April 10, 1945. G. WOLKENHAUER 2,373,214

SHIELDING DEVICE

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Fig. 2.

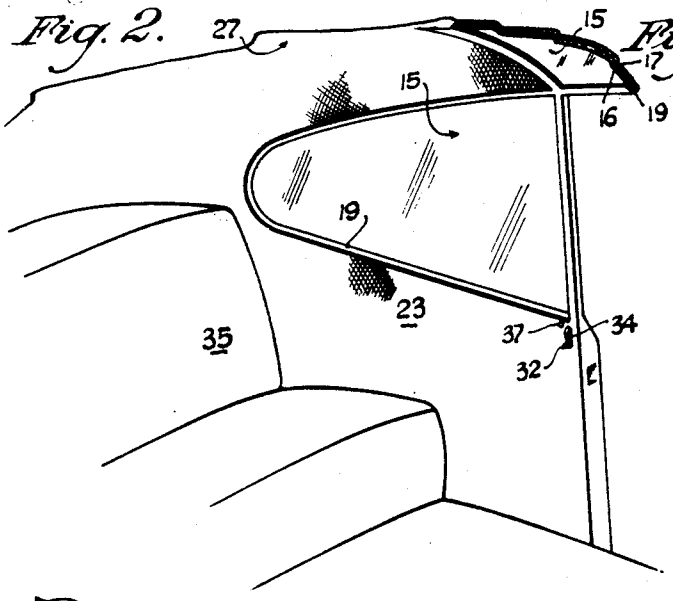


Fig. 3.

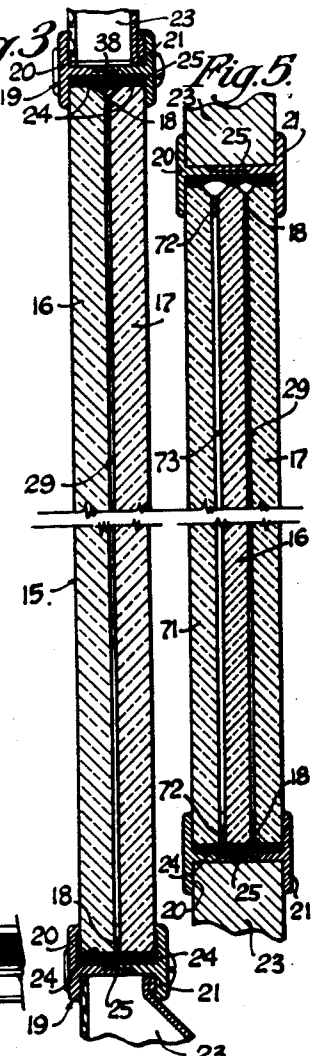
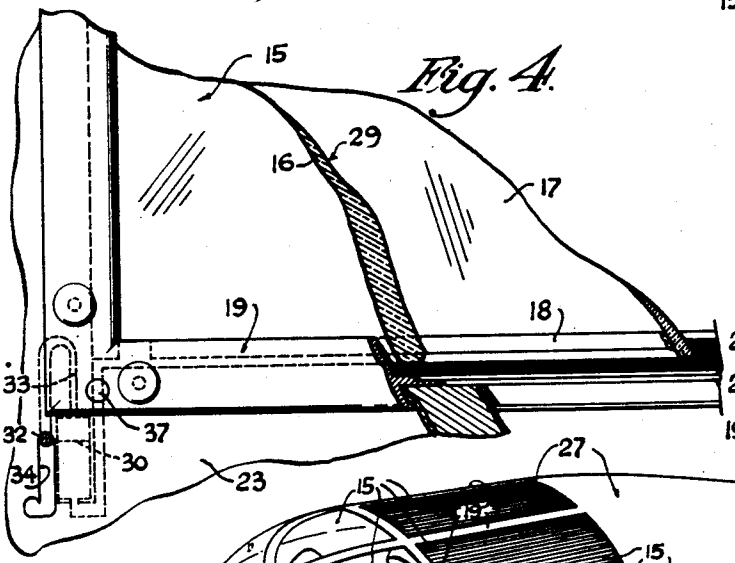


Fig. 5.

Fig. 4.



