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## (54) A slot ventilator

(57) A slot ventilator comprising a frame (10) defining a slot with a longitudinal axis, at least one cover member (12), and a linkage (14) connecting the cover member (12) to the frame (10) for movement between a first position in which the cover (12) closes the slot and a second position in which the slot is open. The linkage (14) is configured to allow the cover member (12) to translate in a direction perpendicular to the longitudinal axis away from the frame (10), and to rotate about an axis parallel to the longitudinal axis, but to prohibit movement of the cover member (12) in a direction parallel to the longitudinal axis. In the second position the cover member (12) is positioned adjacent to and spaced from the frame (10) and clear of the slot. Thus provided is a slot ventilator which allows an unobstructed airflow to run through it.

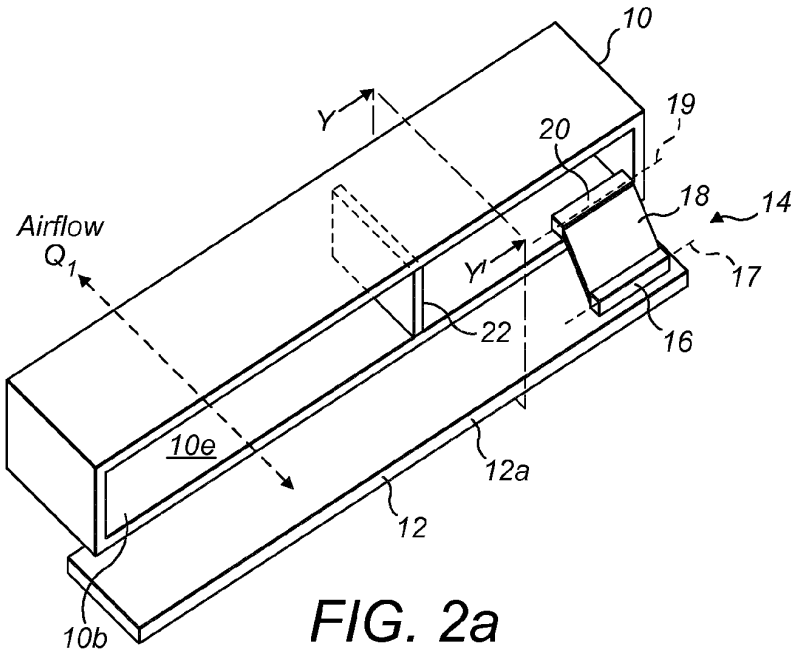


FIG. 2a

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## Description

**[0001]** The present invention relates to the use of slot ventilators for window frames to allow some airflow without opening the window.

**[0002]** As part of building regulations, it is often necessary to install ventilators in buildings to allow airflow at certain times. At other times however, there is no need for such airflow. Movable covers are therefore provided in the ventilator which allows the ventilator to be either open or closed. Examples of slot ventilators may be found in EP 1957882 and GB 2039028. Problems faced by existing ventilators are that when in an open position, the cover is not sufficiently spaced from the airflow passing through the vent, thus causing turbulence in the airflow and also reducing the airflow through the vent. This means the ventilator has to be made larger for a given airflow.

**[0003]** According to the present invention, there is provided a slot ventilator comprising a frame defining a slot with a longitudinal axis, at least one cover member, and a linkage connecting the cover member to the frame for movement between a first position in which the cover closes the slot and a second position in which the slot is open, wherein the linkage is configured to allow the cover member to translate in a direction perpendicular to the longitudinal axis away from the frame, and to rotate about an axis parallel to the longitudinal axis, but to prohibit movement of the cover member in a direction parallel to the longitudinal axis, whereby in the second position the cover member is positioned adjacent to and spaced from the frame and clear of the slot.

**[0004]** Thus the present invention provides for a slot ventilator which allows an unobstructed airflow to run through it.

**[0005]** Preferably, the slot ventilator is configured so that when moving from the first position to the second position the cover member rotates in a first direction and wherein the linkage is configured to allow the cover member to rotate from the first position in a second direction opposite to the first direction to a third position in which the slot is partially open.

