

[54] SHUTTER-TYPE FLUID DISTRIBUTOR

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251/228, 251, 263, 279, 280, 298, 262

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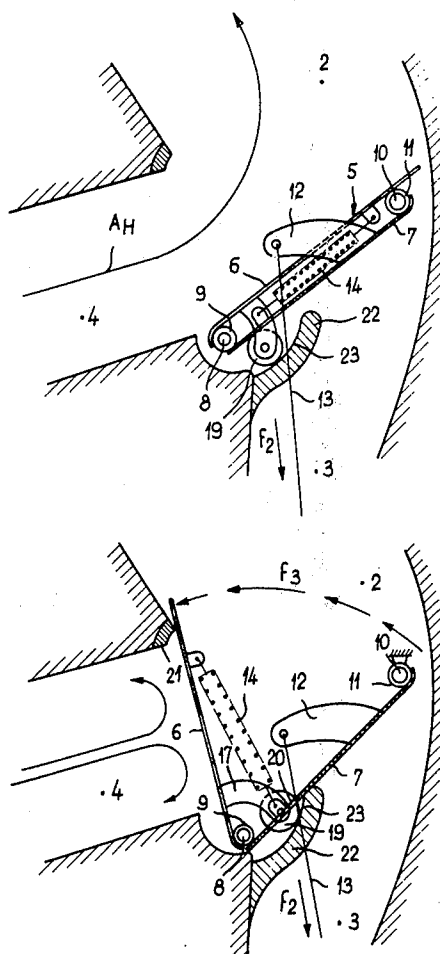
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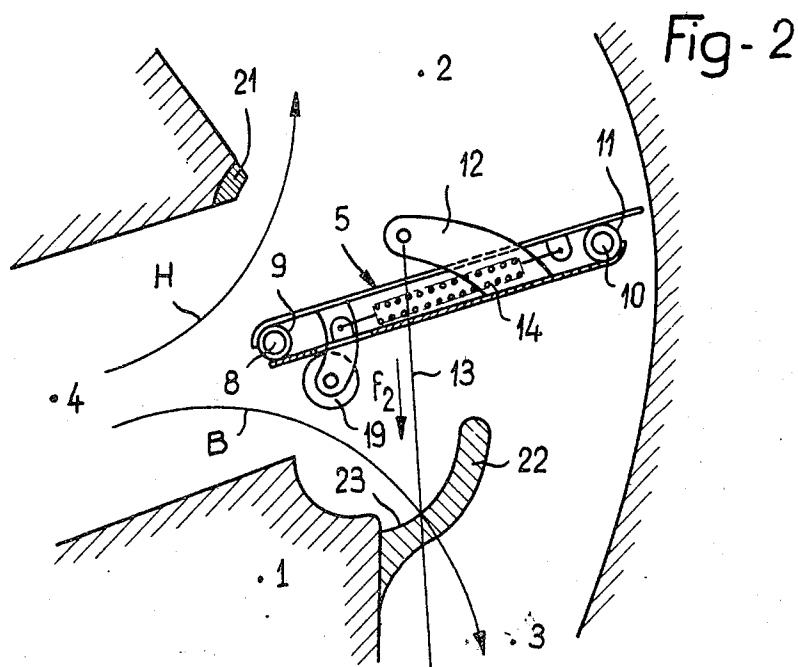
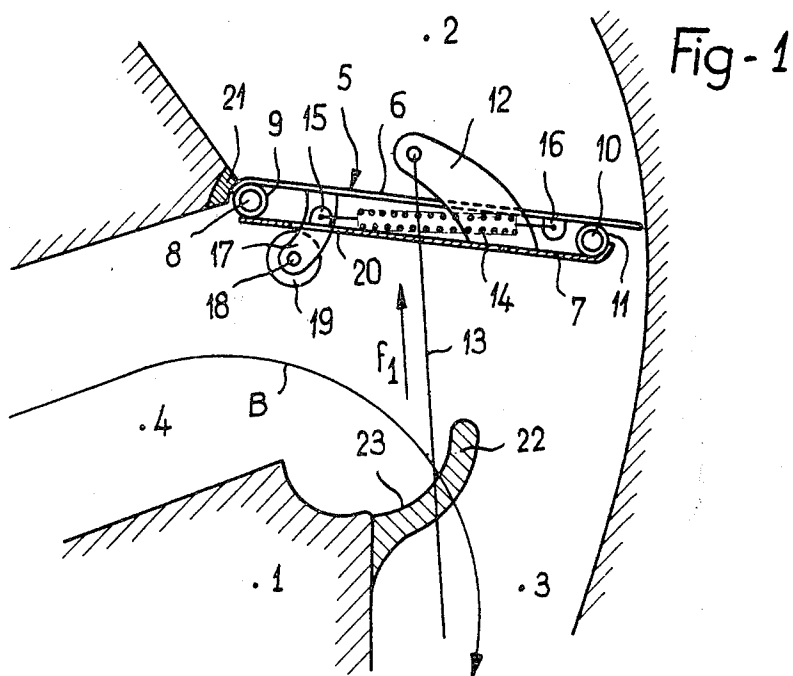
[57] ABSTRACT

