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(54) Kitchen range ventilation arrangement

(57) The invention relates to a kitchen range ventilation arrangement comprising a valve (4) which is designed to regulate an air flow from a kitchen range hood (2) to an outlet duct (3) and which comprises a valve flap (5) which is p ivoted about a first axis of rotation (6), the kitchen range ventilation arrangement moreover comprising an operating device (7) for operation of the valve flap (5). A transmission device (6, 12, 13, 14, 15, 16) connected to the valve flap (5) and the oper ating device (7) is designed such that a swivel movement of the operating device (7) is matched by a swivel movement of the valve flap (5), the swivel movement of the valve flap (5) being of a different magnitude to the swivel movement of the operating device (7).

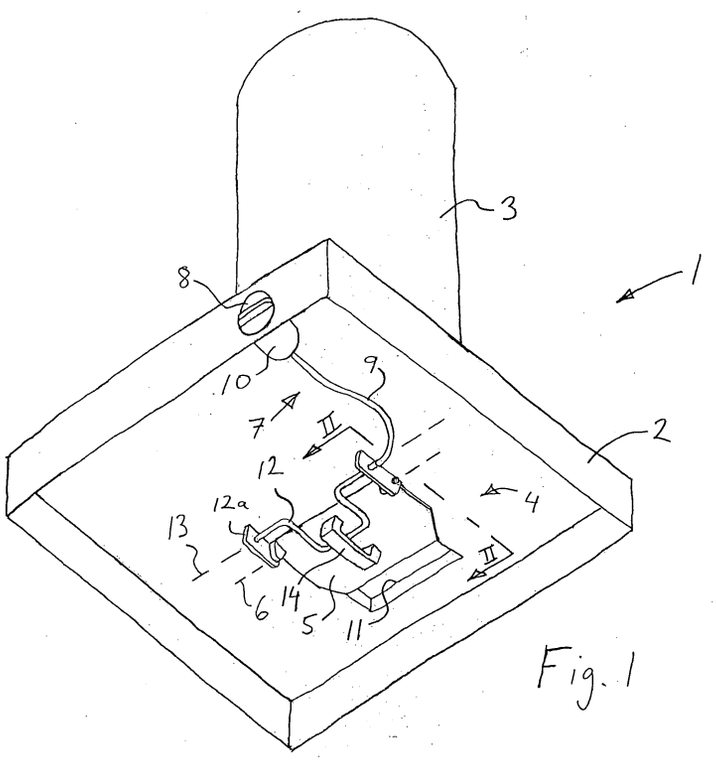

Fig. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a kitchen range ventilation arrangement according to the pre-characterizing part of Claim 1.

BACKGROUND OF THE INVENTION

[0002] A kitchen range ventilation arrangement typically comprises a valve for regulating an air flow from a kitchen range hood to an outlet duct. Some form of operating device, often comprising a knob for control by a user, is usually provided for regulating a valve flap of the valve. One problem in the design of kitchen range ventilation arrangements of said type is that both the valve and the operating device must be designed in the context of the required facilities for control by the user on the one hand, and the position of the valve flap for the desirable air flow characteristics on the other. This may mean that the designer of the kitchen range ventilation arrangement has to compromise and produce an arrangement with less than ideal characteristics in terms of ergonomics and/or the air flow pattern. Unless the designer is able to guard against this, the air flow may generate high noise levels in the form of whistling or whining sounds.

SUMMARY OF THE INVENTION

[0003] An object of the invention is to provide a kitchen range ventilation arrangement allowin g a large degree of freedom in the choice and design of constituent parts of the arrangement.

[0004] This object is achieved by a kitchen range ventilation arrangement of the aforementioned type having the characteristic features of Claim 1.

[0005] The invention means that the magnitude of the opening movement of the valve flap can be adjusted, independently of the operating device, to suit prevailing design parameters of the valve flap, such as the available room for movement in the kitchen range hood or air flow regulating requirements. Furthermore, the operating device can be designed for optimum ease of manipulation by the user without having to take account of the air control characteristics at the valve flap.

[0006] In addition, the invention affords greater scope, whe n making design modifications to the kitchen range ventilation arrangement, for adapting new parts to existing parts. For example, another operating device with a different pattern of movement can be provided, it being possible to adapt the transmission d evice to this without having to make design changes to the valve flap.

[0007] The operating device may be designed in a number of different ways, a greater o r lesser proportion of these being designed to perform a swivelling movement. For example, it may comprise one or more mechanisms that convert translational movements to swivel movements and/or vice versa. A swivel movement of the operating device in each case relates to a movement thereof in immediate proximity to its connection to the transmission device.

[0008] The transmission device is preferably designed such that a swivel movement of the valve flap, at least in one area close to the closed position of the valve flap, is greater than the swivel movement of the operating device. This makes it possible to pro duce a movement of the valve flap which is large enough to ensure that the valve flap does not restrict the air flow or through its position cause noise owing to the air flow. Unwanted high noise levels are thereby avoided.

