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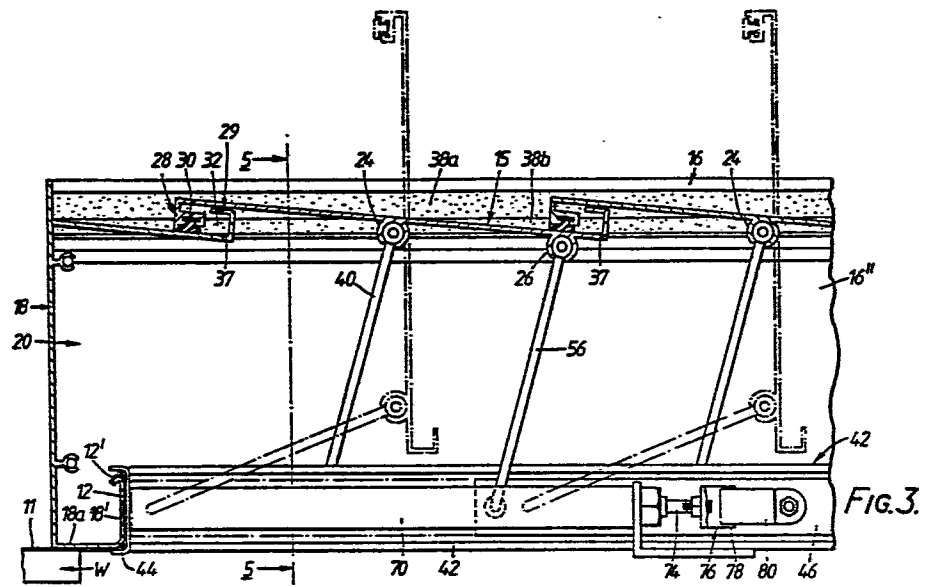
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⑤④ **Improvements in ventilators.**

⑤⑦ A controllable louvred ventilator having open and closed positions has each louvre (15) pivotally supported at opposite ends between one opposite pair of side members (16) of a frame defining a ventilation opening (14) (Fig. 2) to be controlled by the louvres. The louvres are additionally supported for long spans at at least one location between their ends, on pivot arms (40) carried from an intermediate frame member (42) spanning the ventilation opening (14) between a further opposite pair of the side frame members (17, 18) of the ventilator frame. A control member (46) for the louvres is supported by and is slidable on the intermediate frame member (42), the control member (46) being connected to open and close the louvres by a series of links (56).



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IMPROVEMENTS IN VENTILATORS

The present invention comprises improvements in ventilators and concerns controllable, louvred ventilators for natural inlet or extract ventilation, dependent upon siting, and which are suited for use
5 as heat and smoke exhaust ventilators in the event of fire.

One object of the present invention is to provide a controllable, louvred ventilator which is more readily manufactured in different sizes.

10 According to the present invention, and with a view to meeting the above stated object, there is provided a controllable, louvred ventilator having open and closed positions, in which each louvre is pivotally supported at opposite ends for opening and
15 closing movements between one opposite pair of side members of a frame of the ventilator defining a ventilation opening to be controlled by the louvres and is also supported, between its ends, on a pivot arm carried from an intermediate frame member spanning
20 the ventilation opening between a further opposite pair of side members of said ventilator frame.

By pivotally supporting each louvre at opposite ends and between its ends, sagging or bending

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of the louvres is reduced.

Also, by employing a number of said pivot arms for each louvre, spaced along the length of the louvre, and a corresponding number of said intermediate frame members, likewise spaced along the
5 lengths of the louvres, the span of the louvres may be selected to suit a ventilator of any required width.

Preferably, the pivot arms extend sufficiently
10 from the intermediate frame member or members and are inclined with respect thereto such that the louvres are free to open through an angle of substantially 90° .

The louvres are conveniently controlled for opening and closing movements by a control member
15 which is bodily movable and which is connected with the louvres by a series of links, there being a separate link for each louvre, each link being pivoted at its opposite ends respectively to the louvre and to the control member, the link-louvre
20 pivots being positioned close to the pivot arm-louvre pivots in the lengthwise direction of the louvres.

With this arrangement, the intermediate pivotal supports afforded to the louvres by the
25 pivot arms reduces or prevents flexing of the louvres under the action of opening and closing forces

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imparted to the louvres by said links.

Preferably, the control member is supported by, and is slidable on, said intermediate frame member or one of said intermediate frame members
5 in order to add still further rigidity to the ventilator structure.

A specific embodiment of the present invention will now be described by way of example and not by way of limitation with reference to
10 the accompanying drawings in which:

FIG. 1 is a cross-section of a controllable louvred ventilator of the present invention, with the louvres shown in the closed position;

FIG. 2 is a plan view showing part of the
15 body of the ventilator with parts broken away to show further details of the construction;

FIG. 3 is an enlarged left hand portion of Fig. 1 showing the open position of the louvres in phantom outline;

20 FIG. 4 is an enlarged left hand top corner portion of a plan view of the ventilator corresponding to Fig. 2 to show further details of the construction; and

FIG. 5 is a cross-section on line 5-5 in
25 Fig. 3.