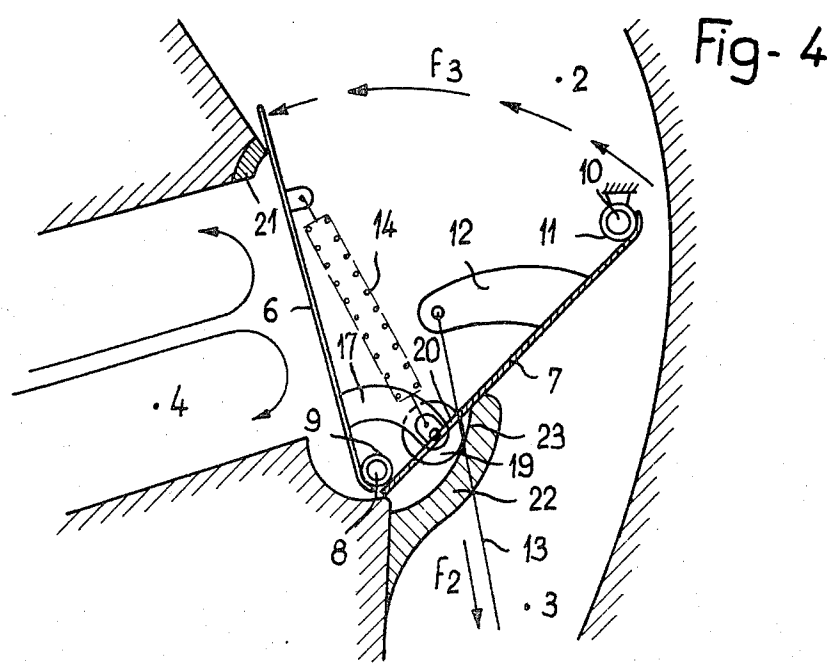
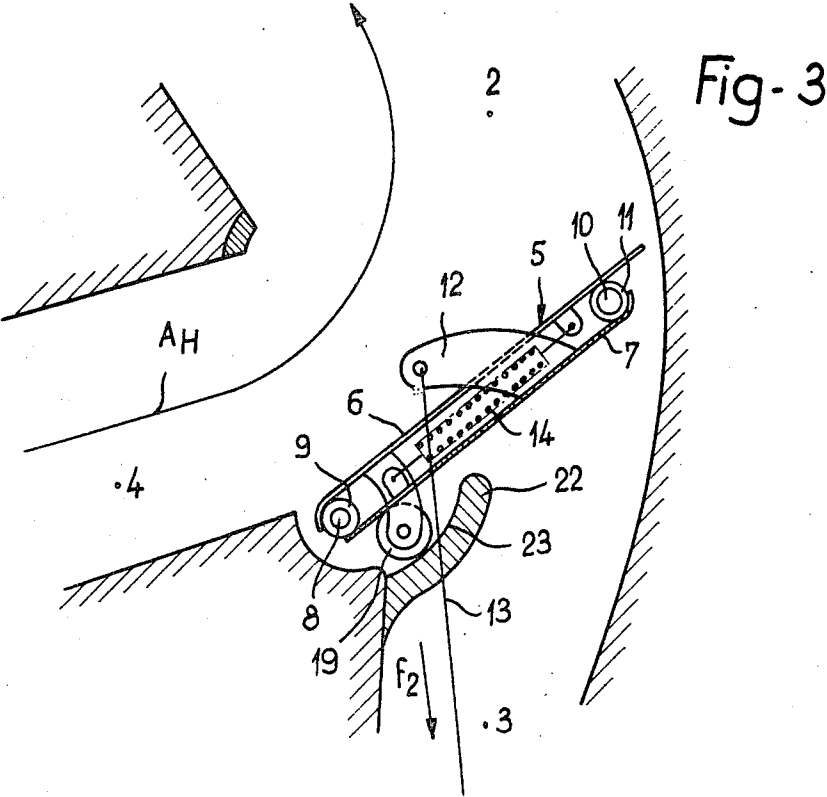
Shutter-type fluid distributor comprises a three-way housing wherein the duct constituting the three ways are spaced angularly from each other and of which two are adapted to be selectively closed by rotation of the shutter in one of two angularly spaced positions thereof. The shutter comprises a pair of substantially parallel flap-valves operatively interconnected, the shutter and housing comprising means such that in one of the duct-closing positions the shutter is adapted to close simultaneously the relevant duct and the third duct of the housing.