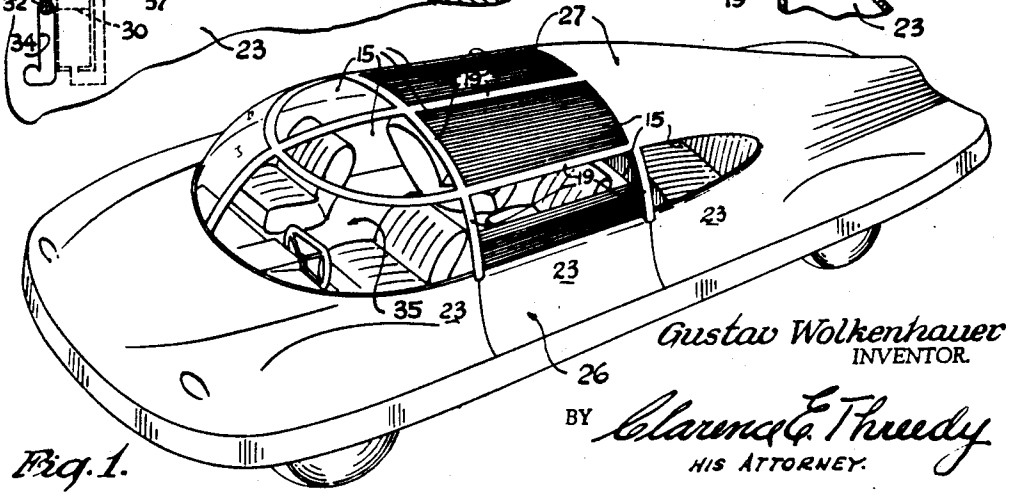


Fig. 1.

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SHIELDING DEVICE

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Fig. 6.

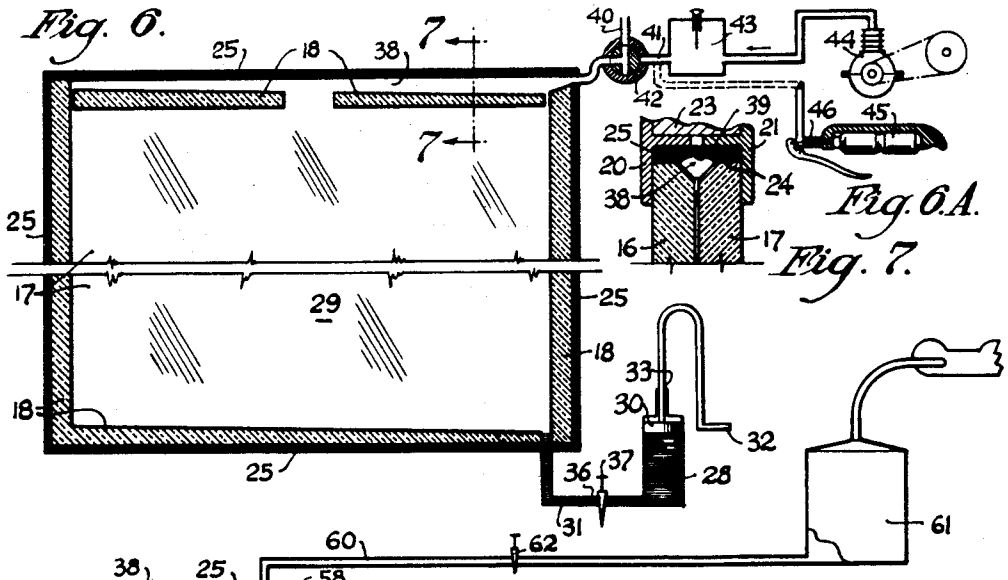

Fig. 6A.

Fig. 7.

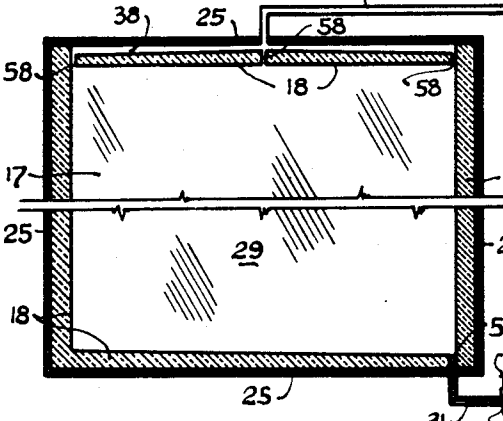

Fig. 10.

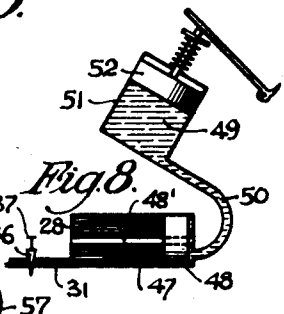

Fig. 8.

