on the wearer's face. As thus positioned, the upper portion **30*a*** of the housing projects above the goggle frame portion **24** and the lower portion **30*b*** of the housing projects below frame portion **24**, into the enclosed space **22**. The rear wall **31** of the housing, as best seen in FIG. **4**, is curved to conform generally to the wearer's forehead, while the forward wall **32** of the housing is correspondingly curved and includes portions defining a forwardly opening C-shaped recess **34** intermediate the upper and lower portions of the housing. This recess is positioned and dimensioned to receive the goggle frame portion **24** when the housing is disposed between the wearer's forehead and the frame.

The interior of the housing **30** is hollow, and constitutes a passage for flow of air from the exterior into the space **22** defined between the goggle and the wearer's face. Air is introduced to this passage from the exterior through an inlet opening **36** formed centrally in the forward wall **32** in the upper portion of the housing, and defined by forwardly projecting portions of wall **32** positioned to overlie the goggle frame portion **24** and to constitute the top of the aforementioned C-shaped recess. In the lower portion of the housing, the forward wall **32** again projects forwardly (constituting the bottom of the C-shaped recess) to define, with the base **38** of the housing, a forwardly opening vent **40** for discharge of air from the passage within the housing. The vent **40** is a horizontally elongated slit, curved to conform generally to the curvature of the inner surface of the lens **11** against which it directs air. The portion of wall **32** defining the upper lip of the vent is bent downwardly and forwardly to constitute a baffle **42**, extending the length of the vent, for directing air (discharged through the vent) generally downwardly over the inner surface of the lens as indicated by arrows **43** in FIG. **7**.

The air passage defined within the housing **30** is shaped to constitute a plenum **44**, extending from the opening **36** in the upper portion of the housing. This plenum, which communicates with both the inlet opening and the vent, diverges downwardly from the opening to the vent so as to be substantially coextensive with the vent in the lower portion of the housing, and is somewhat constricted laterally (as seen in FIG. **7**) at the locality of the C-shaped recess **34**, intermediate the upper and lower portions of the housing.

Mounted within the housing **30**, at the inner end of the inlet opening **36**, is a multibladed fan **46** disposed for rotation about an axis parallel to the direction of inward air flow through opening **36**. The fan is driven by a small electric motor **48**, mounted within the upper portion of the housing forwardly of the fan, above the C-shaped recess **34**, and also forwardly of opening **36**, which in effect laterally surrounds the motor and its enclosing wall portions of the housing so that the motor

does not obstruct air intake therethrough. Motor **48**, when energized, drives the fan in a direction for forcing air from the exterior through the plenum **44** and thence through the vent **40** against the inner surface of lens **11**.

Power is supplied to the motor **48** from dry cells or other batteries (not shown) enclosed within a small case **50** (FIG. **1**) that bears a loop **52** enabling attachment of the case to a belt, suspenders, or other portion of a wearer's clothing. Suitable conventional electrical contacts (not shown) are disposed in well-known manner within the case for appropriate engagement with the dry cells, and are connected to the motor **48** by a pair of flexible wires in a common flexible insulated cord **54** extending from the case **50** to the motor. The cord **54**, which (if desired) may terminate in a separable plug-and-jack type connection (not shown) at housing **50**, is of sufficient length to allow the wearer full freedom of movement when the housing is positioned as shown in FIG. **1** and the case **50** is mounted on the wearer's belt. A single-pole rocker-type switch **56** is mounted in the case **50** for opening and closing the circuit including the dry cells and motor **48**, i.e. to turn the motor on and off. This switch is adapted to be conveniently operable by manual pressure even through several layers of clothing.

Preferably the C-shaped recess **34** is of sufficient vertical extent to accommodate the transverse top frame portion of any of a variety of commercially available goggles; thus, as used with any particular model of goggle, the recess may be somewhat larger than the goggle top frame portion. This clearance fit between the housing and goggle frame also permits some degree of angular adjustment of the housing for comfort of the wearer. A body of resiliently compressible padding material **58** may be mounted within the C-shaped recess and along adjacent surfaces of the housing forward wall **32** to cushionably engage the goggle frame portion **24**; the padding provides stable engagement of the housing with any of a variety of goggle frames having top transverse portions of differing dimensions and configurations. A soft pad **60** may also be adhered to the rear wall **31** of the housing, for comfort of the wearer.

The use and operation of the described device may now be readily understood. Before donning the goggle **10**, the wearer fits the top transverse frame portion thereof into the C-shaped recess of the housing **30**, and then places the goggle on his head in the usual manner, with the padded rear wall **31** of the housing against his forehead. Force exerted on the goggle by the elastic headband **19** effectively clamps the housing between the goggle and the wearer's forehead, and the engagement of the goggle frame with the recessed front wall of the housing prevents displacement of the housing during use, without necessitating positive attachment of the housing to the goggle. Although (as seen in FIG. **7**) the upper portion of the goggle is tipped somewhat forward of its normal position, this tipping does not interfere with the protective function of the goggle, as the curved housing **30** substantially fills the space between the goggle frame and the forehead; also, the base of the housing is disposed above the wearer's line of direct forward vision through the goggle.

While the wearer is in motion, e.g. skiing, the fan **46** may be turned off. Inlet opening **36**, plenum **44**, and vent **40** provide a passage for directing air from the exterior against the inner surface of the lens **11** to prevent fogging, without admitting snow or causing wind blast against the wearer's face; air currents produced by the wearer's motion create adequate air flow through this passage for effective fog prevention.