This shutter is particularly suited for controlling the distribution of fluid in the air-conditioning systems of automotive vehicles and the like.

9 Claims, 5 Drawing Figures







SHUTTER-TYPE FLUID DISTRIBUTOR

BACKGROUND OF THE INVENTION

The present invention is concerned in general with means for distributing fluids among various ducts, but has specific reference to a pivoted flapped-shutter distributor, of the type comprising a three-way distributor housing with angularly spaced ducts, wherein two such ducts are adapted to be closed by rotation of the shutter as the shutter is set in one or the other of two angularly spaced positions.

In known devices of this character either a single distributor shutter having a plurality of rigidly interconnected deflector blades or flaps constantly kept at fixed relative angular spacings, or a plurality of single or double flaps controlled separately or by means of coupling linkages interconnecting them are used, all these blades or flaps being adapted to close the inlet or directional distribution of fluids forced into duct means of the corresponding housings.

SUMMARY OF THE INVENTION

The present invention is directed to a fluid distributor comprising a single shutter having two substantially parallel flap valves, the arrangement being such that the desired portor duct closing positions can be obtained by means of a single control and simple, economical component elements.

The shutter-type fluid distributor according to this invention is characterised essentially in that the shutter and housing are provided with means adapted, in one of the duct closing positions, to close at the same time the relevant duct and the third duct of the housing.

According to another feature characterising this invention the two flap-valves of the shutter are operatively interconnected at their ends by means of pivot pins of which one is free and rigid with one of the flaps to constitute a hinge member for the other flap, the other pivot pin being fixed and acting as a common pivot pin to both flap-valves, a bearing member rigid with one of these flap-valves being adapted to be associated with cam means provided within the housing to permit the closing of the third duct by varying the angular position of one flap in relation to the other, the flaps remaining however parallel to each other in all the other positions of the shutter assembly.