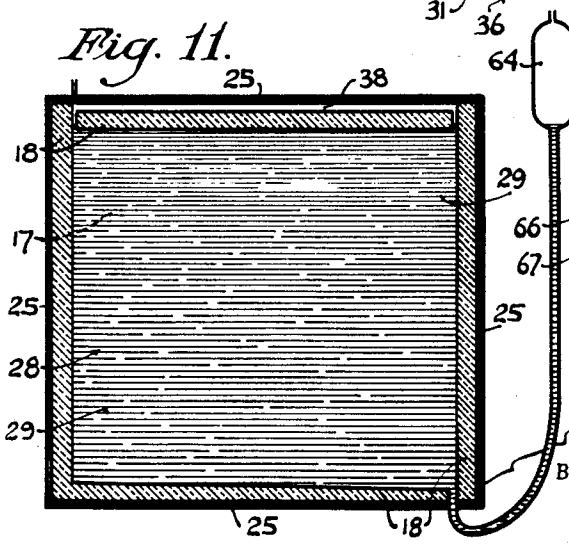

Fig. 11.

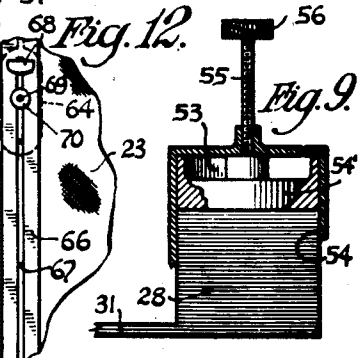

Fig. 9.

Fig. 12.

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2,373,214

UNITED STATES PATENT OFFICE

2,373,214

SHIELDING DEVICE

Gustav Wolkenhauer, Evanston, Ill.

Application January 11, 1943, Serial No. 471,971

1 Claim. (Cl. 296—137)

This invention relates to a shielding device to be used in conjunction with glazed openings and has as its principal object the provision of means for accomplishing that purpose which will be simple in construction, economical in manufacture and highly efficient in use.

It is another object of this invention to provide a novel sash arrangement with shielding means for modifying the intensity of light rays which ordinarily would pass through such sash.

A further object of this invention is to provide a shielding device by projecting a shielding fluid between two transparent members to prevent light rays from passing therethrough.

Still another object of this invention is to provide a means for projecting a shielding fluid between two transparent members to produce a reflector surface.

Other objects will appear more fully hereinafter.

The invention consists in the novel combination of parts hereinafter to be described and claimed.

The invention will be best understood by reference to the accompanying drawings in which:

Fig. 1 is a perspective view of a vehicle embodying window structure employing my invention;

Fig. 2 is a fragmentary perspective view of the interior of the vehicle shown in Fig. 1 illustrating an embodiment of the invention;

Fig. 3 is a vertical sectional detail through a sash construction forming a part of this invention;

Fig. 4 is a fragmentary elevational view, partly in section, of the window sash shown in Fig. 3;

Fig. 5 is a vertical sectional detail of another form of window sash construction likewise embodying my invention;

Fig. 6 is a vertical sectional detail, partly in elevation, illustrating a hand-controlled injector means and an ejector system;

Fig. 6A is a sectional detail view of another form of pressure source for the ejector system and is complementary to Fig. 6;

Fig. 7 is a fragmentary sectional detail view through the head jamb of the sash as seen from line 7—7 in Fig. 6 and illustrating an expansion chamber forming a part of this invention;

Fig. 8 is a sectional detail view of a hydraulic controlled injector means which may be substituted for the hand-controlled pump shown in Fig. 6;

Fig. 9 is a sectional detail view of a screw-controlled pump which may likewise be used in place of the pump shown in Fig. 6;

Fig. 10 is a modified form of system for projecting a shielding fluid into the sash structure by means of a suction;

Fig. 11 is another modification of the system for projecting a shielding fluid into the sash by gravity; and

Fig. 12 is a fragmentary elevational view of a guide rail employed in the modified form shown in Fig. 11.

As shown in the drawings the invention is carried out by the provision of an air tight chamber in a window sash generally indicated at 15 comprising a pair of spaced transparent members in the form of glass panels 16 and 17 separated from each other by a spacer frame 18 which extends around the marginal edges of the members 16 and 17. It is understood that the members 16 and 17 may be made of a translucent plastic material through which light or heat rays may normally penetrate. The window sash 15 is preferably constructed by providing an interlocking frame 19 consisting of two interfitting strips 20 and 21 which have flange portions 22 for attaching the frame work to the body 23 on which the sash is mounted as well as for embracing the two spaced glass panels 16 and 17. The two strips 20 and 21 may be joined by screws, rivets or by welding whichever is most desirable to the particular application involved. The outer edges 24 of the glass members 16 and 17 are sealed by tape 25 or some form of sealing composition which is pressed tightly against the edges 24 to assure against leakage therealong.