**[0006]** Preferably, the frame comprises first and second spaced frame members and the cover comprises first and second opposed edges, such that in the closed position the first edge is adjacent the first frame member and the second edge is adjacent the second frame member, wherein the linkage comprises a first pivot point located on the first frame member and a second pivot point located adjacent the second edge of the cover, and at least one link arm connected between the first and second pivot points.

**[0007]** The at least one link arm may comprise two link arms pivotally connected to each other at a third pivot point.

**[0008]** One or more of the pivot points may define a pivot axis parallel to the longitudinal axis.

**[0009]** One or more of the pivot points may comprise a ball joint.

**[0010]** Conveniently, the slot ventilator further comprises at least one flange on the cover member to assist a user in moving the cover member relative to the frame.

**[0011]** The slot ventilator may further comprise a seal member on at least one of the cover member and the frame to seal the slot when the cover member is in the first, closed position.

**[0012]** The slot ventilator may comprise two or more cover members.

**[0013]** The slot ventilator may comprise two or more linkages for the or each cover member.

**[0014]** The invention will now be described, by example only, with reference to the accompanying drawings in which:

Figures 1a, 1b, and 1c show perspective, cross section, and front views of an embodiment of the present invention in a first, closed position;

Figures 2a, 2b, and 2c show perspective, cross section, and front views of the slot ventilator of Figures 1a-1c in a second, fully open position;

Figures 3a, 3b, and 3c show perspective, cross section, and front views of the slot ventilator of Figures 1a-1c in a third, partially open position;

Figure 4 shows a perspective view of a linkage mechanism for use in the slot ventilator of Figures 1-3;

Figure 5 shows a perspective view of an alternative linkage mechanism for use in the slot ventilator; and

Figure 6 shows a perspective view of another embodiment of the slot ventilator in accordance with the present invention.

**[0015]** Figures 1a-1c shows a slot ventilator in accordance with the present invention in a first, closed position. The slot ventilator is formed of a frame 10, having an elongate, substantially rectangular shape, which has a top surface 10a, a bottom surface 10b, and side surfaces 10c;10d. These frame members 10a-d define an elongate slot with a front open face 10e and a rear open face 10f. The elongate direction of the ventilator and slot are defined by a longitudinal axis 11. The slot ventilator also has a cover 12, which is an elongate, substantially rectangular, planar member, which has an upper edge 12a, a lower edge 12b, side edges 12c;12d, a front surface 12e and a rear surface 12f. In the closed position, the cover 12 is positioned in front of the open face 10e of the frame 10 to close the slot. Thus, the cover 12 is substantially parallel to the front open face 10e and substantially perpendicular to the top and bottom surfaces of the ventilator 10;10b.

**[0016]** In some embodiments, a support (or plurality of supports) 22 may be provided between surfaces 10a-

10d to increase the rigidity of the ventilator.

**[0017]** In use, the slot ventilator is mounted to a wall or window frame etc with a slot formed therein and communicating with the open rear face 10e. When closed, the cover 12 closes the slot and blocks airflow through the ventilator.

**[0018]** Figures 2a-2c shows the slot ventilator in a second, fully open position. In its open position, the slot ventilator allows a flow of air $Q_1$ to pass from the slot in the wall/window frame, through the slot in the ventilator and out of the open front face 10e. In its open position, the cover 12 of the ventilator is positioned away from the airflow $Q_1$. In particular the cover 12 is now substantially perpendicular to the open face 10e and generally parallel to and spaced below the bottom surface 10b of the ventilator.

**[0019]** Connecting the frame 10 and the cover 12 is a linkage mechanism 14. The linkage mechanism 14 is formed of three components: a cover pivot point 16 located on the cover 12, a link arm 18 and a frame pivot point 20 located on the frame 10. The cover pivot point 16 is located on the rear surface 12f of the cover 12 as close to the upper edge 12a as possible. The frame pivot point 20 is located on the frame 10 as near the front face 10e as possible, on the interior of the bottom surface 10b. Each of the pivot points 16;20 may be appropriately connected to their respective parts 12;10, for example by mechanical means or adhesive bonding. The pivot points 16;20 may also be integrally moulded to their respective parts.

