Feb. 3, 1959 KAIJI NEGORO 2,871,523

STORM DOOR VENT AND AUTOMATIC CLOSURE THEREFOR

Filed Nov. 22, 1954

Fig. 1

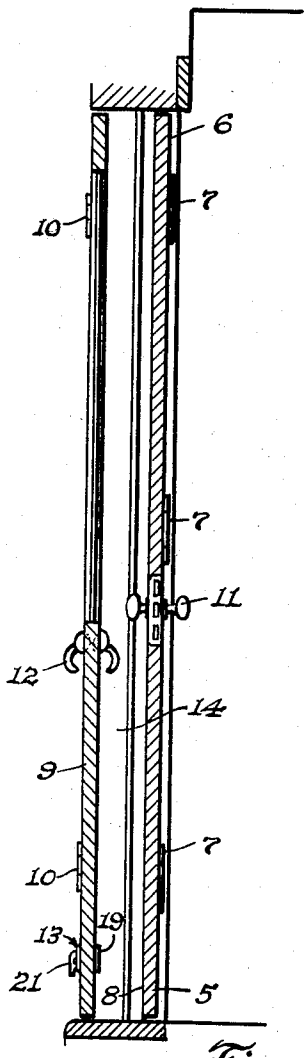


Fig. 2

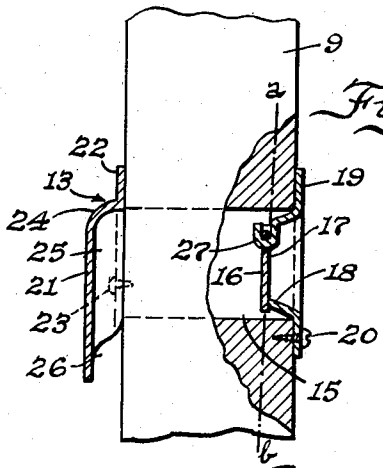


Fig. 3

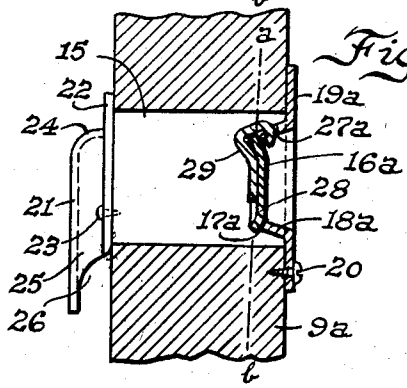


Fig. 4

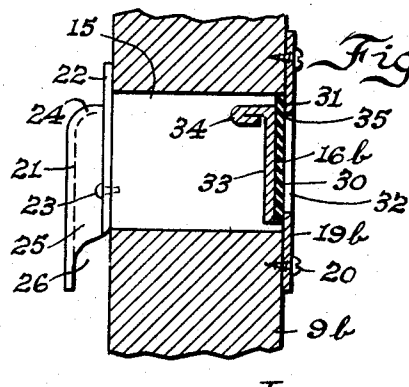
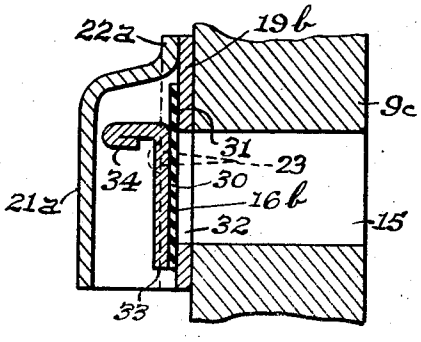


Fig. 5



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STORM DOOR VENT AND AUTOMATIC CLOSURE THEREFOR

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7 Claims. (Cl. 20—16)

This invention relates to a storm door vent and automatic closure therefor.

Everyone has noticed the difficulty in closing the house door after the screen door is removed and a close fitting storm door is installed, this difficulty being due to an air cushion effect in closing, air being compressed in the space between the doors when one of them is closed while the other is closed. In many cases, if the storm door is not latched securely it will be forced open by the closing of the house door, in which event much of the benefit of the storm door is thereby lost. The same difficulty, of course, is experienced in closing the storm door after the house door is closed, compression of the entrapped air causing the house door to be forced open when the storm door is closed if the house door does not happen to be securely latched. It is, therefore, the principal object of my invention to provide an air vent opening in the storm door equipped with a closure in the form of a flap valve that is arranged to open outwardly and close inwardly automatically so as to allow instant escape of the excess air when either of the two doors is closed after the other has been closed, said valve otherwise remaining closed so as to maintain the seal for the dead air chamber between the doors and accordingly eliminate the objection mentioned above.