[0009] The transmission device prefer ably comprises a connecting device which is connected to the operating device and which is pivoted about a second axis of rotation situated at a distance from the first axis of rotation, in addition to which the connecting device at a distance from the sec ond axis of rotation and at distance from the first axis of rotation is designed to engage with a part fixed to the valve flap. This is an embodiment with few constituent design parts in which tolerance requirements can be kept low without detriment to the working of the kitchen range hood ventilation arrangement, which in turn makes the latter easier to manufacture. This embodiment is moreover hard -wearing in long-term use.

[0010] The part fixed to the valve flap preferably has a cam for contact with the conne cting device during an opening movement in the swivel movement of the valve flap. A suitable cam shape can thereby produce a desired movement of the valve flap in relation to the connecting device, which provides further flexibility in the design of the kitchen range ventilation arrangement.

[0011] The cam preferably has a first cam section and a second cam section which in relation to the first cam section is situated further away from the valve flap and closer to the first axis of rotation. This means that wh en it is being opened the swivel movement of the valve flap can be greater than the swivel movement of the connecting device, even at large opening angles of the connecting device.

[0012] The part fixed to the valve flap preferably has a cavity through which the connecting device extends, making it possible to control the valve flap when closing the latter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention is described in more detail below with reference to the drawings attached, in which:

Fig. 1 shows a schematic perspective view obliquely from below of a kitchen range ventilation arrangement according to one embodiment of the invention,
Fig. 2 shows a sectional view in which the section is made along the line II-II in Fig. 1, with a valve,

forming part of the kitchen range ventilation arrangement, in a first position,

Fig. 2a shows a rotary control for the kitchen range ventilation arrangement in a position in which the valve in Fig. 2 is in the position shown therein,

Fig. 3 shows a sectional view, correspondin g to the sectional view in Fig. 2, of the valve in a second position,

Fig. 3a shows the rotary control in Fig. 2a in a position in which the valve in Fig. 3 is situated in the position shown therein,

Fig. 4 shows a sectional view, corresponding to the sect ional view in Fig. 2, of the valve in a third position,

Fig. 4a shows the rotary control in Fig. 2a in a position in which the valve in Fig. 4 is situated in the position shown therein,

Fig. 5 shows a perspective view obliquely from below of a part of a kitchen range ventilation arrangement according to an alternative embodiment of the invention,

Fig. 6 shows a sectional view, viewed in the direction indicated by the arrow VI in Fig. 5, with a valve, forming part of the kitchen range ventilation arrangement, in a first position,

Fig. 7 shows a sectional view, corresponding to the sectional view in Fig. 6, of the valve in a second position,

Fig. 8 shows a sectional view, corresponding to the sectional view in Fig. 6 and 7, of the valve in a third position, and

Fig. 9 shows a sectional view with a valve in a kitchen range ventilation arrangement according to an alternative embodiment of the invention, in which the section is made in corresponding way to that in Fig. 2.

DETAILED DESCRIPTION

[0014] Fig. 1 shows a sche matic perspective view obliquely from below of a kitchen range ventilation arrangement according to one embodiment of the invention. Fig. 1 will be described solely by way of explanation, and the person skilled in the art will appreciate that the design o f the constituent parts and their relative location and dimensions may be varied in a practical working arrangement.

[0015] The kitchen range ventilation arrangement 1 comprises a kitchen range hood 2 and an outlet duct 3, which is connected to the kitchen range hood so that an air flow can be led from the kitchen range hood 2 to the outlet duct 3. The kitchen range ventilation arrangement 1 also comprises a valve 4, situated at the junction of the kitchen range hood 2 with the outlet duct 3. The valve 4 is desi gned to regulate the air flow from the kitchen range hood 2 to the outlet duct 3 and comprises a valve flap 5. The valve flap is pivoted about an axis of rotation, indicated by a broken line in Fig. 1, of a transmission device described in more detail bel ow.

[0016] The kitchen range ventilation arrangement 1 also comprises an operating device 7 for operation of the valve flap 5. The operating device 7 comprises a rotary control 8 on the outside of the kitchen range hood 2, and a cable 9 for transmitting rotatio nal movements from the rotary control 8 to the valve 4. The operating device 7 also comprises a timer device 10 for automatic closure of the valve flap 5 after a length of time that varies according to the user's setting of the rotary control 8, see below .

[0017] Fig. 1 shows the valve flap 5 in its closed position, in which it partially covers an opening 11 between the kitchen range hood 2 and the outlet duct 3. That part of the opening 11 which is not covered when the valve flap 5 is in the closed position according to the prior art allows a so-called basic flow of the kitchen range ventilation arrangement 1. In order to produce a so -called forced air flow, the valve flap 5 is opened by means of the operating device 7, so that the valve flap is swivelled abou t the first axis of rotation 6 and the opening 11 is fully exposed.

[0018] According to the invention, the movement of the flap 5 is achieved in that the operating device 7 is connected to the transmission device, which comprises a connecting device 12, which is pivoted about a second axis of rotation 13 of the transmission device situated at a distance from the first axis of rotation 6. As can be seen from Fig. 1, the second axis of rotation is situated further away from the opening 11 than the first axis of rotation. The connecting device 12 extends at least partially across the second axis of rotation 13 towards the valve flap 5 and is thereby in engagement with a part 14 fixed to the valve flap 5. The area of engagement or contact between the connecting devi ce 12 and the part 14 fixed to the valve flap 5 is situated at a distance from the second axis of rotation 13 and at a distance from the first axis of rotation 6.

