Sept. 25, 1934. R. M. FRAPS 1,974,739

APPARATUS FOR INTERCEPTING HEAT FROM LIGHT

Filed May 14, 1932 2 Sheets-Sheet 1

Fig. 1

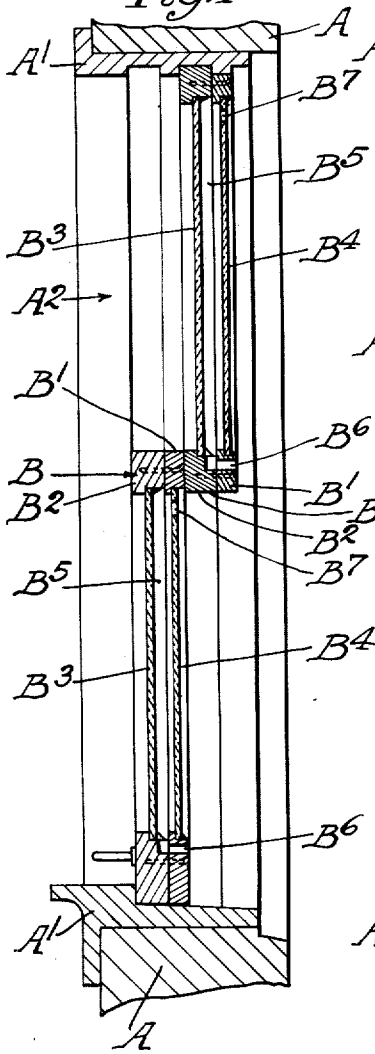


Fig. 2

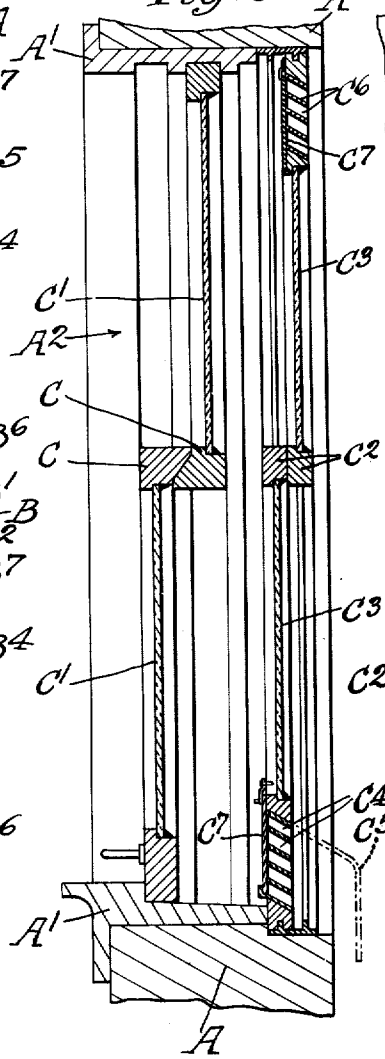


Fig. 3

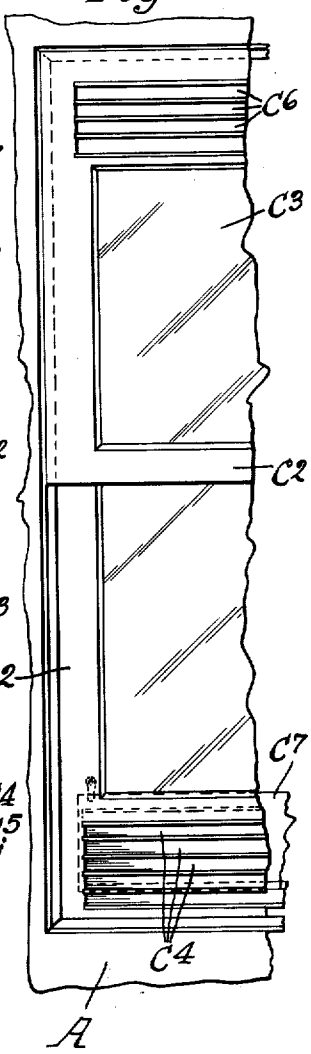
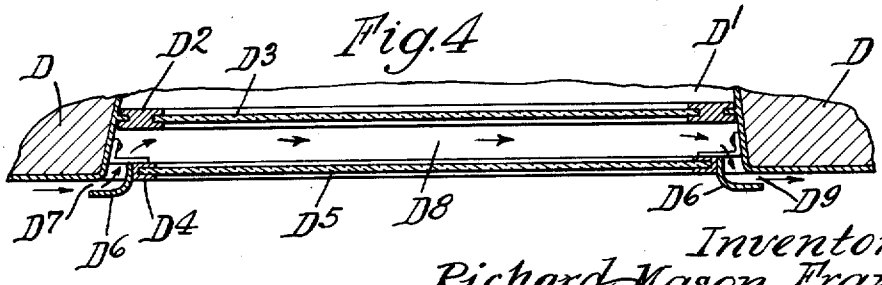


Fig. 4



Inventor
Richard Mason Fraps
Parker & Carter
Attorneys.

