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(54) Hot gas and fume venting device, particularly for emergency situations.

(57) A hot gas and fume venting device comprising a shutter (1) that is pivoted about a horizontal axis (A) to close a skylight-like opening (3), including a supporting beam (4), which is fixed across the opening (3) at right angles to the pivoting axis, and a telescopic jack (6), in which the outer cylinder is articulated to the beam (4) about an axis that lies parallel to the pivoting axis (A) and the innermost cylinder is articulately coupled to a point of the shutter; the jack (6) is positively extendable by means of compressed gas contained in a bottle (39) that is controlled by a smoke and/or hot gas sensor (40) to rotate the shutter (1) from a closed position into an open position, and the jack (6) is provided with a hydraulic shock absorber to allow the controlled descent of the shutter beyond the 90° opening position until it reaches the stop position.

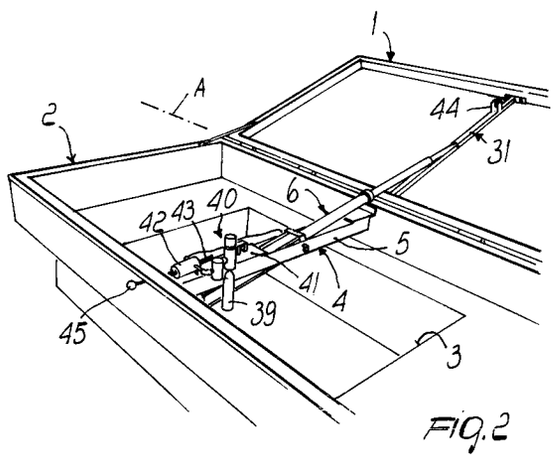

FIG. 2

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The present invention relates to a hot gas and fume venting device, particularly for emergency situations.

Venting devices of this kind are already known and are used for closing a skylight. They comprise a shutter which is articulated about a horizontal axis and is overturned from a closed position into an open position by means of a pair of jacks. One of these jacks produces partial opening up to approximately 90° and the other one completes the opening action beyond 90°.

The provision of two jacks, however, is extremely troublesome and expensive, since the actuation of said jacks is controlled by specifically provided sensors capable of detecting the presence of hot gases or fumes that indicate a dangerous condition.

A principal aim of the present invention is therefore to provide a venting device that is capable of obviating the constructive complexity of known devices.

This aim is achieved by a hot gas and fume venting device comprising a shutter that is pivoted about a horizontal axis to close a skylight-like opening, characterized in that it comprises a supporting beam, fixed across said opening at right angles to said pivoting axis, and a telescopic jack, in which the outer cylinder is articulated to said beam about an axis that lies parallel to said pivoting axis and the innermost cylinder is articulately coupled to an area of said shutter, said jack being positively extendable by means of compressed gas contained in a bottle that is controlled by a smoke and/or hot gas sensor to rotate said shutter from a closed position into an open position, said jack being provided with a hydraulic shock absorber to allow the controlled descent of the shutter beyond the 90° opening position until it reaches the stop position.

Further characteristics and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of the venting device in closed position;

figure 2 is a view of said venting device in open position;

figure 3 is a longitudinal sectional view of the actuation jack; and

figure 4 is a sectional view of a detail of the jack.

With reference to figures 1 and 2, the venting device comprises a rectangular shutter 1 which is pivoted about a horizontal axis A to a frame 2 that surrounds an opening 3. For the sake of illustration, it is assumed that the opening 3 is formed in the ceiling of a room to be monitored, for example a kitchen. The venting device can of course be applied to any kind of room.

The ends of a beam 4 are fixed to the longitudinal walls of the frame 2; said beam is composed of a pair of parallel spaced longitudinal members 5. A hydraulic/pneumatic jack 6 of the multiple-rod or telescopic type is pivoted between the longitudinal members 5.

As shown more clearly in figure 3, the jack 6 comprises a first outer cylinder 7 which is closed at one end by a bottom 8 and has, at the opposite end, a ring 9 provided with two coaxial pivots 10 and 11 for articulation in the beam 4.

A second cylinder 12 is slideable within the cylinder 7 and is closed at one end by a bottom 13; the opposite end of said second cylinder protrudes beyond the ring 9, and a collar 14 is centered therein.