It is apparent that the sash 15 may be constructed by folding a single piece of transparent material back upon itself to provide a pair of spaced members or that a tubular shaped plastic member may be flattened to provide a pair of spaced sheets integrally sealed along two edges with its open edges being either fused into sealed condition or sealed in the manner shown.

As shown in Fig. 1 the sash may be constructed in the body of a vehicle generally indicated at 26 having a turret top 27 provided with glazed panels each of which is constructed substantially in accordance with the window sash hereinbefore described. It is apparent, however, that the sash structure may be installed in a stationary body such as the partition of a building or the door or body of a cabinet such as a refrigerator or the like for the purpose of deflecting sun rays or heat rays to shield against visibility as well as to insulate the compartment to which the sash is exposed.

The shielding means is completed by the provision of a shielding fluid 28 which is adapted

to be injected into the chamber 29 formed by the spaced transparent members 16 and 17. One form of injector system is that shown in Fig. 6 wherein the entire vertical area of the chamber 29 is displayed and has a hand operated pressure pump 30 connected to its lower end through a conduit 31. This pump 30 is disposed to be concealed within the body 26 with the handle 32 on the piston rod 33 extending through a guide slot 34 whereby a person within the cab 35 can manipulate the pump 30 to displace the fluid 28 for injection into the chamber 29. There is a valve 36 in the conduit 31 which controls the flowage from the pump to the chamber and this valve has a control handle 37 which also extends into the cab so that a person seated therein can open or shut the valve 37 at will.

In the case of the application of my invention in vehicles as shown it is obvious that by reason of the transparency of the glazed panels, sun rays constantly beating down upon the top 27 of the body would expose the occupants of the vehicle to severe burning by the sun and that even though the rays of the sun were obstructed by a separate shading means such as is commonly known, the heat would nevertheless radiate inwardly from the glass panels and would render the interior of the vehicle excessively hot. To overcome such objectionable characteristics of the style of body 26 shown my invention is particularly adapted and in this regard mercury may be used in the pump 30. By using mercury the chamber 29 when filled with the fluid as hereinbefore explained, becomes a mirror which reflects heat as well as sun rays off of the top 27 of the vehicle and hence insulates the interior of the vehicle from the heat rays as well as the glaring rays of light.

In using mercury as a fluid I have discovered that an expansion chamber is necessary in the upper extremity of the chamber 29 and to this end an enlarged area 38 is provided (as shown in Fig. 7) at that point by beveling the adjacent corners of the top edges of glass panels 16 and 17 and also arching the surface 39 of the sealing material 25. It is to be noted that the spacing of glass panels 16—17 is very minute so as to support a very thin film of mercury. By reason of the thinness of the film of mercury it is apparent that a slight downward movement of the piston handle 32 will result in a proportionately greater rise of mercury in the chamber 29. Also by reason of the thinness of the film of mercury any expansion of that fluid by reason of heat from the sun or any other source, will be adequately provided for by the expansion chamber 38.

A vent 40 is provided at the head of the sash 15 so that the fluid 28 may freely flow into and out of the chamber 29. In the use of mercury as a fluid there is need of some means for providing a forced ejection and to this end there is provided a pipe line 41 having a three-way valve 42 for shutting off the passage to the vent 40 and for connecting the chamber 29 with a compressed air reservoir 43 which in turn may be supplied either by a compressor 44 driven by the drive shaft of the vehicle 26 or by a carbon dioxide bulb 45 as shown in Fig. 6A having a hand-controlled valve 46. By this means the fluid 28 is removed from the chamber 29 by first opening the valve 36 to permit return of the fluid to the pump 30 and at the same time the three-way valve 42 is adjusted to shut off the vent 40 and open up the pipe lines 41 to the compressed air reservoir 43 thus putting a pressure on the top surface of the fluid 28 to assure its return to the pump 30.

Various forms of pumps may be employed in lieu of the hand-controlled pump 30. For example a hydraulically operated pump 47 such as is shown in Fig. 8 may be used. In this form of pump there is a piston 48 operable on a guide shaft 48' and having the fluid 28 on one side thereof and a liquid 49 of any well-known type used in hydraulic systems on the other side which liquid flows through a conduit 50 into a cylinder 51 having a piston 52 operable by a treadle or any other form of operating means at the disposal of the driver of the vehicle. Another form of pump is generally indicated as 53 in Fig. 9 wherein there is shown a large cylinder 54 with a piston 54' operable by a threaded shaft 55 with a handle 56 at the disposal of a person. In this form of pump a slight descension of the piston 54 by a turn of the screw shaft 55 will displace a sufficient volume of fluid 28 to cause a considerable rise in the thin space provided between the two transparent members 16—17.