Sept. 25, 1934. R. M. FRAPS 1,974,739

APPARATUS FOR INTERCEPTING HEAT FROM LIGHT

Filed May 14, 1932 2 Sheets-Sheet 2

Fig. 5

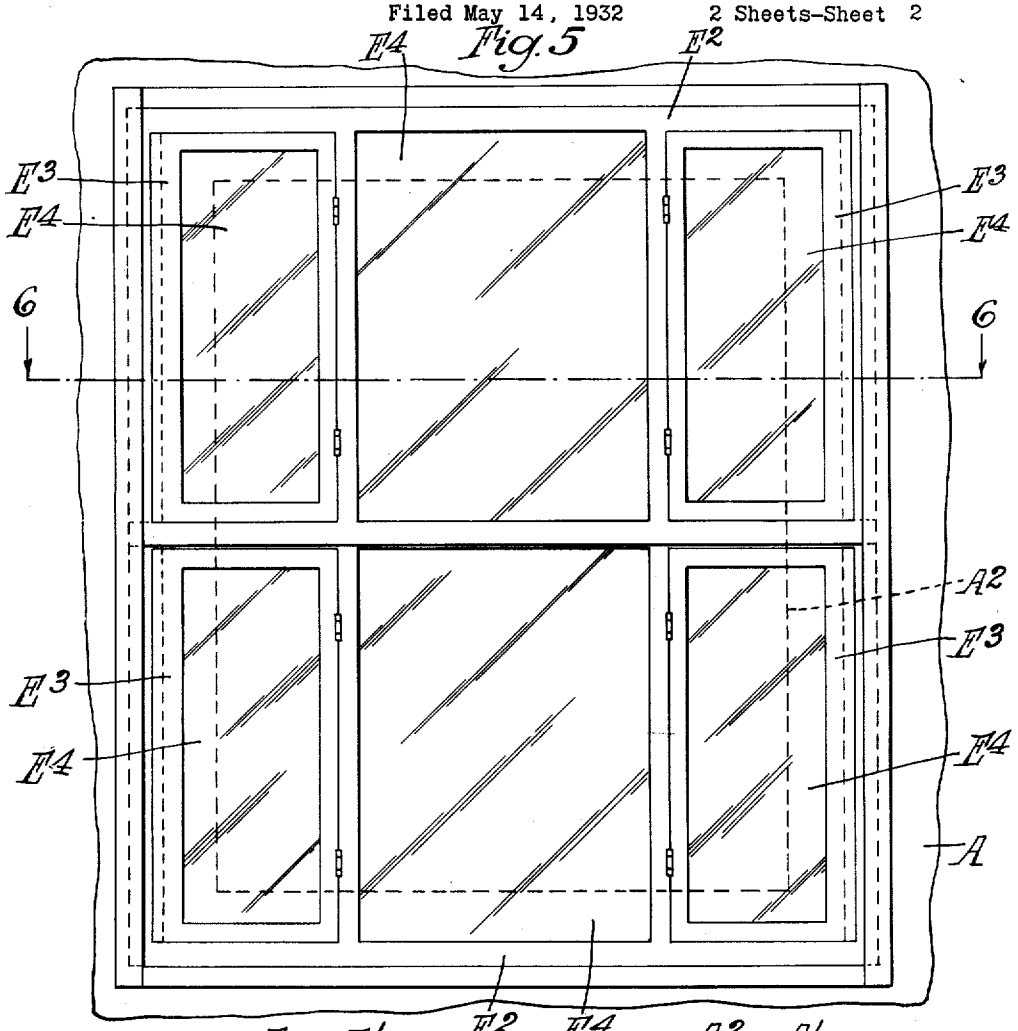
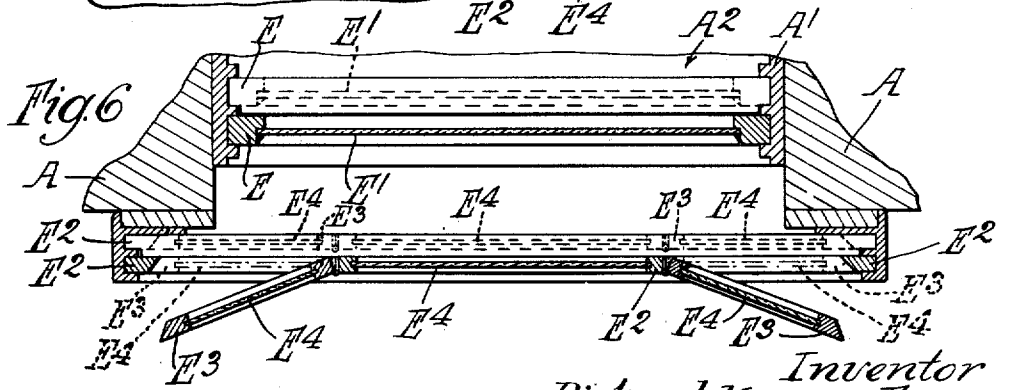


Fig. 6



Inventor
Richard Mason Fraps
by Parker & Carter
Attorneys.