When the wearer is moving at a slow walk or is stationary, however, the lens **11** may tend to fog. To prevent or remove such fog, the wearer depresses the switch **56** on case **50** (which may be mounted on his belt or suspenders), to turn on the fan **46**. As the fan is driven by motor **48**, it draws air from the exterior through inlet opening **36** and forces the air into plenum **44**, wherein the velocity head of the introduced air is partially converted to pressure head; from the plenum **44**, the air is forced through vent **40** against the inner surface of the lens **11** and thence out of space **22** through lateral openings inherently present around the goggle frame. This flow of external air driven across the lens inner surface by the fan **46** rapidly removes any fog that may have accumulated thereon and prevents further condensation on the lens. The shape of the vent **40** is such that the air flow covers at least a major portion of the lens surface in front of the wearer's eyes.

As the wearer resumes motion sufficiently rapid to obviate use of the fan, the wearer again depresses switch **56** to turn the fan off. Battery power may thus be conserved for use as needed.

An anti-fogging device of the described type may be advantageously light and compact. For instance, in an operative example of the illustrated embodiment of the invention utilizing two size "D" dry cells for the motor, the weight of the case **50** was about eight ounces and the weight of the housing **30** (including the fan and motor) was about one and one quarter ounces. The fan, when operating, was audible to the wearer, but no vibration or other sensation could be felt except for a mild flow of air across the portion of the face enclosed by the goggle. This unit was fully effective in preventing fogging when the fan was turned on, and also when the fan was turned off with the wearer moving at a speed of as little as 3 to 5 miles per hour; if fog was allowed to accumulate on the goggle lens before the fan was started, complete dissipation of fog was achieved within about ten seconds after start-up of the fan.

It is to be understood that the invention is not limited to the features and embodiments hereinabove specifically set forth but may be carried out in other ways without departure from its spirit.

I claim:

1. An anti-fogging device for use with an eye shield having a lens for protecting a wearer's eyes, a lens-holding frame including an upper frame portion positioned to extend across the wearer's forehead, and means for holding the frame and lens in eye-protecting position on the wearer's face such that a space is defined between the major extent of the lens and the wearer's face, said upper frame portion projecting rearwardly of the lens and said frame-holding means comprising means for resiliently urging the frame and lens toward the wearer's face, said device comprising

a. a housing shaped and dimensioned to be positioned and retained between said upper frame portion and the wearer's forehead, said housing including an upper portion disposed to project above said frame and a lower portion disposed to project into said space,

b. said housing defining a passage including a plenum extending from the upper portion to the lower por-

tion thereof for conducting air into said space from the exterior,

c. said lower housing portion defining a vent communicating with said plenum for directing air flow from the plenum toward the inner surface of said lens within said space, and

d. said upper housing portion defining an inlet opening for admitting air into said plenum from the exterior;

e. a fan mounted in said passage for forcing air from the exterior through said vent against the inner surface of said lens;

f. a motor mounted in said housing for driving said fan in a direction for forcing air through said vent as aforesaid; and

g. means, supportable on the wearer's person, for supplying power to said motor;

h. said housing having a forward wall defining a forwardly opening C-shaped recess intermediate said upper and lower housing portions for receiving the rearwardly projecting upper frame portion of the eye shield, and

i. said housing further having a rear wall curved to conform generally to the wearer's forehead, thereby to enable said housing to be clamped between said upper frame portion and the wearer's forehead by force exerted on the frame by the holding means, with the housing restrained against vertical movement by the upper frame portion received in said recess.

2. A device as defined in claim **1,** wherein said vent is a horizontally elongated slot opening through the lower portion of said forward wall, said inlet opening is formed in the upper portion of said forward wall, and said plenum diverges downwardly from said inlet opening to said vent such that the lower extremity of said plenum is substantially coextensive in length with said vent.

3. A device as defined in claim **2,** wherein said plenum is laterally constricted intermediate said upper and lower housing portions; and wherein said housing further includes a horizontally elongated baffle sloping forwardly and downwardly along the upper edge of said vent for directing air, flowing through said vent, in a generally downward direction toward the inner surface of said lens.

4. A device as defined in claim **2,** wherein said fan is oriented such that the axis of rotation thereof is parallel to the direction of air flow through said inlet opening, and wherein said motor is mounted in the upper portion of said housing forwardly of said inlet opening, said upper housing portion being shaped to extend forwardly over the upper frame portion of the eye shield.

5. A device as defined in claim **1,** further including resilient padding mounted within said C-shaped recess for cushioning engagement with the upper frame portion of the eye shield, and a soft head-engaging element mounted on said rear wall of said housing.

6. An anti-fogging device for use with an eye shield having a lens for protecting a wearer's eyes, a lens-holding frame including an upper frame portion positioned to extend across the wearer's forehead, and means for holding the frame and lens in eye-protecting position on the wearer's face such that a space is defined between the major extent of the lens and the wearer's face, said device comprising

a. a housing, separate from the eye shield, shaped and dimensioned to be positioned against a wearer's forehead, said housing including an upper portion disposed to be positioned above said upper frame portion, a lower portion, and means for retaining the housing in position on the wearer's forehead,

b. said housing defining a passage including a plenum extending from the upper portion to the lower portion thereof for conducting air into said space from the exterior,

c. said lower housing portion defining a vent communicating with said plenum and shaped and positioned for directing air flow from the plenum against the inner surface of said lens within said space, and

d. said upper housing portion defining an inlet opening for admitting air into said plenum from the exterior;

e. a fan mounted in said passage for forcing air from the exterior downwardly through said passage and thence through said vent against the inner surface of said lens;

f. a motor mounted in said housing for driving said fan in a direction for forcing air through said vent as aforesaid; and

g. means, supportable on the wearer's person, for supplying power to said motor.

* * * * *