**[0020]** In this example, the pivot points 16;20 are pin joints, each having a pivot axis 17;21 which extends in a direction parallel to the longitudinal axis 11. As shown in Figures 2a-2c, during use of the ventilator the position of the frame pivot axis 19 does not change. The position of the cover pivot axis 17 can move in a plane perpendicular to the longitudinal axis 11. The positioning of the linkage mechanism 14 along the elongate length of the ventilator may be chosen as appropriate. In some instances, more than one linkage mechanism 14 may be present.

**[0021]** It will be seen that in the second, open position, the cover 12 is spaced away out the path of the airflow $Q_1$ and does not disrupt or reduce airflow through the ventilator. The advantage of this is that the ventilator can be made smaller for a given airflow and hence cheaper than if the cover 12 was partially obstructing the airflow $Q_1$.

**[0022]** Figures 3a-3c shows the slot ventilator in a third, partially open position. In this position, the cover 12 extends at a predetermined angle $\theta$, which is less than 90°, from the front face 10e of the ventilator. In this position, a smaller flow of air $Q_2$ to that of $Q_1$ passes through the ventilator in a non-straight path. The upper edge 12a of the cover 12 when in the partially open position remains adjacent the top surface 10a while the lower edge 12b is tilted away from the bottom surface 10b. The advantage of this configuration is that it allows a smaller degree of ventilation and a user of the ventilator can easily tell if the ventilator is partially open or fully open since the position of the cover 12 is visibly different.

**[0023]** To move from the first, closed position of Figures 1a-1c to the second, open position of Figures 2a-2c, a user touches the top edge 12a of the cover 12 and pulls the cover 12 away from the frame 10. To aid gripping of the cover 12 in the closed position, flanges or raised projections 13 may extend from upper edge 12a, above the top surface 10a, as shown in Figure 1c. Movement between the closed position and the fully open position may be largely achieved through rotation about the frame pivot point 20. However, some rotation about the axis 17 of the cover pivot point 16 may also occur, allowing the cover 12 to translate in a direction perpendicular to the longitudinal axis 11. As the rotation axis 19 of the frame pivot point 20 is parallel with the longitudinal axis 11, during movement between the first, closed position and the second, fully open position, the cover simply rotates about axis 19 in a first direction away from the frame 10 and there is no movement of the cover 12 in a direction parallel to the longitudinal axis 11 of the ventilator 10. As no such parallel movement occurs in the cover 12, less clearance space is required on the window frame beyond the side surfaces 10c;10d.

**[0024]** To move from the open position of Figures 2a-2c to the closed position of Figures 1a-1c, the user simply applies upward pressure to the cover 12 to cause it to rotate in a direction back towards the front face 10e.

**[0025]** Movement between the closed position of Figures 1a-1c and the partially open position of Figures 3a-3c is best achieved by contacting the cover at its bottom edge 12b and pulling the edge 12b away from the front face 10e. To aid gripping of the cover 12 in the closed position, flanges or raised projections 15 may extend from lower edge 12b, below the bottom surface 10b, as shown in Figure 1c. In contrast to movement between the closed position and the fully open position of Figures 2a-2c, movement between the closed position and the partially open position of Figures 3a-3c is largely achieved through rotation about axis 17 of the cover pivot point 20. The direction of rotation is generally opposite to the direction of rotation when moving from the closed position of Figures 1a-1c to the fully open position of Figures 2a-2c. In the partially open position, friction in the linkage mechanism 14 balances the gravitational force willing the cover 12 back to the closed position.

**[0026]** To move from the partially open position to the closed position, the user simply applies pressure to the cover 12 in a direction back towards the front face 10e.