Patented Sept. 25, 1934 1,974,739

UNITED STATES PATENT OFFICE

1,974,739

APPARATUS FOR INTERCEPTING HEAT FROM LIGHT

Richard Mason Fraps, Chicago, Ill.

Application May 14, 1932, Serial No. 611,305

12 Claims. (Cl. 20—56.5)

My invention relates to a method of and means for limiting or preventing the admission of heat through a window, door or skylight or, in general, to a room or enclosed space, while permitting light to penetrate such space. An immediate statement of the problem is the exclusion of direct solar heat radiation from any aperture or enclosed space, while permitting sunlight, direct or reflected, to penetrate or enter the enclosure in question. I employ the word "enclosure" as broad enough to cover any room, it being understood that the sunlight may be admitted through windows, doors, skylights or even through light pervious walls, as in modern steel and glass construction.

One object of my invention is the provision of means for permitting the employment of light, such as sunlight, and its penetration to any enclosure, while limiting or substantially preventing the penetration of heat to the enclosure.

A ready application of my invention is to windows, doors, skylights and the like for example for summer use or for use in countries and areas where sunlight and high temperatures prevail. Another object is the provision of means for lighting cars, Pullmans, and the like by sunlight, while preventing undue heating of the car interior by sunlight. Other objects will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a vertical section through one application of my invention;

Figure 2 is a similar section through another application;

Figure 3 is a partial side elevation of the structure shown in Figure 2;

Figure 4 is a horizontal section through a further application of my invention;

Figure 5 is a front view of a further application of my invention; and

Figure 6 is a section on the line 6—6 of Figure 5.

Like parts are indicated by like symbols throughout the specification and drawings.

Referring for example to Figure 1, A is any suitable partition, wall, window frame or the like in which a window frame proper A^1 may be positioned. A^2 generally indicates a window aperture.

B B indicate the usual window sash, herein shown as of duplex construction, including for example outer members B^1 and inner members B^2. In the inner members B^2, I may position a pane of glass generally indicated as B^3. This may for example be any ordinary window glass, for example of any of the types commercially used, pervious both to sunlight and to the heat radiation of sunlight. B^4 indicate light pervious panes or members in the outer sash elements B^1. The panes B^4 may be made of any suitable light pervious but heat absorptive material, such as heat absorptive glass. The space between the panes B^3 and B^4, indicated as B^5, may be a dead air space. It will be understood, however, that any suitable means may be employed for drawing off and disposing of the heated air penetrating therein. For example I may illustrate air inlet and outlet apertures which are indicated as passing through the sash as at B^6 or through the outer pane itself as at B^7.

Where a greater circulation of air is needed I illustrate as in Figure 2 a duplex window construction in which I employ inner sash members C, with panes of ordinary glass C^1, an outer sash C^2 with panes of heat absorptive glass C^3. In connection with the lower sash C^2 I employ air inlet apertures C^4 which may be in the lower member of the sash and may be shielded or provided with draft increasing means as indicated at C^5. C^6 or any suitable outlet apertures in the upper sash member.

It will be understood that in the form of Figure 1 the heated air passes out through the upper apertures of the individual panes, whereas in Figure 2 the heated air of the interior space passes out by the upper aperture C^6 of the upper sash. If the operator wishes to prevent air circulation he may employ any suitable closure sheets or gates as shown at C^7.

My invention is applicable to automobiles, cars and the like. For example with Pullmans, observation and dining cars for use in summer or in the Southwest when and where there are maximums of light and heat I may employ a cooling circulation of air provided by the movement of the vehicle itself. Referring to Figure 4, D generally indicates a portion of a vehicle, such as an automobile or railroad car. D^1 is a window frame in which I show illustratively a sash D^2 having a pane of glass D^3. I provide any suitable window frame means D^4 or an outer pane D^5 of light pervious but heat absorptive material. D^6 are vanes or deflectors whereby the outside air is directed through the aperture D^7 into the space D^8 between the panes D^3 and D^5. The air so passing may pass out as by the aperture D^9. It will be understood for example that the movement of the car itself will cause a more or less violent circulation of outer air through

the space D^6, thus preventing any tendency for hot air to be entrapped therein. The result is the dissipation of the heat which would otherwise gather as a result of the heat absorptive characteristics of the pane D^5. The outside air is of course effective in transmitting heat which gathers in the air layer exterior to the pane D^5.