BRIEF DESCRIPTION OF THE DRAWING

A clearer understanding of this invention will be had as the following description proceeds with reference to the accompanying drawings illustrating diagrammatically by way of example a typical embodiment thereof. In the drawings:

FIG. 1 shows a three-way shutter-type fluid distributor, in the position closing the ingress to one duct;

FIG. 2 is a view similar to FIG. 1 but showing the shutter in the position freeing the ingress to the three ways;

FIG. 3 shows the same arrangement with the shutter positioned to close the second way;

FIG. 4 is a corresponding view showing the distributor with the shutter positioned to close the second and third ways, simultaneously; and

FIG. 5 shows a modification of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring first to FIG. 1, it will be seen that a fluid

distributor, for example for the air ventilation or conditioning system of a motor vehicle, which comprises a three-way housing 1, has a first way or duct 2 for directing the fluid upwards, for example for de-misting, defrosting and/or de-icing the windscreen, a second way or duct 3 for directing the fluid downwards, for example for supplying hot or cold air (or any temperature therebetween) into the body of the vehicle, and a third way or duct 4 constituting the fluid supply duct.

A shutter, of the composite type, designated in general by the reference numeral 5, is shown in its upper position in FIG. 1, in which it closes the ingress of duct 2. This shutter comprises a pair of substantially parallel flap-valves or like members 6, 7, i.e. a first, so-called "reaction" flap 6, which has one end rotatably solid with a free pivot pin 8 constituting a hinge member fitted in a hinge socket 9 rigid with the adjacent end of the other flap 7, said socket 9 being adapted to pivot about the pin 8. Pivoted to another pivot pin 10 constituting the main or general and fixed pivot pin of the shutter 5 is another socket 11 rigid with the opposite end of the second flap 7. A lug 12 is rigidly secured to, or formed integrally with, the second flap 7 and has its outer end connected to the driving end of a linkage member 13, for instance a rod, for controlling the shutter 5.

A tension or draw-spring 14 extending within the gap left between the two flap-valves 6 and 7 has its ends attached to anchoring lugs 15 and 16, respectively. The first lug 15 is secured to or formed integrally with, the flap 7 at a short distance from pivot pin 8, and the second lug 16 is secured to, or formed integrally with, the flap 6 adjacent the fixed pivot pin 10, whereby the spring 14 constantly urges the flap 6 to a position in which it is substantially parallel to the flap 7, the free end of flap 6 then bearing against the socket 11 of pivot pin 10.

A bracket 17 receiving the shaft 18 of a bearing roller or follower 19 is rigid with the first flap 6 and extends downwards, as seen in FIG. 1, from a point located at a short distance from the hinge pin 8. An aperture 20 is formed in flap 7 to permit the free passage of roller 19 therethrough.

A sealing strip 21 engageable by the corresponding curved end of flap 6 rigid with hinge pin 8 is provided in the housing 1 at the inlet end of duct 2, as shown.

A reaction cam member 22 formed with an internal cam face 23 incurvated upwards towards the outlet port or aperture of supply duct 4 is provided in the housing 1 at the inlet end of the duct 3 for directing the fluid downwards.

The above-described distributor operates as follows:

Assuming that, in the position shown in FIG. 1, the shutter 5 having its flap-valves 6, 7 retained in their substantially parallel position by the tension spring 14 is pushed by means of the linkage member 13 in the direction of the arrow f_1 against the sealing strip 21; thus, fluid will flow from the supply duct 4 along the path shown by the arrow B towards the downward distributing duct 3.

Pulling the linkage member 13 in the direction of the arrow f_2 will cause the shutter assembly 5 to pivot about the fixed pivot pin 10 to the intermediate position shown in FIG. 2. Thus, the fluid forced through the supply duct will be divided into an upward stream and a downward stream, as shown by the arrows H and B, such streams flowing into ducts 2 and 3, respectively.

The relative proportions of these streams depend of course on the specific position in which the median plane of shutter 5 is set in relation to the axis of supply duct 4.

Continuing the pull-down movement of linkage member 13 (arrow f_2) will bring the shutter 5 pivoting about its pivot pin 10 to the position shown in FIG. 3, thus causing the roller follower 19 carried by the upper flap 6 to engage the cam face 23 of cam member 22. In this position, the shutter assembly 5 will close the ingress of duct 3 supplying fluid in the downward direction, this fluid being thus directed along the path shown by the arrow H from the supply duct 4 to the upper distributing duct 2.