**[0027]** Figure 4 shows in more detail an example connection of a pivot point. In this case, the references refer to the frame pivot point 20 but the same configuration may be used for the cover pivot point 16. In this particular connection, the end 118 of the link arm 18 may be hook shaped to allow the link arm 18 to connect to an axle 120 located at the frame pivot point 20. Other equivalent connection means may be envisaged to allow rotation of the link arm 18 about each rotation axis 17;19.

**[0028]** Figure 5 shows part of a ball-and-socket linkage mechanism as an alternative to the pin joint type described above. A ball-and-socket linkage mechanism is also formed of three components: a cover pivot point 16a located on the cover 12, a link arm 18a and a frame pivot point 20a which is located on the frame 10. Both the pivot points 16a and 20a are guided socket joints, which allow a symmetric ball ended bar 18a to rotate in each socket about various axes including through a plane of rotation perpendicular to longitudinal axis 11 of the ventilator 10 through a predetermined angle range.

**[0029]** In another embodiment of the slot ventilator as shown in Figure 6, a linkage mechanism 14a may have two link arms 18' joined at an intermediate pivot point 22, which is neither located on the frame 10 nor cover 12. The intermediate pivot point 22 has a pivot axis 21 which extends in a direction parallel to longitudinal axis 11 and to axes 17 and 19. Link arms 18' connect each of the pivot points 16;20;22 together, such that the linking members are arranged in series.

**[0030]** In this configuration, because an extra degree of freedom is present in the linkage mechanism 14a than in linkage mechanism 14, the cover 12 has a greater range of movement and is capable of being moved further away from the airflow $Q_1$.

**[0031]** It will be appreciated that various modifications can be made to the slot ventilator described. For example, more than one cover 12 could be used, so that instead of having one cover 12 extending along the entire elongate length of the frame 10 of the ventilator, two or more covers could be present. Each cover would have its own linkage mechanism, or more than one linkage mechanism.

**[0032]** To minimise any airflow through the ventilator in the closed position, a seal could be attached to the edges of cover 12 and/or the frame 10.

**[0033]** To provide fixing to either a wall or a window, the slot ventilator may also be provided with fixation means of any convenient form. For example the rear face 10f of the frame 10 may have brackets with screw holes.

**[0034]** It will be appreciated that the slot ventilator may be orientated at any angle with respect to the wall or window frame. Therefore, while the frame 10 and the cover 12 are described with reference to upper and lower parts and with the cover 12 being below the frame in the fully open position, the slot ventilator could be positioned the other way up so the cover 12 would be above the frame in the fully open position, or vertically so the cover 12 would be to one side of the frame in the fully open position.

**[0035]** Although the above can be used as an illustrative guide to the present invention, it will be appreciated by those skilled in the art that variations and modifications can be made without departing from the scope of the invention as set out in the claims.

## Claims

1. A slot ventilator comprising a frame defining a slot with a longitudinal axis, at least one cover member, and a linkage connecting the cover member to the frame for movement between a first position in which the cover closes the slot and a second position in which the slot is open, wherein the linkage is configured to allow the cover member to translate in a direction perpendicular to the longitudinal axis away from the frame, and to rotate about an axis parallel to the longitudinal axis, but to prohibit movement of the cover member in a direction parallel to the longitudinal axis, whereby in the second position the cover member is positioned adjacent to and spaced from the frame and clear of the slot.

2. A slot ventilator as claimed in claim 1, wherein when moving from the first position to the second position the cover member rotates in a first direction and wherein the linkage is configured to allow the cover member to rotate from the first position in a second direction opposite to the first direction to a third position in which the slot is partially open.

3. A slot ventilator as claimed in claim 1 or claim 2, wherein the frame comprises first and second spaced frame members and the cover comprises first and second opposed edges, such that in the closed position the first edge is adjacent the first frame member and the second edge is adjacent the second frame member, wherein the linkage comprises a first pivot point located on the first frame member and a second pivot point located adjacent the second edge of the cover, and at least one link arm connected between the first and second pivot points.

4. A slot ventilator as claimed in claim 3, wherein the at least one link arm comprises two link arms pivotally connected to each other at a third pivot point.