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With reference now to the accompanying drawings, the ventilator is a louvred ventilator for roof or wall mounting. The ventilator has a rectangular body comprising a base 10, best seen in Fig. 2, presenting a base flange 11 for flashing the ventilator to the roof or wall W. The base flange 11 is flat in the present example but it may be of any of the standard shapes suitable for flashing it to different kinds of roof or wall cladding or to glazing bars. The base 10 has an upstanding wall 12 defining a rectangular ventilation opening 14 through the base, the wall having a downwardly directed lip 12' along its upper edge overhanging the base flange 11. The base may conveniently be formed by welding together, as at 10', four roll-formed or extruded sheet metal, e.g. aluminium, parts 10a, 10b having the section shown in Figs. 1 and 3. Alternatively, square corner pieces may be welded to a single roll-formed part of the same section which is slit and bent to form a rectangular frame with the wall 12 in one piece. Ventilation through the opening 14 is controlled by the louvres 15 (see Figs. 1 and 3) which also weather the opening.

The ventilator further comprises a readily removable outer body part 20 made up of opposite pairs of straight channel sectioned members 16, 16 and

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and 17, 18 removably interconnected with one another at their adjacent ends by means of self-tapping screws 21. The members 16, 17, 18 are formed as extruded metal, e.g. aluminium, sections and each presents an equally spaced pair of walls extending away from the base flange 11 to the outside of the wall 12. The wall, e.g. 18' (see Fig. 3) of this pair of walls adjacent the wall 12 abuts the outside of the wall 12 and is engaged under the overhanging lip portion 12', each wall, such as 18', itself having a corresponding downturned lip along its upper edge. The adjacent walls, such as 18', of all the members 16, 17, 18 substantially correspond with one another in cross-sectional size and shape to interfit with the wall 12 in the manner seen in Fig. 3. The webs or floors 16_a, 17_a, 18_a of the channel members 16, 17, 18 abut the base flange 11. The channel members 16, 17, 18 act as drainage channels for water which runs off the louvres 15. The other upstanding walls 16", 17" and 18" of the channel members 16, 17, 18 form a rectangular frame or box which carries the pivots for the outer ends of the louvres 15. The louvre end pivots 22 are arranged as seen in Fig. 4. These pivots, which are formed by headed pivot pins, are driven into the respective ends of

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part-cylindrical channels formed in hollow part-cylindrical (270°) formations 24 extending along the longitudinal louvre centre lines, and corresponding formations 26 are also provided, extending parallel to the central formations 24, adjacent the inwardly opening, trailing edges of the louvres, for fixing link-louvre pivots in a manner which will be described below. The louvres 15 are cut to the required length from metal, e.g. aluminium, extrusions of the section indicated in Fig. 3 and are additionally provided with leading and trailing edge formations 28, 29 which overlap one another in the closed position of the louvres, as best shown in Fig. 3. The leading edge formations 28 carry elastomeric seals 30, which may be lip seals, carried by the formations 28 which seals then act to resist water penetrating under the leading edges of the louvres, and water penetrating under the leading edges of the louvres is trapped in the trailing edge rain channels 32 which also act to catch and drain off water into the channel members 16 of the body part 20, particularly when the louvres are in a partly opened position and the ventilator is flat roof mounted.

The louvre end pivots 22 are provided with bearing shoulders 34 which bear directly in the

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walls 16" of the box and the pivot pins 22 are secured in the formations 24 by wing formations 22' on the pins which occupy cross-cuts 36 in the formations 24, formed prior to assembly of the ventilator, the pins
5 being driven into the formations 24 until the wings 22' reach this position whereby the louvres 15 are predeterminedly positioned between the walls 16". To secure each louvre against rotation with respect to its pivot pins 22, the pins have splines 22" which
10 fit closely between the free edges of the channel formation 24 of the louvre. The gaps between the louvre ends and the walls 16" are sealed with pile weather seals 38a, 38b mounted in open-ended T-slots formed on the insides of the walls 16" and form gaps 37
15 at the ends of the channels 32 for the drainage of water from these channels when the louvres are in a closed position.