[0019] In this example, the connecting device 12 comprises a curved steel rod or tube, which at its ends coincides with the second axis of rotation and between the ends extends like a bow to the part fixed to the valve flap 5. Like the valve flap, the connecting device 12 is mounted in lugs 12a. The connecting device may naturally be designed in a num ber of alternative ways, for example with one or more bars or the like extending transversely to the second axis of rotation, or with an articulated connection between the second axis of rotation and a part fixed to the valve flap.

[0020] The lugs 12a are displa ceable in a transverse direction to the first and second axes of rotation 6, 13, and essentially parallel to the valve flap 5 in its closed position. The lugs 12a can thereby be locked in a number of positions, so that the position of the valve flap 5, when closed, can be adjusted. This makes it possible to adjust the size of that portion of the opening 11 which is not covered when the valve flap 5 is in the closed position, so that the basic flow of the kitchen range venti-

lation arrangement 1 can be adju sted.

[0021] Fig. 2 shows a sectional view in which the section is made along the line II-II in Fig. 1, with the valve 4 in a first position, which is the same position as shown in Fig. 1, that is to say a position in which the valve flap 5 is closed. The part 14 fixed to the valve flap 5 takes the form of a shackle 14, under which the connecting device 12 extends. The part 14 fixed to the valve flap 5 forms a cavity 14a, which extends essentially transversely to the first axis of rotation 6 and in which a part of the connecting device 12 moves during swivel movements of the valve flap 5.

[0022] Further on in this description, an alternative embodiment of the part 14 fixed to the valve flap 5 will be described. In general, said part may naturally be designed in a num ber of different ways, for example as a lug fixed to the valve flap and having a slot or the like for engagement of the connecting device 12. The part 14 fixed to the valve flap 5 may also be integrally formed with or in the same thickness of material as the valve flap 5, for example by punching and/or drawing of a plate to form the valve flap 5, or as an integral injection-moulded part with the valve flap and the part fixed thereto. The part fixed to the valve flap 5 may also consist of a part of the val ve flap 5 in the form, for example, of at least one slotted part of the valve flap 5, the connecting device 12 engaging in the slot(s). Alternatively, multiple parts fixed to the valve flap may be provided for engagement with the connecting device. Regar dless of which of the said alternatives is chosen, within the area for engagement with the pa rt 14 fixed to the valve flap 5 , the connecting device 12 is capable of moving in relation to the valve flap 5 when the kitchen range ventilation arrangement 1 is operated.

[0023] Fig. 2a shows the rotary control 8 in a position in which the valve 4 is in the closed position.

[0024] Fig. 3 shows a sectional view, corresponding to the sectional view in Fig. 2, of the valve in a second position, and Fig. 3 a shows the rotary control 8 in a position in which the valve is situated in the position shown in Fig. 3. The rotary control is turned approximately 90° in relation to the position in Fig. 2a, which has caused the connecting device 12 to swivel approximately 90° about the secon d axis of rotation, whilst the valve flap 5 has swivelled approximately 113° about the first axis of rotation 6. In the position in Fig. 3, the opening 11 to the outlet duct 3 (Fig. 1) is fully exposed.

[0025] Fig. 4 shows a sectional view, corresponding to the sectional view in Fig. 2, of the valve 4 in a third position, in which the connecting device 12 and the valve 5 are swivelled by approximately 180° about the second axis of rotation 13 and the first axis of rotation 6 respectively compared to the position s shown in Fig. 2. Fig. 4a shows the rotary control 8 in Fig. 2a in a position in which the valve 4 is situated in the position shown in Fig. 4. The rotary control 8 is turned by approximately 180° in relation to the position in Fig. 2a.

[0026] As stated, the operating device 7 comprises a timer device 10 (Fig. 1) for automatic closure of the valve flap 5 after a length of time that varies according to the user's setting of the rotary control 8. In this embodiment, the timer device 10, which is coupled to the rotary control 8, is activated approximately at the position shown in Fig. 3a, and turning the rotary control 8 towards the position shown in Fig. 4a extends the time to closure of the flap 5. From the positions shown in Fig. 4 and 4a, or any positions be tween those shown in Fig. 4 and 4a and those shown in Fig. 3 and 3a, the timer device 10 is designed to swivel the connecting device 12 and the rotary control 8 slowly towards the positions shown in Fig. 3 or 3a, in which a spring device in the timer devic e 10 causes the connecting device 12 to swivel rapidly towards the position shown in Fig. 2, so that the valve flap 5 is closed.

[0027] The description above referring to Fig. 2 -4a must be regarded solely as an explanation of one embodiment of the invention. Th e kitchen range ventilation arrangement 1 is preferably designed such that the spring device is biased towards the closed position of the valve flap 5, in order to ensure that said flap bears against bearing surfaces provided in the opening 11. From the c losed position of the valve, a certain rotation of the rotary control 8 will thereby cause a swivelling of the connecting device 12 which is less than the rotation of the rotary control. For example, turning the rotary control 8 through 90° will result in a less than 90° swivelling of the connecting device. The invention nevertheless ensures that the valve flap 5 at the same time swivels more than the connecting device 12.

