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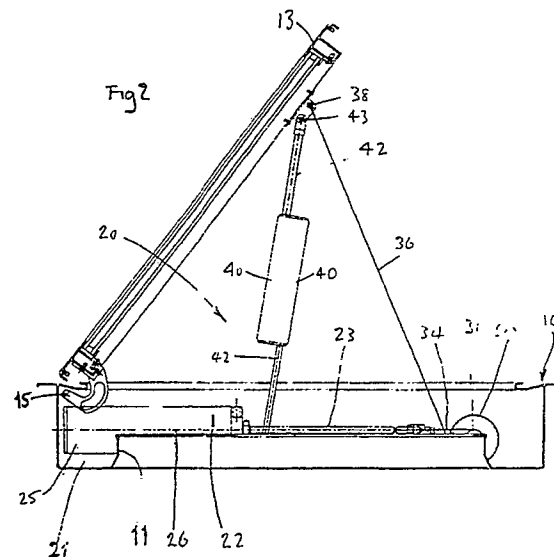
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54 **Ventilators.**

57 A controllable, hinged flap ventilator having a frame (10) defining a ventilation opening (11), one or a pair of outwardly opening flaps (13) hinged to the frame and movable between a closed position closing the ventilation opening and an open position opening the ventilation opening, a flap opening spring or springs (40) for opening the flap or flaps, a fluid operable piston and cylinder unit (22) mounted on the frame and operable to close the or a hinged flap of the ventilator against the action of the spring or springs upon instroking of its piston via first (34) and second (36) flexible connection members connected respectively to the hinged flap and to the unit at one end and a pair of drivingly interconnected rotatable drums (30,31) mounted on the frame and windably receiving the other ends of the flexible connection members, the drum receiving the first flexible connection member (34) connected with the piston and cylinder unit having a diameter less than the diameter of the drum receiving the second flexible connection member (36) connected with the hinged flap.



IMPROVEMENTS RELATING TO VENTILATORS

The present invention comprises improvements relating to ventilators and concerns controllable ventilators which are required to open to promote the circulation of air in a building and exhaust vitiated air or to exhaust heat and/or smoke and fumes from a building in the event of a fire and to close to conserve heat in the building under wintery or normal conditions.

One such type of ventilator is a hinged flap ventilator having a frame defining a ventilation opening, and a single ventilation flap hinged to the frame and angularly movable about its hinge axis between a closed position closing the opening and an open position opening the opening, there being a spring or springs for opening the ventilation flap, the flap normally being closed by a piston and cylinder device powered by pressure fluid.

A ventilator of this type, particularly when used as a fire ventilator to exhaust heat, smoke and fumes from a building in the event of a fire, may be mounted in a horizontal or near horizontal flat roof position or in a vertical position in a wall of the building or again, in an inclined position on a pitched roof of the building for example, the single flap being arranged to swing open outwardly and being hinged along its lower edge when the ventilator is mounted in a vertical or inclined position.

A roof ventilator is also known having a pair of hinged flaps which swing open upwardly and outwardly with respect to one another in opposite directions to uncover the ventilation opening in the ventilator frame, the pair of flaps either overlapping or abutting one another at their free edges when closed, with or without an underlying gutter spanning the ventilation opening. Usually, the flaps of this twin opening flap type of ventilator are mutually inclined when closed so as to run off rain water and open into a position in which they lie generally in parallel planes.

With either the single opening flap or twin opening flap type of ventilator but more particularly with the single opening flap type of ventilator there is often a problem in accommodating the flap opening and closing mechanism in the ventilator. This is particularly so when the mechanism needs to be accommodated within the frame of the ventilator but to the outside of the ventilation opening when the ventilator is closed, the single ventilation flap being glazed and then serving as a window or a skylight for example.

In order to mitigate this problem, the present invention proposes to provide a more compact flap opening and closing mechanism in a hinged flap ventilator.

According to the present invention there is provided a controllable, hinged flap ventilator having a frame defining a ventilation opening, one or a pair of outwardly opening flaps hinged to the frame and mov-

able between a closed position closing the ventilation opening and an open position opening the ventilation opening, a flap opening spring or springs for opening the flap or flaps, a fluid operable piston and cylinder unit mounted on the frame and operable to close the or a hinged flap of the ventilator against the action of the spring or springs upon instroking of its piston via first and second flexible connection members connected respectively to the hinged flap and to the unit at one end and a pair of drivingly interconnected rotatable drums mounted on the frame and windably receiving the other ends of the flexible connection members, the drum receiving the first flexible connection member connected with the piston and cylinder unit having a diameter less than the diameter of the drum receiving the first and second flexible connection members connected with the hinged flap.

By means of this arrangement, the length of the second connection member drawn on to the drum of larger diameter is made greater than the stroke movement of the piston and cylinder unit resulting in a piston and cylinder unit which is compact in length.

