Abstract: The invention consists of a metal box frame into which a series of hinged louvers are fitted. These louvers consist of a metal wing section with a leading edge with an up stand or slot and a formed tab on the trailing edge that has the effect of an aileron. They are hinged on a pivot point that is offset from a point drawn from the leading edge to the trailing edge. This offset has the effect of using the weight of the louvers as a bias about the pivot point effectively holding the louvers closed and the overlap or interlinked portion together until a minimum air pressure is reached. The effective aileron on the trailing edge of each blade serves two purposes, one is to fit into a slot or up stand on the leading edge of the next blade for the purposes of protection from fire penetration and the other is to provide a mechanically advantageous position, that being the furthest point from the pivot, to best use the force of the passing air being relieved to efficiently open the vent at low pressures. One major application for this invention is to relieve the excess pressure created during the discharge of a gas suppression system. As an addition to this invention is the ability through the use of an electric or pneumatic motor to be able to control the opening of the louvers via a switching method attached to the motors. The linkage to do this has the ability to allow the louvers to open under air pressure independently of the mechanical drive fitted to the motor but also allow the opening of the louvers mechanically at choice when there is either no air pressure acting on them or there is a backwards air pressure that is acting on the louvers to hold them shut. One of the main applications for this configuration is for use in a chemical fire suppression system discharge where there is first a negative pressure created in the enclosure caused by the cooling effects of the gas discharge. It is assumed that in this additional application the vents are fitted to allow a positive pressure in the enclosure to be relieved by the free opening ability of the louvers due to the direction of the air flow acting on them and oriented accordingly. On the deployment of the gas this addition to this invention allows for the louvers to be temporarily opened mechanically so as to relieve the negative pressure in the enclosure and once that negative pressure has been released the motors disengage their drive to the louvers allowing them to shut under gravity and free to open again under air or gas pressure which can then occur in the enclosure due to the warming and therefore expansion of the gas and air inside. Note that in this invention the louvers will only open freely under air pressure from one direction and there fore the ability to add this mechanism as an add on allows for the pressure relief when the air flow would be in the opposite direction. In Diagram 6.
1. DESCRIPTION

Title: INVENTION . 'Improvements in enclosure pressure relief whilst maintaining fire rating integrity'.

Background: This invention relates to an automatic pressure relief vent that resists fire penetration through itself in the walls, ceilings and floors into which it is fitted whilst providing for efficient air pressure relief for an enclosure. The most common application is in relieving the excess pressure from an enclosure in which a gas suppression system has been fitted for the purposes of suppressing or extinguishing a potential fire by releasing an inert or chemical gas into the enclosure. It is also necessary that once the extinguishing gas has been discharged its concentration must be held for extended periods therefore once the excess pressure has been released the enclosure must be sealed from major leakage. The action of such a discharge in a sealed room is that the increased pressure can lead to structural damage. This invention relates to the relief of the potential damaging pressure spike whilst maintaining an effective barrier to any fire penetration from an outside source through the pressure relief vent itself.

Example: To overcome this the present invention proposes a metal box into which are fitted a series of interlinked metal louvers which automatically unlink and open via air pressure pushing on them.

Advantages: The interlinked blades maintain a linked status even when bending and general heat distortion occurs under fire conditions therefore maintaining an effective barrier from fire penetration. The trailing edge portion of each blade that forms part of the interlinking combination also acts as an aileron which greatly assists its opening at the kinds of pressures that if exceeded can cause enclosure damage, therefore allowing for smaller vents to do the same job as previous less efficient ones.

Preferably the vent consists of a casing with one or more louvers or control members.

Preferably the leading edge of each blade has a rear facing slot or flap into which the forward facing aileron trailing edge of the corresponding blade fits.

Preferably each louver has a pivot pin about which it is free to rotate under air pressure.

Preferably the trailing edge of each louver extends below the level of the underneath surface of each louver.

Preferably the pivot point of each louver will be in front the center of gravity as defined by the route of each louver being a mean line drawn from leading edge to trailing edge of each blade or as defined as the pivot being in front of each louver in the direction of the pressure to be relieved.

Preferably the louver has one or more skins to form a non flat blade or box type section.
2.

Introduction to Drawings.

An example of the invention will now be described by referring to the accompanying drawings:

Figure 1 shows a cross section of a series of louvers A hung on pivot D in casing E. The louvers are in the closed position with leading edge B interlinked with trailing edge C trailing edges interlinked.

Figure 2 shows the louvers A in open position having rotated about pivot D from the force provided by air flow Z which when pushing on aileron C causes a rotational moment about D. Also the Airflow Z passing over the top of the Louver A creates a negative pressure Y which has a lifting moment about D.

Figure 3 shows how the minimum opening pressure of the vent can be varied and set by the amount of forward offset V between the pivot and the route of the louver W W. V1 is of lesser offset that V2 and there fore the mass of the louver is acting about D on a shorter lever therefore having less resistance to opening under air pressure P. To increase the opening pressure the offset can be increased as with V2.

Figure 4 shows a casing E into which are fitted louvers A with pivot pins D which fit through corresponding holes in casing E.

Fig 5. Shows louvers A in open position from force df air or gas flow Z.

Fig 6. Shows the potential addition of a motor operated opening only vent where drive arm G rotates about axis F which his driven by a motor where pin H can rotate to push on link K which is fixed to pivot D which in turn is fixed to louver A but free to rotate in casing E. Drag arm J rotates about pivot I which transforms power drive to all louvers, hi this figure the motor is disengaged and the louvdr is closed.

Fig 7. Shows the vent in motor open position where drive arhi G has rotated about axis F under the power of a motor and driven pin H under push link K to open louvers A irrespective of air flowZ2 orZ3.

Fig 8. Shows the vent with the drive arm G in the disengaged position and with the louvers A open from the force of air flow Z.

Fig 9. Shows three variations of cross sections as variations of louver design to represent some of the variation possibilities of this invention.
3.

CLAIMS

1. A pressure relief vent which comprises a frame defining an opening, control members mounted in the opening for movement about a spindle having a pivot axis offset from the axis running from leading edge to trailing edge of control member whereby the effective offset weight of the member acts as a moment about the spindle so as to hold the control member in the closed position until a set minimum air pressure is met.

2. A pressure relief vent according to claim 1, wherein there is a slot or up stand formed onto the leading edge of the control member into which the trailing edge of the adjacent member fits or overlaps and through opening motion separate from each other.

3. A pressure relief vent according to claim 1, or 2, wherein the spindle is offset from the axis running from leading edge to trailing edge creating a weight bias from the mass of the blade effective in holding the control members in the closed position until a minimum pressure is met.

4. A pressure relief vent according to 1 to 3 which has a formed flap on the trailing edge that extends past the belly of the blade that acts to interlink with adjacent blade and provide an aileron formed into the down position onto which passing air can act as an assistance to the blade opening about its axis pivot.

5. A pressure relief vent according to 1 to 4 where the pivot axis of each control member is distanced so the down forrad aileron of each control member fits into the corresponding slot in the leading edge of the next.