[0028] In the embodiment described above, a movement of the rotary control 8 in order to activate the time device 10 may be of an ergonomically suitable magnitude , for example 90°, whilst the movement of the valve flap is greater in order to prevent the large air flow from the kitchen range hood and/or [lacunae] causing whistling, buzzing or o ther unwanted noises owing to its position in relation to the flowing air.

[0029] It should also be noted that in the embodiment described above, during movement of the rotary control 8 from activation of the timer device 10 (Fig. 3, 3a) to the position for the maximum time setting of the timer device (Fig. 4, 4a), the valve flap 5 moves a shorter angular distance than does the rotary control 8. The rotary interval on the rotary control for the time setting is large enough (approximately 90°) to allow the user, without difficulty, to set approximately the desired time. T he restrictions which movement of the valve flap imposes on the freedom of movement of the rotary control are thereby eliminated, allowing a designer to provide an arrangement in which a user c an readily set a desired time for closure of the flap.

[0030] As stated, the invention affords great scope, when making design modifications to kitchen range ventilation arrangements, for adapting new parts to existing parts. In the example above, on activation of the timer device 10, the opening angle of the valve flap 5 can be

easily adjusted, for example by adjusting the extent of the connecting device 12 transversely to its axis of rotation 13, without needing to adjust other parts such as the rotary control or the valve flap 5.

[0031] In the example above, the connecting device 12 has a relatively long lever arm actuating the valve flap 5, in order to counteract inertial forces and forces resulting from the air flow. This reduces the torque and forces when regula ting the kitchen range ventilation arrangement, which in turn reduces wear. Thus the strength requirements for the constituent parts can be kept relatively low whilst still ensuring a long service life for the kitchen range ventilation arrangement.

[0032] Fig. 5 shows a perspective view obliquely from below of a part of a kitchen range ventilation arrangement according to an alternat ive embodiment of the invention. Like the kitchen range ventilation arrangement described above, this comprises a kitchen range hood 2, an outlet duct (cf. Fig. 1) and a valve 4, situated at the junction of the kitchen range hood with the outlet duct. The valve 4 comprises a valve flap 5, pivoted about a first axis of rotation 6 of a transmission device indicated by a broken line in Fig. 5. As in the embodiment described above, the kitchen range ventilation arrangement also comprises an operating device for operation of the valve flap 5, with a rotary control (cf. Fig. 1), and a cable 9 for transmitting rotation al movements from the rotary control to the valve 4. The operating device also comprises a timer device of the same type as in the embodiment described above. Fig. 5 shows the valve flap 5 in its closed position, in which, as in the embodiment described above, it partially c overs an opening 11 between the kitchen range hood and the outlet duct.

[0033] As described above, the movement of the flap 5 is produced in that the operating device is connected to the transmission device, which comprises a connecting device 12, which is pivoted about a second axis of rotation 13 of the transmission device situated at a distance from the first axis of rotation 6. The connecting device 12 extends at least partially across the second axis of rotation 13 towards the valve flap 5 and is thereby in engagement with a part 14 connected to the valve flap 5.

[0034] As described above, the connecting device 12 comprises a curved steel rod or tube, which at its ends coincides with the second axis of rotation and between the ends extends like a bow to the valve flap 5 or the part fixed thereto. Like the valve flap, the connecting device 12 is mounted in lugs 12a, which are adjustable in the same way as described above.

[0035] Fig. 6 shows a sectional view, viewed in the direction indicated by the arrow VI in Fig. 5, with the valve 4 in a first position in which the valve flap 5 is closed. The part 14 fixed to the valve flap 5 is, together with the valve flap 5, designed such that a cavity 14a is formed through which the connecting device 12 extends, and in which a p art of the connecting device 12 moves during swivel movements of the valve flap 5. The cavity is partially defined by a cam 17 on the part 14 fixed to the valve 5. The cam 17 has a first cam section 17a close to the valve flap 5, a second cam section 17b , which in relation to the first cam section 17a is situated further from the valve flap 5 and closer to the first axis of rotation 6. An intermediate cam section 17c is situated between the first and the second cam section 17a, 17b. The cam 17 is design ed to be in contact with the connecting device 12, at least during the opening movement of the valve flap, and as the connecting device 12 rotates helps to ensure that the valve flap 5 moves in a desired way, see below. As can be seen from Fig. 6, in the closed position of the valve flap 5 , the connecting device 12 extends through the cavity 14a at a second cam section 17b.

[0036] Fig. 7 shows a sectional view, corresponding to the sectional view in Fig. 6, of the valve in a second position. As a result of the operation of the rotary control, the connecting device 12 has swivelled approximately 78° about the second axis of rotation, whilst the valve flap 5 has swivelled approximately 90° about the first axis of rotation 6. As can be seen from Fig. 7, the connec ting device 12, in the position shown in the figure, bears against the intermediate cam section 17c. The intermediate cam section 17c has a length inclined in relation to the valve flap 5. This inclination, the position of the first and second axes of rotation 6, 13 relative to one another, the distance between the second axis of rotation 13 and the area for contact of the connecting device 12 with the cam 14 e, and the angular position or positions of the connecting device 12 in contact with the intermediate cam section 17c are adjusted so that a further transmission ratio occurs, which means that a certain angular movement of the connecting device 12 gives a greater angular movement of the valve flap 5.