From this position, continuing again the pull-down movement of control linkage 13 in the direction of the arrow f_2 will further pivot the flap 7 with its socket 11 about the fixed pivot pin 10 until this flap 7 engages the edge of cam member 22, as shown in FIG. 4. Due to the reaction produced on roller follower 19 rising along the cam face 23, the flap 6 will be lifted against the force of tension spring 14; thus, this flap 6 will rotate bodily with its pivot pin 8, away from flap 7, until (as shown by the arrow f_3) it engages the sealing strip 21 and closes the outlet aperture of supply duct 4. During this movement of flap 6 the roller supporting bracket 17 and the roller proper 19 can move freely through the aperture 20 formed to this end in the other flap 7.

Thus, the fluid forced into the supply duct 4 will impinge the flap 6 of shutter 5, and the fluid distribution is discontinued.

Of course, it would not constitute a departure from the basic principles of this invention to bring various modifications and variations to the specific embodiment shown and described herein. Thus, for instance as shown in FIG. 5, a friction shoe 19' could be substituted for the roller follower 19. Besides, the control linkage member 13 and its lug 12 could be disposed outside the housing 1, and the flap 6 of shutter 5 urged towards the other flap 7 by a spiral or torsion spring disposed across the pivot pin 8 carried by flap 6. Furthermore, a flexible cable, for example of the Bowden type, could be substituted for the linkage member 13, provided that suitable means are provided for constantly urging the shutter 5 upwards (as shown in FIG. 1), these means consisting for example of a torsion or spiral spring carried by the pivot pin 10.

What is claimed as new is:

1. A fluid distributor comprising:

a housing having therein three ducts angularly spaced from each other;

a shutter comprising two substantially parallel flap-valves pivotally mounted about a common axis in said housing;

said two flap-valves being selectively movable from a first position blocking a first of said ducts to a second position blocking a second of said ducts; and

means operatively connected with said shutter for causing said two flap-valves, when in one of said first and second positions, to block the respective one of said first and second ducts and to simultaneously block said third duct.

2. Fluid distributor according to claim 1, wherein said two flap-valves of said shutter are operatively interconnected at their ends by means of a pair of pivot pins, a first pivot pin being free and rigid with a first flap-valve to act as a hinge member to a second flap-valve, the second pivot pin being fixed and acting as a common hinge pin to both flap-valves; and said means comprises a bearing member rigid with said first flap-valve being adapted to engage a cam face formed on a cam member rigid with said housing for closing the third duct and varying the angular position of one flap-valve in relation to the other; resilient means constantly maintaining said flap-valves substantially parallel to each other in all the other positions.

3. Fluid distributor according to claim 2, wherein one end of the second flap-valve of said shutter is rigid with a socket pivoted to said first pivot pin, the opposite end of said second flap-valve being rigid with another socket pivoted to said second fixed pivot pin.

4. Fluid distributor according to claim 2, wherein said resilient means constantly maintaining said flap-valves substantially parallel to each other comprises a tension spring pre-stressed between the registering faces of said flap-valves in the vicinity of their pivoted ends.

5. Fluid distributor according to claim 2, wherein said resilient means constantly maintaining said flap-valves substantially parallel to each other comprises a torsion spring associated with the free pivot pin in such a way as to urge the first flap-valve rigid with said free pivot pin to a position in which said first flap-valve is substantially parallel to said second flap-valve.

6. Fluid distributor according to claim 2, wherein said cam member rigid with said housing comprises a projecting lip disposed at the inlet end of the duct which is to be closed simultaneously with the third duct of the housing, said projecting lip being curved towards the outlet of said third duct.

7. Fluid distributor according to claim 2, wherein said bearing member comprises a roller follower adapted to engage said cam face formed on said cam member.

8. Fluid distributor according to claim 2, wherein said bearing member comprises a friction shoe movable along said cam face.

9. Fluid distributor according to claim 2, wherein an aperture is formed in said second flap-valve of said shutter to permit the free movements of said bearing member during the closing of said third duct by the first flap of said shutter.

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