A chamber 15 is formed between the bottoms 8 and 13; by means of a channel 16 formed in the bottom 8, said chamber is connected to a pipe 17 that runs outside the cylinder 7. The opposite ends of the pipe 17 are sealingly inserted in seats of the bottom 8 and of the ring 9, and the pipe is connected to a passage 18 that passes axially through the pivot 11 to be connected to a source of compressed air, as will become apparent hereinafter.

A third cylinder 19 is slidingly accommodated inside the cylinder 12, and one end of said third cylinder is guided in the collar 14, whereas the opposite end is closed by a sort of cup 20 which is screwed on said end and sealingly guided inside the cylinder 12.

The cup 20 has, at its center, a cylindrical raised portion 21 that protrudes into a recess 22 of the bottom 13 so as to form, together with said bottom, a chamber that is connected to the chamber 15 by means of a hole 23 formed in the bottom 13 and to the inside of the cylinder 19 by means of a hole 24.

A rod 25 is screwed into the raised portion 21, lies coaxially to the cylinder 19, and supports a piston 26.

The piston 26 is sealingly slideable within a fourth cylinder 27 which is guided inside the cylinder 19 and has an end that protrudes outside the cylinder 19 and is closed by a plug 28. A bushing 29 is applied to the opposite end of the cylinder 27, sealingly slides within the cylinder 19 on the outside, and sealingly slides over the rod 25 on the inside.

The plug 28 has a threaded stem 30 that allows to apply a body for articulated coupling to a median point of a cross-member 31 that connects the two longitudinal rails of the shutter 1.

The piston 26 divides the inside of the cylinder 27 into two chambers containing a pneumatic/hydraulic fluid, for example CO_2 gas and oil. The

two chambers 32 and 33 are mutually connected by means of a gauged hole 34 (see figure 4) and a check valve 35 of the type constituted by a ball 36 which is pushed by a spring 37 and closes a hole 38 that passes axially through the piston 26. The valve 35 is orientated so as to close the hole 38 when the pressure in the chamber 32 is higher than the pressure in the chamber 33.

In order to supply the jack 6 there is a bottle 39 of a compressed gas, for example CO_2, which is controlled by a hot gas and/or fume sensor 40 and is installed on a bracket 41 that joins, in an upward region, the longitudinal members 5 that compose the beam 4.

A pneumatic cylinder 42 is also mounted on the bracket 41 and is connected in series to the jack 6; the rod 43 of said pneumatic cylinder is adapted to engage like a sliding bolt in an eyelet 44 located on the cross-member 31.

A pivot 45 guided in the frame 2 and provided with a knob that can be accessed from outside is associated with the pneumatic cylinder 42.

The pivot 45 is aligned with the rod 43 and can be operated manually to release the rod 43 from its engagement position in the eyelet 44 during periodic inspections or in case of failure of the venting device in emergency situations.

The operation of the described venting device is as follows. In normal conditions, the shutter 1 rests on the frame 2 and is closed by the engagement of the rod 43 in the eyelet 44.

In an emergency situation (presence of fumes or of a temperature higher than a preset value), the sensor 40 detects this anomaly and activates the opening of the bottle 39. The compressed gas thus released activates first of all the cylinder 42, releasing the shutter 1, and then the telescopic jack 6. Accordingly, the compressed air, after entering the chambers 15 and 22, causes the extension of the cylinders 12 and 19 and the extension of the jack until the shutter has rotated beyond 90°.

When the cylinders 12 and 19 have reached their respective stroke limits, the compressed air acts on the cylinder 27 through the hole 24, causing the protrusion of said cylinder 27 from the cylinder 19. However, the consequent extension is braked by the resistance with which the pneumatic/hydraulic fluid contained in the cylinder 27 flows from the chamber 32 into the chamber 33 through the gauged hole 34.

This allows the shutter 1 to gently reach the final open position.

The shutter is overturned into the closed position by acting manually. In particular, the transfer of fluid from the chamber 33 into the chamber 32 during the retraction of the jack is facilitated by the opening of the valve 35.

It is evident that the described venting device fully achieves the intended aim and objects. In particular, the use of a telescopic jack allows considerable simplification in construction and assembly and therefore allows better adaptability in applying the venting device to the various types of shutter, from rectangular ones to circular ones, with flat or cambered dome-shaped glazed panels.