[0037] Fig. 8 shows a sectional view, corresponding to t he sectional view in Fig. 6 and 7, o f the valve in a third position. As a result of the operation of the rotary control , the connecting device 12 has swivelled approximately 150° about the second axis of rotation, whilst the valve flap 5 has swivelled app roximately 162° about the first axis of rotation 6. As can be seen from Fig. 8, the connecting device 12, in the position shown in Fig. 8, bears against the first cam section 17a. During the opening movement of the valve flap 5 the connecting device 12 h as therefore shifted from the second cam section 17b, past the intermediate cam section 17c to the first cam section 17a. The fact that the first cam section 17a, against which the connecting device 12 lies at large opening angles of the valve flap 5, is situated closer to the valve flap 5 than the cam sections against which the connecting device 12 lies at smaller opening angles of the valve flap 5, means that the swivelling movement of the valve flap 5 is substantially greater than the swivelling movement of the connecting device 12, even after the connecting device 12 has swivelled more than 90°.

[0038] Fig. 9 shows a part of a kitchen range ventilation arrangement according to a further alternative em-

bodiment of the invention. The kitchen range ventilation a rrangement comprises a valve flap 5 which is pivoted about a first axis of rotation 6. A transmission device comprises a first gear 15 pivotally mounted on the first axis of rotation 6 and fixed to the valve flap 5. An operating device is connected to a second gear 16 of the transmission device capable of rotating about a second axis of rotation 13. The gears are designed such that a suitable transmission ratio is obtained between the operating device and the valve flap so that, as in the example above, both the ergonomic requirements and the air flow requirements can be fully met.

Claims

1. Kitchen range ventilation arrangement comprising a valve (4) which is designed to regulate an air flow from a kitchen range hood (2) to an outlet duct (3) and which comprises a valve flap (5) which is pivoted about a first axis of rotation (6), the kitchen range ventilation arrangement moreover comprising an operating device (7) for operation of the valve flap (5), **characterized in that** a transmission device (6, 12, 13, 14, 15, 16) connected to the valve flap (5) and the operating device (7) is designed such that a swivel movement of the operating device (7) is matched by a swivel movement of the valve flap (5), the swivel movement of the valve flap (5) being of a different magnitude to the swivel movem ent of the operating device (7).

2. Kitchen range ventilation arrangement according to Claim 1, **characterized in that** the transmission device (6, 12, 13, 14, 15, 16) is arranged such that the swivel movement of the valve flap (5), in one area close to the closed position of the valve flap (5), is greater than the swivel movement of the operating device (7).

3. Kitchen range ventilation arrangement according to any one of the preceding claims, **characterized in that** the transmission device (6, 12, 13, 14) comprises a connecting device (12) which is connected to the operating device (7) and is pivoted about a second axis of rotation (13) situated at a distance from the first axis of rotation (6), the connecting device (12) at a dist ance from the second axis of rotation (13) and a distance from the first axis of rotation (6) moreover being designed to be in engagement or contact with a part (14) fixed to the valve flap (5).

4. Kitchen range ventilation arrangement according to Claim 3, **characterized in that** the part (14) fixed to the valve flap (5) has a cam (17) for contact with the connecting device (12) during an opening movement in the swivel movement of the valve flap (5).

5. Kitchen range ventilation arrangement according to Claim 4, **characterized in that** the cam (17) has a first cam section (17a) and a second cam section (17b), which in relation to the first cam section (17a) is situated further away from the valve flap (5) and closer to the first axis of rotation (6).

6. Kitchen range ventilation arrangement according to Claim 4 or 5, **characterized in that** the cam (17) has, at least in part, a length (17c) which is inclined in relation to the valve flap (5).

7. Kitchen range ventilation arrangement according to Claim 6, **characterized in that** the inclination of the cam (17), the position of the first and second axes of rotation (6, 13) relative to one another, the distance between the second axis of rotation (13) and the area for contact of the connecting device (12) with the cam (17) and the angular position(s) of the connecting device (12) in contact with the inclined length (17c) of the cam are adjusted so that a certain angular movement of the connecting device (12) gives a greater angular movement of the valve flap (5).

8. Kitchen range ventilation arrangement according to any one of Claims 3 to 7, **characterized in that** the part (14) fixed to the valve flap (5) is designed such that a cavity (14a) is formed, through which the connecting device (12) extends.

9. Kitchen range ventilation arrangement according to any one of the preceding claims, **characterized in that** the operating device (7) comprises a rotary control.

10. Kitchen range ventilation arrangement according to Claim 9, **characterized in that** the operating device (7) comprises a timer device (10) for automatic closure of the valve flap (5), it being possible to activate and set said timer device by means of the rotary control (8).

11. Kitchen range ventilation arrangement according to Claim 10, **characterized in that**, during movement of the rotary control (8) from activation of the timer device (10) to a position for a maximum time setting of the timer device, the transmission device (12, 14) is designed such that the valve flap (5) moves through a shorter angular distance than does the rota ry control (8).