5. A slot ventilator as claimed in claim 3 or claim 4, wherein one or more of the pivot points define a pivot axis parallel to the longitudinal axis.

6. A slot ventilator as claimed in claim 3 or claim 4, wherein one or more of the pivot points comprises a ball joint.

7. A slot ventilator as claimed in any preceding claim, further comprising at least one flange on the cover member to assist a user in moving the cover member relative to the frame.

8. A slot ventilator as claimed in any preceding claim, further comprising a seal member on at least one of the cover member and the frame to seal the slot when the cover member is in the first, closed position.

**9.** A slot ventilator as claimed in any preceding claim comprising two or more cover members.

**10.** A slot ventilator as claimed in any preceding claims, comprising two or more linkages for the or each cover member.

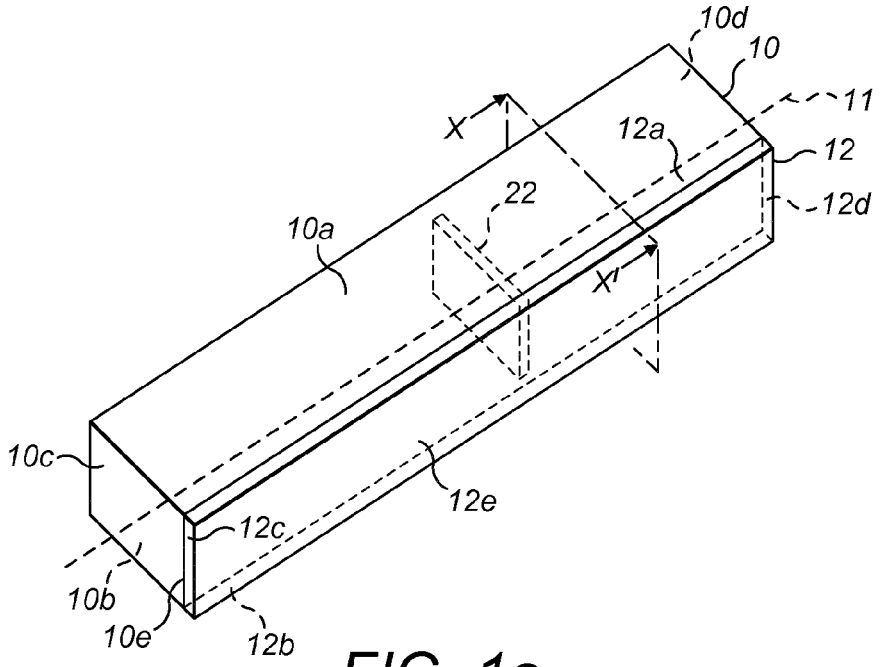


FIG. 1a

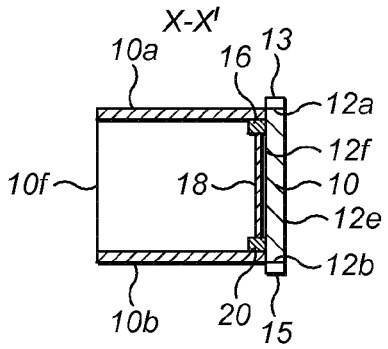


FIG. 1b

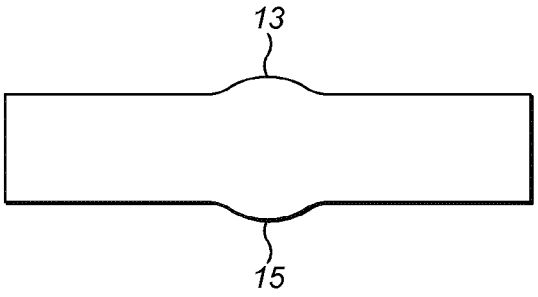


FIG. 1c

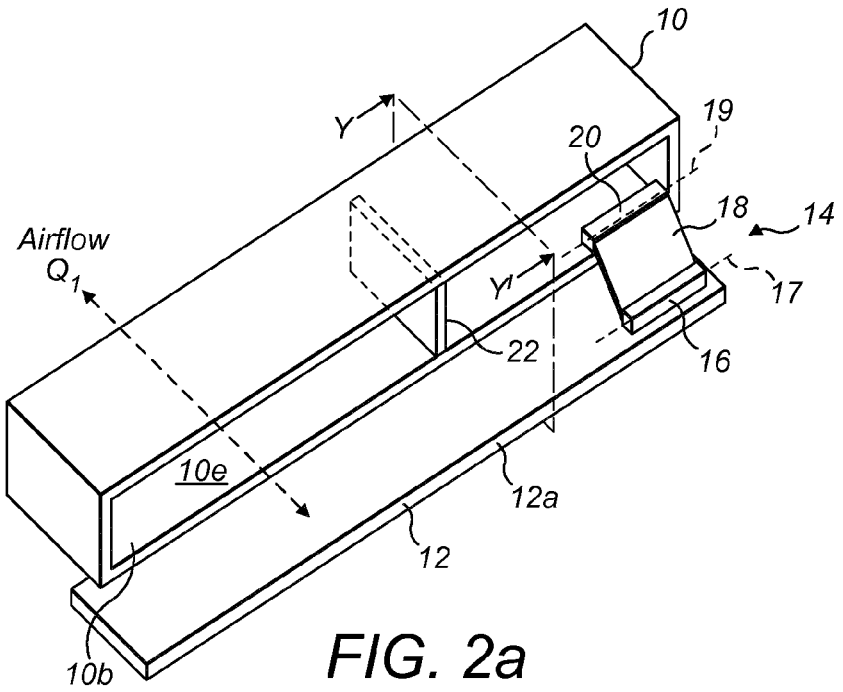


FIG. 2a

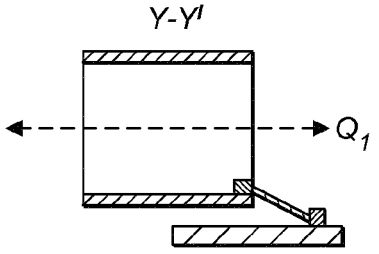


FIG. 2b

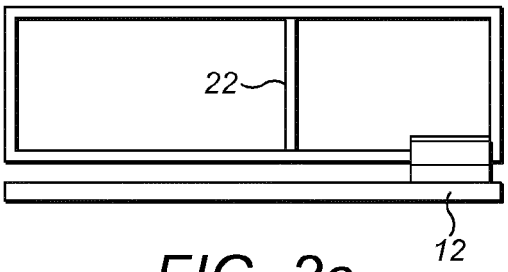


FIG. 2c

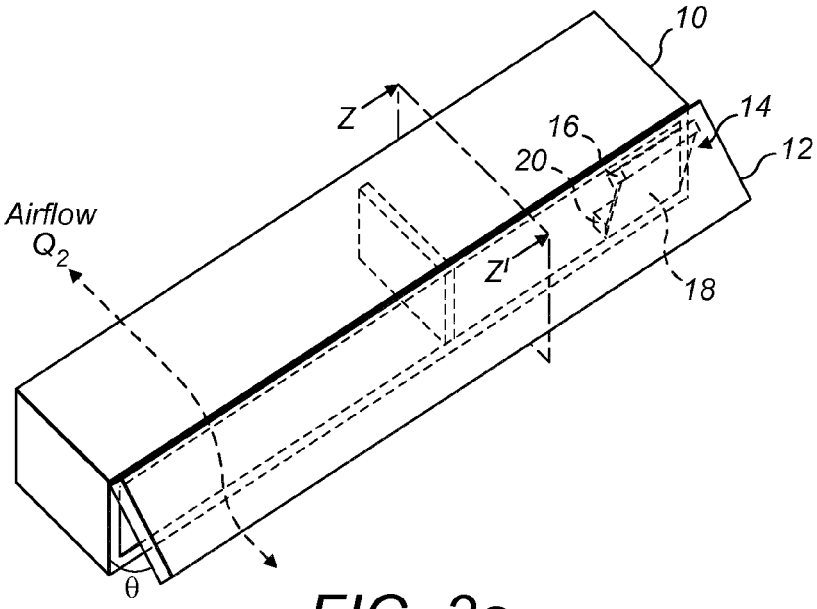