Numerous modifications and variations are possible in the practical embodiment of the invention, and all are within the scope of the same inventive concept. The shapes and dimensions, as well as the materials employed, may furthermore be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. Hot gas and fume venting device of the type which comprises a shutter (1) that is pivoted about a horizontal axis (A) to close a skylight-like opening (3), characterized in that it comprises a supporting beam (4), which is fixed across said opening at right angles to said pivoting axis, and a telescopic jack (6), in which the outer cylinder (7) is articulated to said beam (4) about an axis that lies parallel to said pivoting axis and the innermost cylinder (27) is articulately coupled to a point of said shutter, said jack (6) being positively extendable by means of compressed gas contained in a bottle (39) that is controlled by a smoke and/or hot gas sensor (40) to rotate said shutter (1) from a closed position into an open position, said jack being provided with a hydraulic shock absorber (34) to allow the controlled descent of the shutter beyond the 90° opening position until it reaches the stop position.

2. Venting device according to claim 1, characterized in that the innermost cylinder (27) of said jack (6) has one end that is articulately connected to said shutter (1) and is divided into two chambers (32, 33) by a piston (26) which, by means of a coaxial rod (25), is connected to the next outer cylinder (19), said chambers (32, 33) containing a pneumatic/hydraulic fluid and being mutually connected by a gauged hole (34) and by a one-way valve (35) which are located in the piston (26), said valve (35)

being orientated so as to cut off the transfer of fluid between the two chambers (32, 33) during the extension of the jack (6) and allow only the transfer of fluid through said gauged hole (34).

3. Venting device according to claim 2, characterized in that a pneumatic cylinder (42) is connected in series to said telescopic jack (6), the rod (43) of said cylinder constituting a sliding bolt for retaining said shutter (1) in closed position.

4. Venting device according to one of the preceding claims, characterized in that the outermost cylinder (7) of the jack (6) is articulated to said beam (4) by means of a pair of coaxial pivots (10, 11), a passage (18) being provided through one (11) of said pivots for feeding compressed gas to said jack (6).

5. Venting device according to one of claims 3 and 4, characterized in that there is a manually-operated pivot (45) which acts from the outside on the rod (43) of said cylinder (42) to release said rod (43) and allow to open the shutter (1) manually.