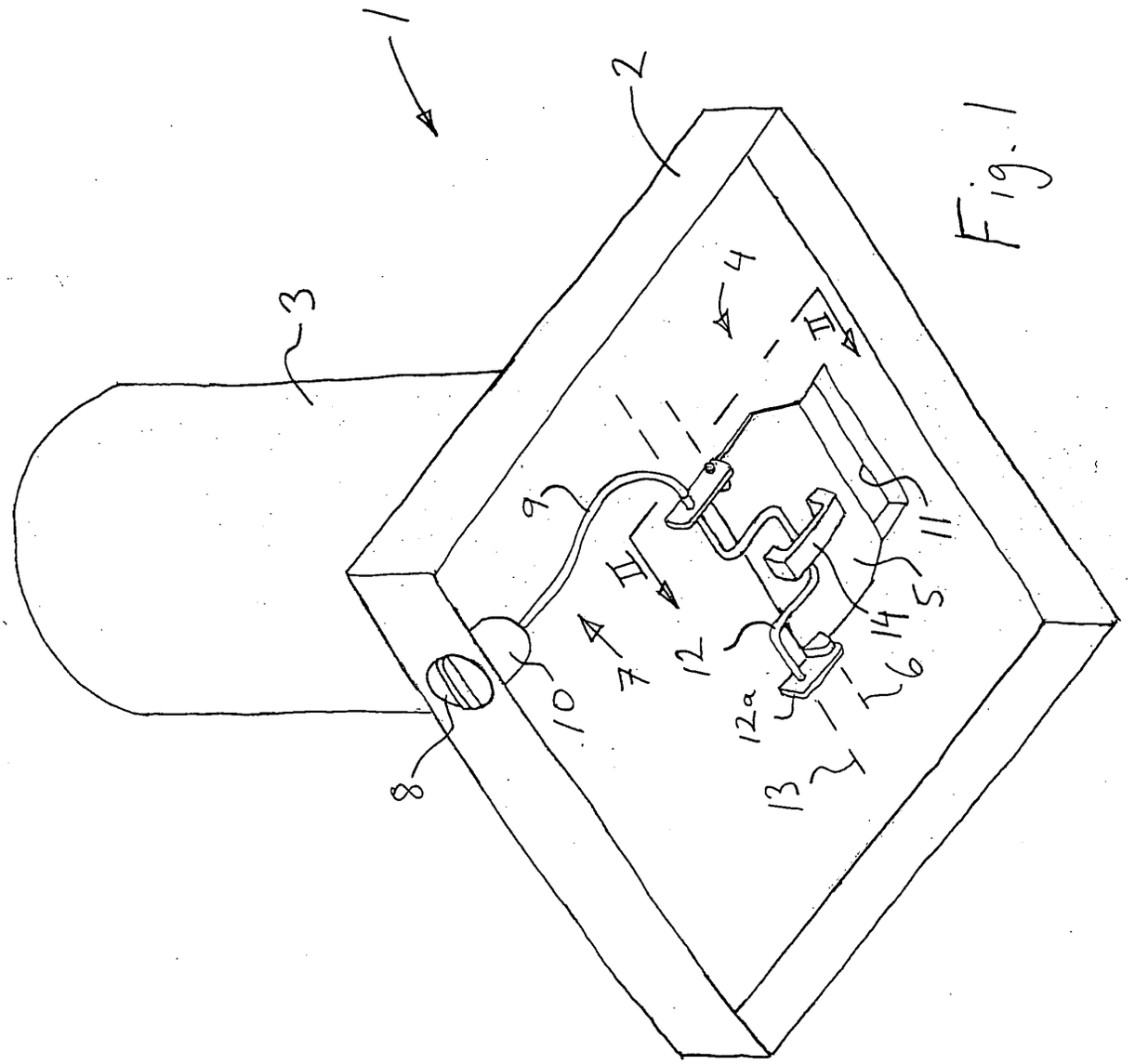

Fig. 1

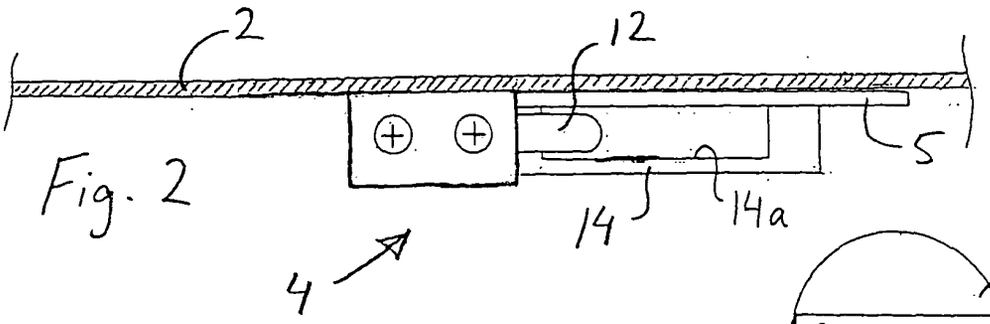

Fig. 2

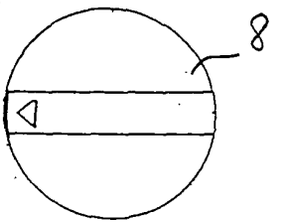

Fig. 2a

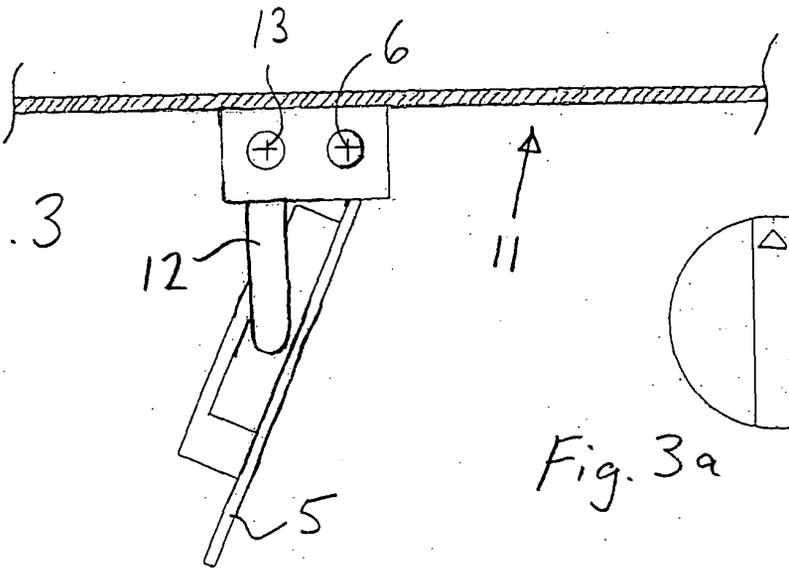

Fig. 3