Preferably, a pair of interconnected, linearly operable flap opening springs is provided for the or each flap, the springs having overlapping, linearly operable extents and being hingeably connected respectively to the ventilator frame and the flap, the springs lying between the piston and cylinder unit and the drums in the closed position of the flap.

A specific embodiment of the present invention will now be described in detail by way of example with reference to the accompanying drawings in which :

FIG. 1 is a cross section of a single flap ventilator of the present invention in a closed position ;

FIG. 2 is a cross section of the ventilator in the open position ; and

FIG. 3 is a plan view of the ventilator.

With reference now to the accompanying drawings, the ventilator comprises a frame 10 defining a ventilation opening 11 and a single, glazed ventilation flap 13 hinged to the frame and angularly movable about its hinge axis 15 to open and close the ventilator.

Mechanism generally indicated at 20 is provided for opening and closing the ventilator and one such mechanism is housed in each longitudinally extending internal side channel 21 of the frame (see Fig. 3). The mechanisms 20 are identical and one only of them will be described.

The mechanism 20 comprises a pneumatic piston and cylinder unit 22 having its cylinder 25 mounted to the frame 10 with its cylinder inner end positioned in the side channel 22 adjacent the flap hinge axis 15 and its cylinder axis 26 extending longitudinally of the side channel 21. Rotatably mounted towards the

opposite end of the side channel 21 is an integral pair of drums 30, 31 of different diameter. The smaller diameter drum 31 receives a wound-on end portion of a flat high tensile flexible steel strip 34 connected at its other end to the piston rod 23 of the piston of the piston and cylinder unit 22. The larger diameter drum winds on one end of a wire rope or a further flexible steel strip 36, the other end of which is connected to the flap 13 as at 38.

A pair of linearly operable gas springs 40 are fixed together in parallel, side-by-side, so as to overlap their linearly operable extents. The gas springs 40 have their piston rods 42 extending in opposite directions and hingeably connected at their outer ends respectively to the flap 13, as at 43, and the frame 10, as at 44, in this case by means of ball joints 45. Instead of side-by-side gas springs 40 a pair of telescoping gas springs, one housed within the other, could be used. Again, cylinder guided, coiled wire springs could be substituted. However, linearly operable gas springs are preferred.

The gas springs 40 operate as linearly extendible struts to open the ventilator and the ventilator is closed by fluid pressure supplied to the piston and cylinder units 22.

As will be appreciated, the overall length of the cylinders 25 is dependent upon their stroke length and a fixed dimension for internal seals, piston and end mountings. Thus, the overall outstroked length of the piston and cylinder units 22 is at least twice their stroke length. By using the different diameter drums 30, 31, the stroke length of the units 22 is magnified to an extent sufficient to close the ventilator flap whilst positioning the connection points 38 of the flexible connection members 36 at a location close to the connection points 43 of the gas springs 40 and close to the free transverse edge of the flap 13.

The arrangement thus achieved gives rise to a favourably low stress distribution in an otherwise compact mechanism. Further, this outcome is assisted by the use of the back-to-back gas springs 40 which have an increased outstroked to instroked length ratio enabling them to be accommodated, in their instroked condition, in front of the units 22 in the side channels 21 and between the units 22 and the drums 30, 31 as clearly seen in Fig. 3.

Lastly, by use of high tensile flexible steel strip 34, 36, the acceptable diameter of winding and, therefore, the acceptable diameter(s) of the drum(s) 30, 31 is/are reduced.

Instead of providing two mechanisms 20 one only may be used, housed as illustrated in one of the longitudinally extending internal side channels 21 of the frame. In order to ensure a symmetrical pull on the flap 13 the connection point at 38 of the other end of the wire rope or steel strip 36 is shifted to a point close to the mid point of the free edge of the flap 13. The wire rope is then led from the larger diameter drum 30 over

a pulley on the frame, the axis of rotation of the drums 30, 31 extending at right angles and the drums being drivingly interconnected by means of a pair of bevel gears.

Claims

1. A controllable, hinged flap ventilator having a frame defining a ventilation opening, one or a pair of outwardly opening flaps hinged to the frame and movable between a closed position closing the ventilation opening and an open position opening the ventilation opening, a flap opening spring or springs for opening the flap or flaps, a fluid operable piston and cylinder unit mounted on the frame and operable to close the or a hinged flap of the ventilator against the action of the spring or springs upon instroking of its piston via first and second flexible connection members connected respectively to the hinged flap and to the unit at one end and a pair of drivingly interconnected rotatable drums mounted on the frame and windably receiving the other ends of the flexible connection members, the drum receiving the first flexible connection member connected with the piston and cylinder unit having a diameter less than the diameter of the drum receiving the first and second flexible connection member connected with the hinged flap.
2. A ventilator as claimed in claim 1 wherein a pair of interconnected, linearly operable flap opening springs is provided for the or each flap, the springs having overlapping, linearly operable extents and being hingeably connected respectively to the ventilator frame and the flap, the springs lying between the piston and cylinder unit and the drums in the closed position of the flap.
3. A controllable hinged flap ventilator substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