FIG. 3a

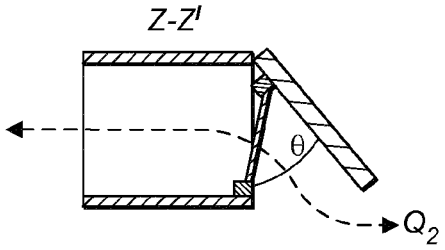


FIG. 3b

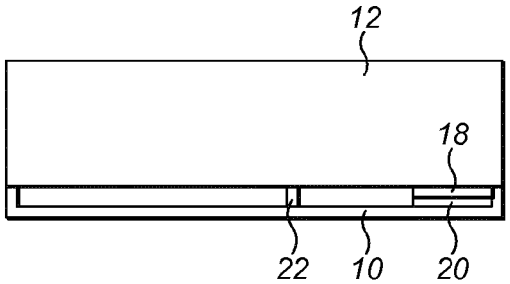


FIG. 3c

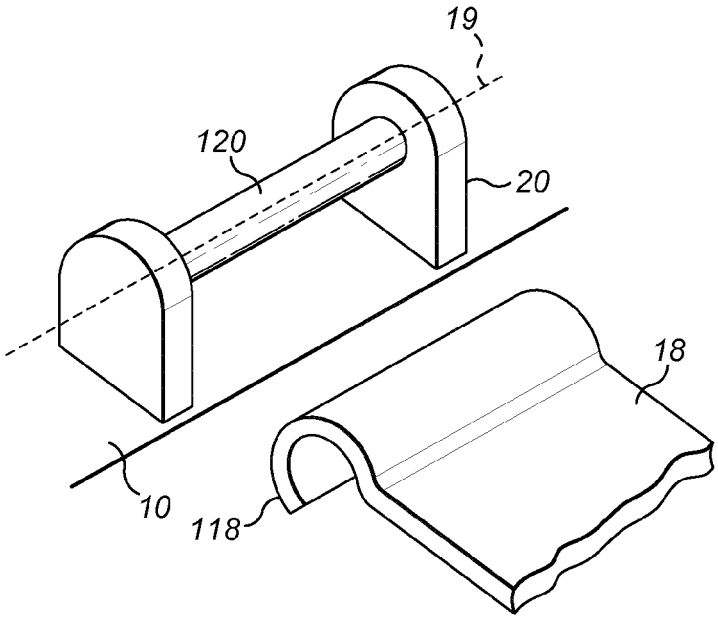


FIG. 4

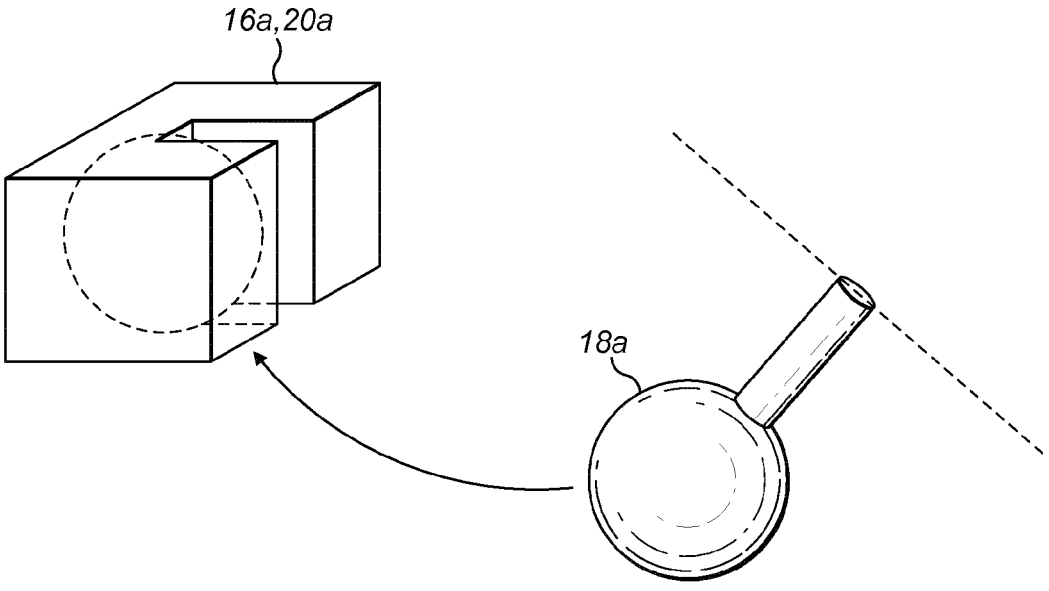


FIG. 5

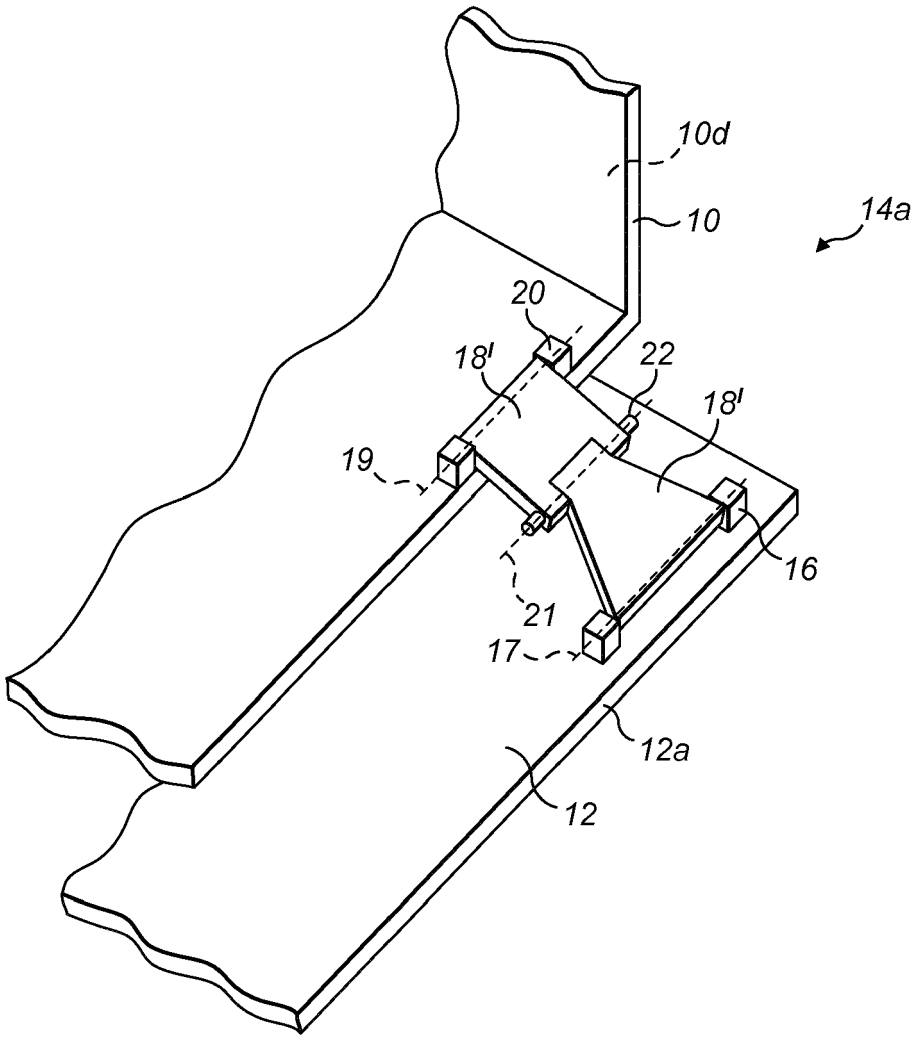


FIG. 6

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


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- GB 2039028 A **[0002]**