It is contemplated that the principles of suction may be employed in drawing the fluid 28 into the chamber 29 and this is accomplished as shown in Fig. 10 by providing a reservoir 57 to maintain the fluid 28 at a level aligned with the lowest extremity 59 of the chamber 29. The upper edge of the sash 15 is slightly modified to provide spaced ports 58 which communicate with the expansion chamber 38 which in turn is connected via a conductor 60 to a suction pump which may be in the form of a vacuum tank 61 operating on a well-known principle in conjunction with internal combustion engines as shown. In this suction type system a valve 62 is employed in addition to the hand-controlled valve 36 and this valve 62 is in the conduit leading from the sash 15 to the vacuum tank 61 and operates to control the suction line to permit ejection of air in the chamber 29 thus reducing its internal pressure below normal air pressure. The reservoir 57 has a vent 63 whereby to maintain normal air pressure on the fluid 28 in the reservoir and hence the fluid 28 will flow up into the chamber 29 to provide a shield for the normally transparent member. When the fluid has ascended in the chamber 29 to the desired level the valves 62 and 36 are shut off to lock the system, the lower valve 36 preventing descent of the fluid and the upper valve 62 preventing further suction in the chamber 29.

The force of gravity is also available to the accomplishing of my purpose and in this regard reference is made to Figs. 11 and 12 wherein a movable reservoir 64 is provided and has a flexible conduit 65 communicating the reservoir with the chamber 29. One side rail 66 of the frame 19 has formed therein a vertical slot 67 which acts as a guide for the movable reservoir 64. A handle 68 is attached to the reservoir 64 and extends through the slot 67 so that the reservoir 64 may be manually raised or lowered as the case may be. A stud screw 69 extends from the reservoir 64 and through the slot 67 and has a thumb nut 70 threaded thereon whereby to adjustably set the reservoir at any desired level with respect to the sash 15. By this gravity type system the level of the shielding means may be controlled by a mere setting of the handle 68 and thumb nut 70.

As hereinbefore explained my invention is es-

pecially adapted for use in vehicles such as the one shown in Fig. 1. In this connection I desire to point out that when mercury is used as the fluid 28 the glazed panels have the characteristics of a mirror, reflecting images within the cab 35. In some instances the numerous images move about to the distraction of the operator of the vehicle to such an extent as to confuse him in so far as traffic conditions are concerned. To remove the effects of such images I provide a second shielding means such as is shown in Fig. 5 by arranging three transparent members in spaced relation. This is done by providing an additional pane of glass 71 and spacer means 72 between it and the inner pane of glass 16 thus forming an auxiliary chamber 73. The frame is similar to the frame 19 already explained and is identified with like reference characters.

Any one of the systems shown in Figs. 6 through 12 may be employed in conjunction with the auxiliary chamber 73 it being intended, however, that a fluid other than mercury be used for the auxiliary chamber. This fluid may be either an opaque liquid or a tinted transparent liquid. An example of a tinted transparent liquid would be a solution of alcohol and formaldehyde with a dye substance of sufficient density to render a column of such solution glare proof. The density of the tinted transparent liquid is proportioned in accordance with the distance between the glass panes 16 and 71 so as to attain the desired result.

Having thus described my invention it is apparent that I have provided an improved shielding means for normally transparent window openings. That the device herein disclosed provides a means for insulating as well as shading the occupied side of the device against heat or light rays impinging upon the opposite side thereof. That the use of mercury for insulating and tinted liquid for minimizing reflection provides a complete opaque closure and that by using the tinted liquid explained above a glare proof visor results.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claim.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

In a shielding means for glazed openings in vehicles said shielding means comprising treble glass layers with each layer spaced from its adjacent layer, means for binding the outer edges of said glass layers in spaced relation as aforesaid and providing a pair of spaced chambers, each of said chambers having a reservoir communicating therewith, a reflector fluid in one of said reservoirs and a tinted transparent liquid in the other of said reservoirs communicating with the inside chamber with respect to the vehicle, and means associated with each of said reservoirs for projecting their respective fluids into their respective chambers whereby to shield the interior of said vehicle against excessive reflective qualities of said reflector fluid.

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