The invention is illustrated in the accompanying drawing, in which—

Fig. 1 is a vertical section through an otherwise conventional doorway showing the house door and the storm door in the usual spaced relationship but showing installed on the storm door a vent and automatic closure therefor constructed along the lines disclosed in Fig. 2, the latter showing the parts about full size;

Figs. 3 and 4 are views similar to Fig. 2 showing modified or alternative constructions, and

Fig. 5 is a view similar to Fig. 4 showing another modified or alternative construction.

Similar reference numerals are used to designate corresponding parts in these views.

Referring to the drawing, the reference numeral 5 designates the house door hingedly mounted in the doorway 6, as indicated at 7, to swing inwardly away from the door jamb 8. No weather-strips are shown but may, of course, be provided around the edges of the door 5. 9 is the storm door disposed in outwardly spaced parallel relation to the house door 5 and hingedly mounted in the door opening to swing outwardly, as indicated at 10. Door knobs are indicated at 11 on the house door 5 and other knobs 12 are indicated on the storm door 9.

In accordance with my invention, the storm door 9 is provided, as indicated at 13, with a relief valve adapted to open so as to allow escape of excess air when either of the doors 5 and 9 is closed after the other has been closed, said valve thereafter closing again so as to maintain the seal for the dead air chamber 14 between the doors. Thus, a hole 15 is bored through the door 9 at one or more convenient locations, one being thought to be enough for a door of average size, although two or

even more may be provided, if desired, and suitably located on the door. At the inner end of each hole 15 a flap valve 16 is provided which opens outwardly away from and closes inwardly against a valve seat 17 provided on the edge of an annular flange 18 that projects into the hole 15 from a ring 19 that is suitably secured to the inner side of the storm door 9 by means of one or more screws 20. To protect the outer end of the hole 15 from the weather, a shield 21 is provided which is fastened by means of its annular flange 22 onto the outer side of the door with two or more screws 23, this shield being closed at the top 24 and on both sides 25, but open at the bottom, as indicated at 26, so that air escaping from the chamber 14 will find an easy outlet at 26. The flap valve 16 is in the form of a flat disk and is pivotally suspended on the hook 27 provided on the flange 18 and is slightly inclined from a vertical, as indicated by the dot and dash line *ab* (Fig. 2) so that it tends to gravitate to its closed position and yet will open readily enough under the slight air pressure created in the chamber 14 when either of the doors 5 and 9 is closed after the other has been closed.

The operation is thought to be self-evident. The flap valve 16 normally remains closed to seal the dead air chamber 14 so that the full advantage of the storm door 9 is obtained at all times. It is only when either of the two doors 5 and 9 is closed after the other has been closed that the flap valve 16 is momentarily opened by air pressure in chamber 14 to relieve the pressure as the house door 5 is closed or the storm door 9 is closed. The flap valve 16 closes instantly by gravity when the pressure in chamber 14 is relieved. There is nothing that is apt to get out of order and no springs that might break or fail to function. The weather shield 21 keeps the flap valve 16 and its seat 17 dry and there is therefore very little likelihood of these parts rusting and sticking if they do not happen to be made of brass or other non-rusting material. The operator can, from time to time, check the operativeness of the flap valve by simply poking his finger through the ring 18 to make sure that the flap valve is working freely enough and seating properly. A little oil applied to the pivot 27 once per season at the time the storm door is put up, will insure good operation indefinitely.

The construction disclosed in Fig. 3 is closely similar to that shown in Fig. 2 and corresponding parts have been numbered alike. The flap valve indicated at 16*a* is of circular form and cupped, as indicated at 28, to be self-centering in the seat 17*a*. This flap valve like the valve 16 is disposed in a slightly inclined plane *ab* so as to tend to gravitate toward the seat, the valve being pivotally suspended in an opening 27*a* in the ring 18*a* by means of a hook-shaped member 29 that is welded or otherwise suitably secured to the back of the flap valve. The operation of this construction is substantially the same as that of Figs. 1 and 2.