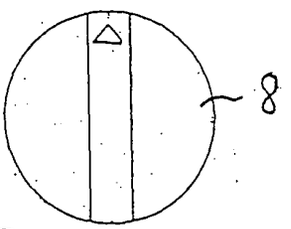

Fig. 3a

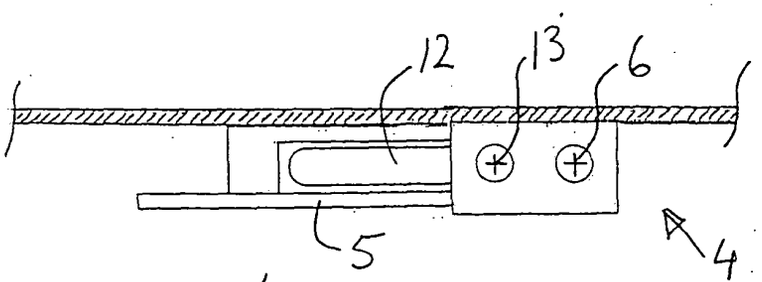

Fig. 4

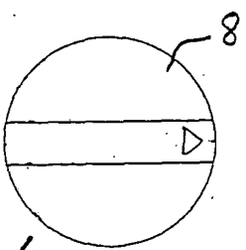

Fig. 4a

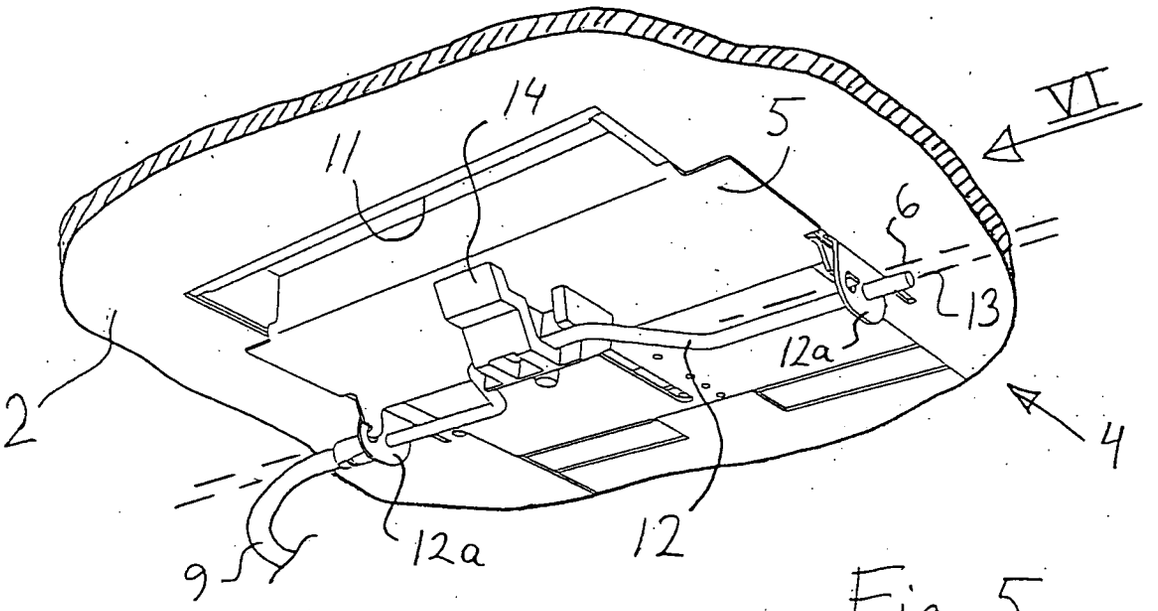

Fig. 5