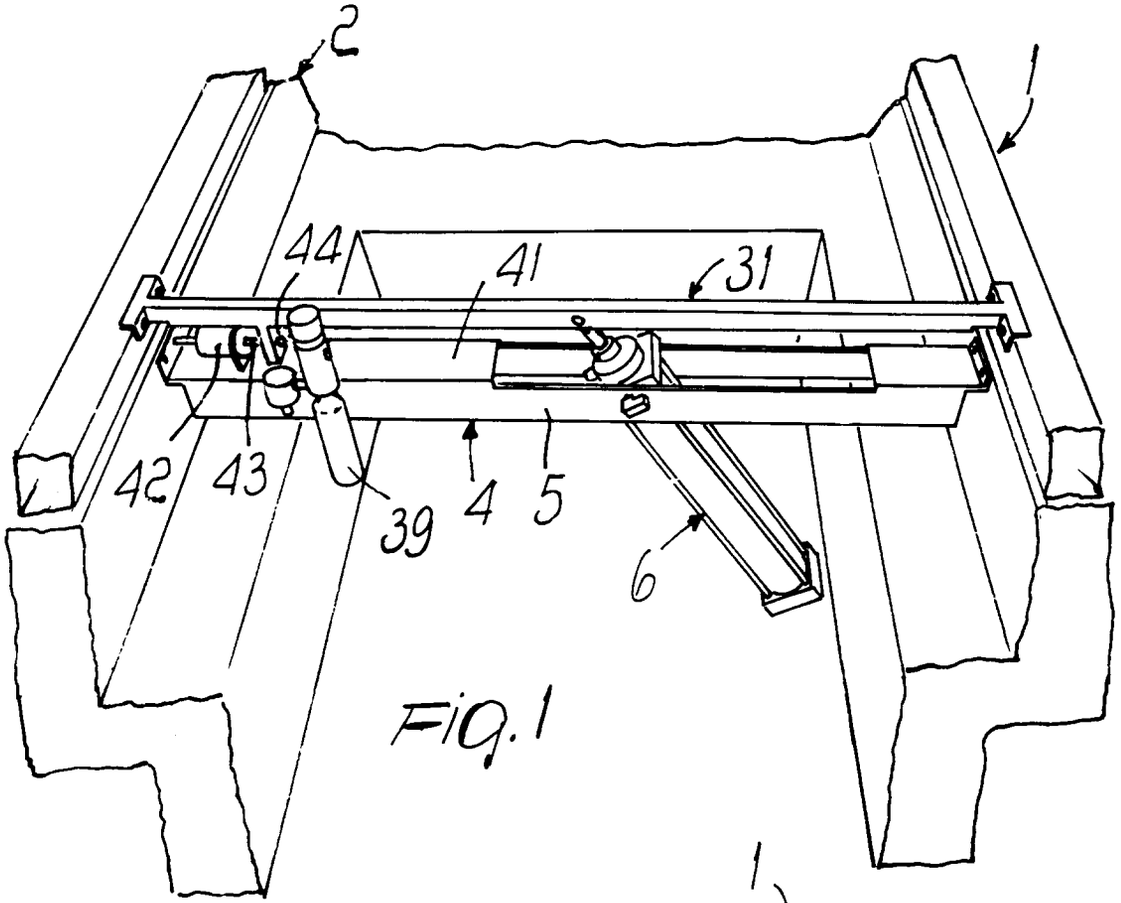

Fig. 1

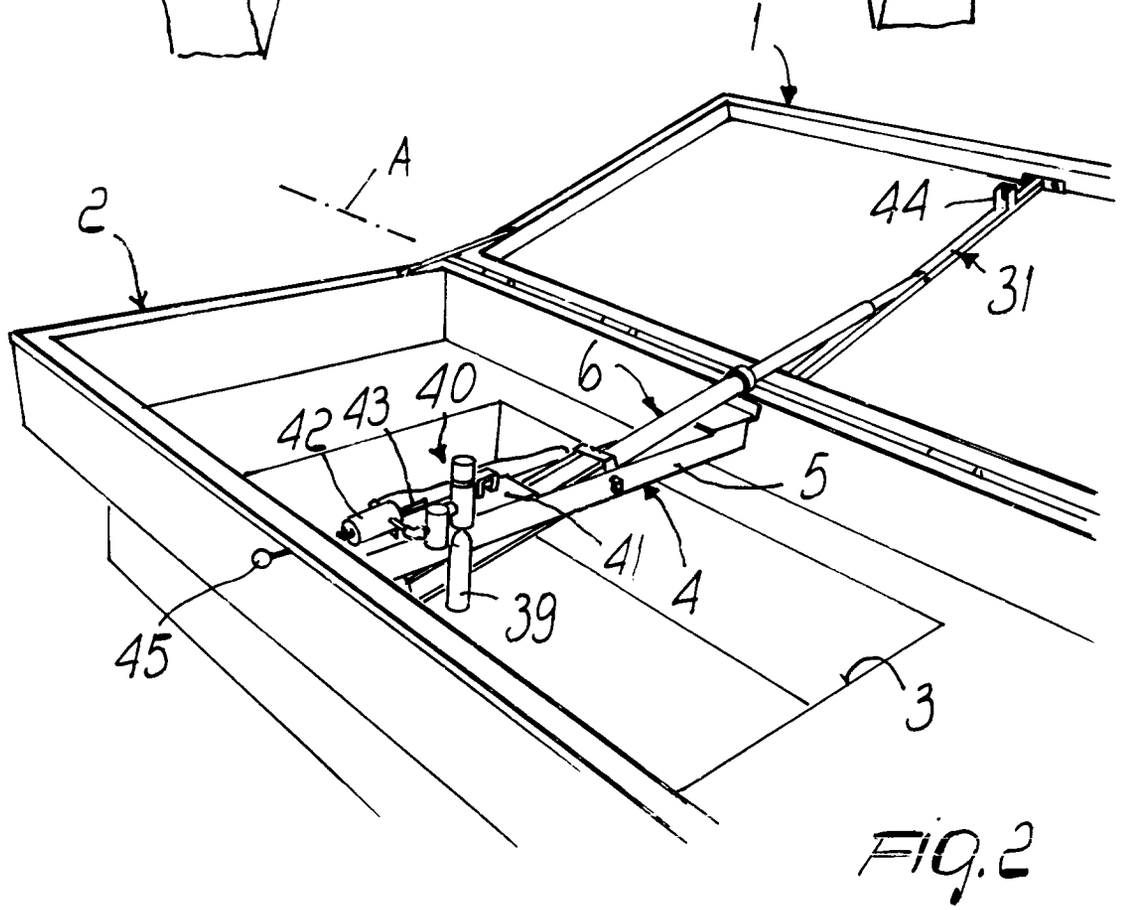

Fig. 2

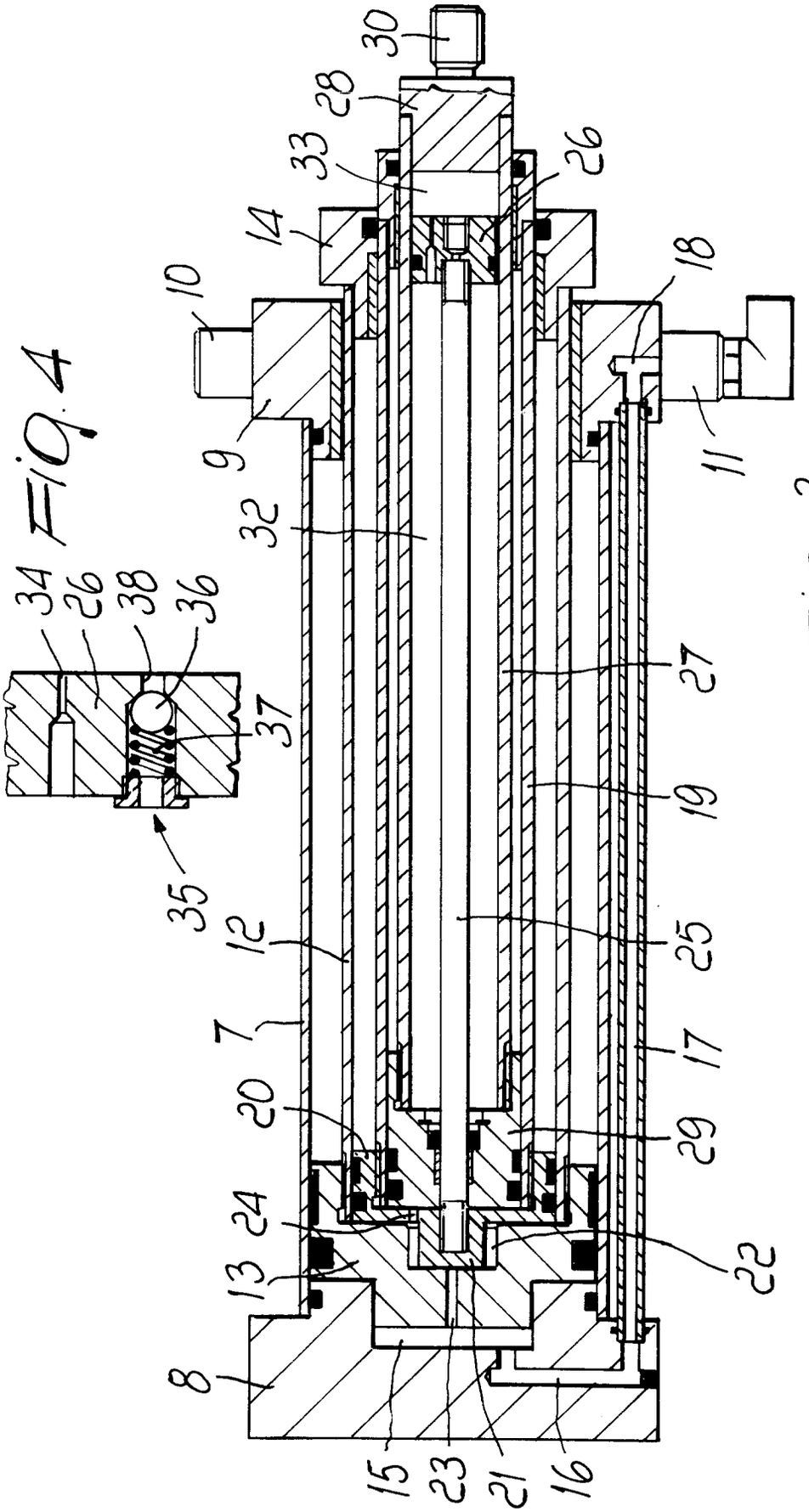
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Fig. 3

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 95 10 4070

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	NL-A-7 501 949 (GRESCHA-GESELLSCHAFT GREFE & SCHARF)	1,4	E05F1/00 A62C2/24
Y	* page 6, line 18 - page 7, line 11 * * page 8, line 8 - line 17 * * page 9, line 21 - line 29; figure 2 *	3,5	F15B15/16
Y	GB-A-2 261 916 (A. GUERRINI) * page 3, paragraph 3 - paragraph 4; figure 1 *	3,5	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E05F
A62C
F15B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 July 1995	Guillaume, G

CATEGORY OF CITED DOCUMENTS

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