Referring to Fig. 4, the flap valve 16*b* shown in this form comprises a generally circular piece of flexible sheet material 30 that is glued or otherwise suitably secured at its upper end as at 31 to the inner side of a flat plate 19*b* to serve as a closure for a circular opening 32 provided in said plate. A metallic disk 33 cemented or otherwise suitably secured to the back of the valve 16*b* has a lug 34 on the upper portion thereof extending horizontally away from the valve and serving as a counterweight to assist the closing of the valve, the valve being disposed vertically and adapted to hinge with respect to its upper end portion at 35 in opening. The operation of this form is substantially the same as the other two forms.

Referring to Fig. 5 the same flap valve 16*b* is illustrated as in Fig. 4 but in this form the flat plate 19*b* is fastened onto the outside of the storm door 9*c* instead

of onto the inside and has the weather shield **21***a* fastened with it to the door by means of its annular flange **22***a*, so that the shield serves as an enclosure for the flap valve in addition to providing protection for the vent hole **15**. The operation of this form is substantially the same as the other three forms.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. In combination, a hinged house door, an oppositely hinged storm door in spaced relation to the house door having a small vent hole provided therein for escape of air from between said doors, a flap valve comprising a seat ring mounted on the storm door at the inner end of said vent hole and having an annular flange portion projecting into said hole, and a valve disk hingedly mounted at the top thereof on said flange and engaging the flange circumferentially of the edge thereof as a seat, said disk normally gravitating to closed position but swingable away from the seat under air pressure in said space between the doors.

2. A structure as set forth in claim 1, wherein the annular flange on the seat ring provides a valve seat that is inclined at an acute angle from a vertical plane so that the valve disk rests lightly on said seat by gravity.

3. In combination, a hinged house door, an oppositely hinged storm door in spaced relation to the house door having a small vent hole provided therein for escape of air from between said doors, a flap valve comprising a seat ring mounted on the storm door at the inner end of said vent hole and having an annular flange portion projecting into said hole, and a valve disk hingedly mounted at the top thereof on said flange and engaging the flange circumferentially of the edge thereof as a seat, said disk normally gravitating to closed position but swingable away from the seat under air pressure in said space between the doors, said disk being cupped so that a portion thereof that is of smaller radius than the flange projects into the opening defined by the flange.

4. A structure as set forth in claim 3, wherein the annular flange on the seat ring provides a valve seat that is inclined at an acute angle from a vertical plane so that the valve disk rests lightly on said seat by gravity.

5. In combination, a hinged house door, an oppositely hinged storm door in spaced relation to the house door having a small vent hole provided therein for escape of air from between said doors, and a flap valve in the inner end of said vent hole comprising a ring mounted on the inner side of the storm door and providing a valve seat

on the inner side thereof at the inner end of the vent hole, and a valve disk hingedly mounted on said ring at the upper portion of said valve seat, said disk normally gravitating to a closed position in engagement with the valve seat.

6. In combination, a hinged house door, an oppositely hinged storm door in spaced relation to the house door having a small vent hole provided therein for escape of air from between said doors, and a flap valve for closing one end of said vent hole comprising a ring mounted on the face of the storm door and providing a valve seat on one side thereof, and a valve element for cooperation with said valve seat comprising a sheet of flexible material secured to the valve seat at the upper portion thereof, said sheet being normally disposed in a substantially vertical plane in abutment with the valve seat but being flexible away from said seat, and a relatively stiff backing plate secured to the back of said sheet.

7. In combination, a hinged house door, an oppositely hinged storm door in spaced relation to the house door having a small vent hole provided therein for escape of air from between said doors, and a flap valve for closing one end of said vent hole comprising a ring mounted on the face of the storm door and providing a valve seat on one side thereof, and a valve element for cooperation with said valve seat comprising a sheet of flexible material secured to the valve seat at the upper portion thereof, said sheet being normally disposed in a substantially vertical plane in abutment with the valve seat but being flexible away from said seat, and a relatively stiff backing plate secured to the back of said sheet, said backing plate having at the top thereof an inwardly projecting counterweight which tends to cause the valve element to gravitate toward closed position under a predetermined pressure.

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