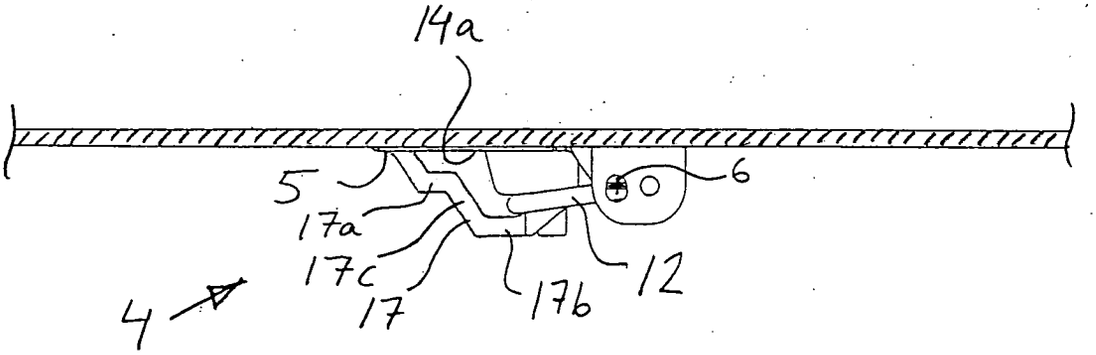

Fig. 6

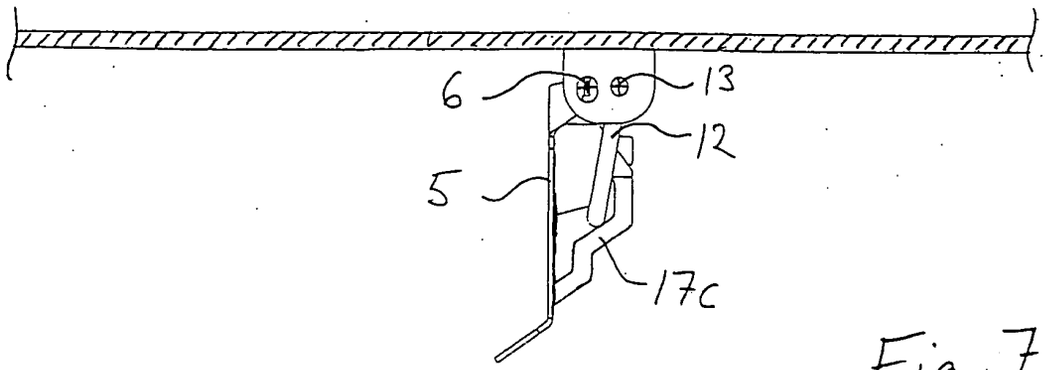

Fig. 7

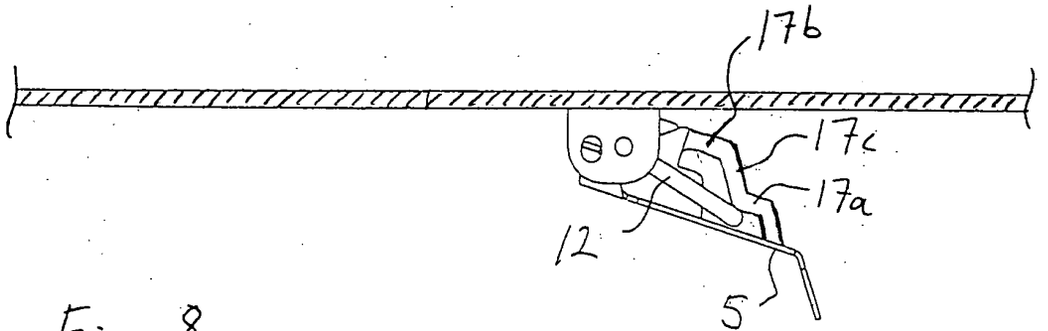

Fig. 8

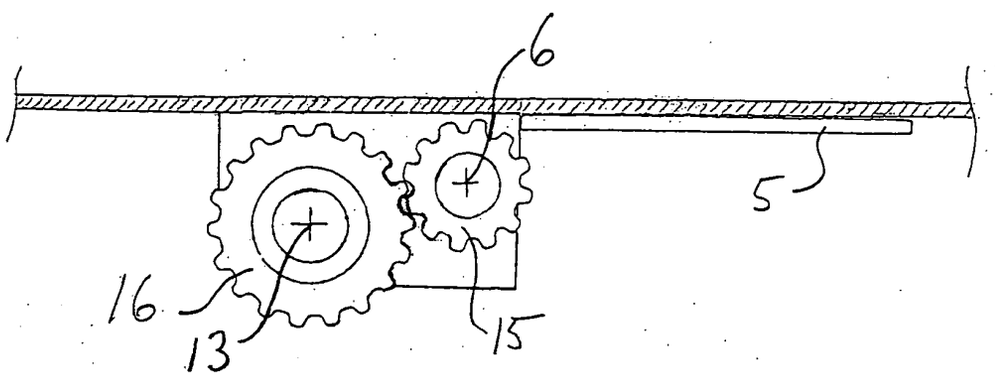

Fig. 9