Referring to Figures 5 and 6, I illustrate a modification of the window structures shown in Figures 1 and 2. E indicates the sash of the window proper, with the glass panes E^1. E^2 indicate exterior sash structures which may include hinged portions E^3. E^4 are panes of heat absorptive material. It will be understood that when the outer hinged sections are in the dotted line position there will be a dead air space between the window pane E^1 and the outer heat absorbent panes E^4. When a circulation is desired the terminal hinged sections may be swung into the full line position in which they are shown in Figure 6 in which case there will be a circulation of air through the space between the panes E^1 and E^4. This application of my invention is adaptable for example to houses, but may also be employed with moving vehicles where the rate of movement is not too high.

Referring for example to the form of Figures 5 and 6 it will be realized that by swinging the hinged frames out into the full line position of Figure 6 it is possible not merely to carry off the heated air which would otherwise gather between the panes E^1 and E^4, but it is possible to direct unheated outside air into a room. For example, if the lower outside sash E^2 is somewhat raised, unheated outside air will flow beneath the lower edge thereof and if the inside pane E^1 is also raised it will flow directly into the room. This unheated air is available for ventilation. As to the upper portion of the outer sash, the outer hinging is effective to cause a lateral circulation across the window and laterally through the space between the inner and outer window. This will dissipate the heated air and the heated air will be carried not into the room but out into the outer air. Also, in the form of Figure 1 if the lower sash is raised unheated outside air can blow into the space below it, while the circulation of the heated air, particularly of the upper sash, continues undisturbed. Similarly, in Figure 2 if the lower sash of both the inner and the outer window is raised, no cooled outside air will blow under the lower edges of the sash, but the dissipation of the heated air between the two spaces of panes will be undisturbed.

I claim:

1. In a means for limiting the passage of heat through a light admitting aperture, a light pervious window member, a light pervious and heat absorptive outer window member spaced therefrom, and means for maintaining a circulation of air through the space between the two window members.

2. In a means for limiting the passage of heat through a light admitting aperture, a light pervious window member, a light pervious and heat absorptive outer window member spaced therefrom, and means for maintaining a circulation of air through the space between the two window members, and means for directing the heated air from said space away from said window and away from the enclosed space to which said window admits light.

3. In means for limiting the passage of heat through a light admitting aperture, a light pervious window member, a light pervious and heat absorptive window member spaced from the first mentioned window member, and means for maintaining a dead air space therebetween.

4. In means for limiting the passage of heat through a light admitting aperture, a light pervious window member, a light pervious and heat absorptive window member spaced from the first mentioned window member, and means for substantially enclosing the space therebetween, and means for maintaining a circulation of air through such enclosed space.

5. In a means for limiting the passage of heat through a light admitting aperture, a compound window member including two light pervious window elements and means for positioning them in spaced relationship, one of said elements being heat absorptive.

6. In means for limiting the passage of heat through a light admitting aperture, a light pervious window member in said aperture, and a light pervious and heat absorptive window member removably associated with said first mentioned window member.

7. In means for limiting the passage of heat through a light admitting aperture, a light pervious window member in said aperture, and a light pervious and heat absorptive window member removably associated with said first mentioned window member, and means for positioning said last mentioned light pervious member in a predetermined spaced relation to the first mentioned window member.

8. In means for limiting the passage of heat through a light admitting aperture, a light pervious window member in said aperture, and a light pervious and heat absorptive window member adjustably associated with said first mentioned window member.

9. In means for limiting the passage of heat through a light admitting aperture, a light pervious window member positioned in said aperture, and an additional light pervious and heat absorptive window member associated with said aperture and positioned exterior to said first mentioned window member, and means for maintaining a circulation of air through the space between said window members, both of said window members being adjustably positioned in relation to the aperture.

10. In a vehicle having a light admitting aperture, a light pervious window member positioned in said aperture, a light pervious and heat absorptive member positioned exterior to said first mentioned window member, and means for causing the passage of outside air therebetween, in response to movement of the vehicle.

11. In a vehicle having a light admitting aperture, a light pervious window member positioned in said aperture, a light pervious and heat absorptive member positioned exterior to said first mentioned window member, and means for causing the passage of outside air therebetween, in response to movement of the vehicle, including a directing means adapted to deflect air into said space in response to movement of the vehicle.

12. In means for limiting the passage of heat through a light admitting aperture, a light pervious window member in said aperture, and a light pervious and heat absorptive window member spaced therefrom, means for maintaining a circulation of air through the space between said members, and additional means for directing unheated air into the room to which light is admitted.

RICHARD MASON FRAPS.