Each louvre 15 is also supported, between its ends, on a wire pivot arm 40 carried from an intermediate frame member 42 which spans the ventilation
20 opening 14 between the opposite pair of its side walls 12 extending in the longitudinal direction of the louvres. The member 42 is metal, e.g. aluminium hollow extruded section and is attached to the walls
25 12 by means of brackets 44 welded or rivetted to the

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walls during assembly of the ventilator. The member 42 is centrally disposed between the walls 16" and carries a control member 46 supported by, and slidable on, the member 42 by means of ball bearing slides 48, the balls of which are trapped in cages 50 and move between runways 52, 54 of the members 42 and 46 respectively to provide a low friction, linear slider mechanism for opening and closing the louvres. The bodily movable control member 46 is connected with the louvres 15 by a series of wire links 56, there being a separate link 56 for each louvre. As seen in Fig. 5, the link-louvre pivots 56' and the pivot arm-louvre pivots 40' are correspondingly positioned in the lengthwise direction of the louvres whereby the opening and closing forces imparted to the louvres are carried mainly or wholly by the pivot arms 40 and the intermediate frame member 42, and the louvres are substantially relieved of opening and closing forces tending to flex the louvres.

The pivot arm-louvre pivots 40' and the link-louvre pivots 56' have Nylon (Registered-Trade Mark) pivot bearings 60 of the same general form as the pivot pins 22 fitted in the part-cylindrical channels of the louvre formations 24 and 26 respectively. The formations 24 and 26 are, in this case, both cut away

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locally, centrally of the louvres, to provide formation gaps 24' and 26' to expose part-cylindrical channel ends for insertion of the bearings 60 and the wire ends of the pivot arms and links, and to one side of the gaps 24' and 26' by cross cuts 36' corresponding to the cross cuts 36 already described for receiving the wing formations 60' of the bearings 60 corresponding to the wing formations 22'. The formation gaps 24', 26' also provide operating spaces for the louvres to pivot on the pivots 40' and for the links 56 to pivot the louvres on their pivots. The link-control member pivots 56" also have Nylon pivot bearings 62. The pivot arm-frame member bushings 64 are likewise composed of Nylon but no pivoting is accommodated for in this case since, as will be understood, the pivot arms 40 remain static, the pivot arms 40 simply lending strut-like support to the louvres 15 between their ends.

The Nylon pivot bearings 62 and the Nylon bushings 64 have wing formations to retain them in position.

As seen in Fig. 3 the pivot arms 40 extend sufficiently from the member 42, and are inclined with respect thereto, such that the louvres are free to open through an angle of substantially 90° and so as to assume a vertical position when the ventilator is set

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horizontally, as shown in Fig. 3. In this position a maximum unobstructed throat opening for the ventilator is achieved. Also, the inclination of the pivot arms ensures that the pivot arms still lend strut-like support to the louvres even when the louvres are in their fully open position.

The wire links 56 are of Z-shape as seen in Fig. 5 to minimize the closing forces tending to wrench the link-louvre pivots 56' and pivot bearings 60 out of the channel formations 26.

The control member 46 may be operated in any desired fashion. In the present embodiment a single acting pneumatic ram 70 is provided, carried from the frame of the ventilator, for moving the member 46 in one direction to the right in Figs. 1 to 3 to close the louvres against the action of a return spring 72 connected between the member 46 and the frame. The piston rod 74 of the ram is connected with the member 46 through a coupling 76 incorporating a fusible link 78, 80 so that in the event of a fire and yielding of the fusible link, the control member 46 is released for return movement, to the left in Fig. 3, by the spring 72 and the louvres are opened automatically to ventilate the fire.

By providing additional control mechanisms

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and intermediate frame members 42, all as already described with reference to the accompanying drawings, the louvres 15 and the top and bottom outer body members 17, 18 may be selected to be of increasing
5 length to interfit with wider bases 10 to form ventilators in a range of sizes as desired.

The members 16, 17, 18 forming the body part 20 or box are offered up separately to the base 10, when constructing the ventilator and rotated into
10 position with their walls such as 18' engaging with their downturned upper edge lips under the lip 12'. The fixing screws 21 are then inserted to unite the box and fix the box to the base.

The base 10 is then fitted with as many of the
15 intermediate frame members 42, already mounting their brackets 44 and control mechanisms, as are required to support and operate louvres 15 spanning the width of the base. Initially, the frame members are loosely positioned.

20 The louvres are assembled into the box formed by the outer body part 20 and interconnected with the control mechanisms without mechanical fixings, the various parts being simply pressed in place. The brackets 44 are then rivetted or welded to the base
25 frames. Rapid assembly of ventilators as described with

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reference to the accompanying drawings is, therefore, achieved.

5 The end of each channel member 16 may open through the wall 18" to drain off water from the channels outside the body of the ventilator.

 The base 10 is welded in one piece and is nowhere penetrated by fixing holes. Provided, therefore, that the flange 11 is properly flashed to the roof or wall W, water cannot penetrate under
10 or through the base. At the same time, the body part 20 of the ventilator which is exposed outside the roof or wall is readily removable, by removing the screws 21, to gain access to the louvre operating mechanism of the ventilator, e.g. for servicing.

15 The louvre blades may be formed e.g. extruded from translucent material e.g. u.p.v.c. or polycarbonate. Other translucent louvre blade constructions e.g. framed constructions may be used.

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CLAIMS:

1. A controllable louvred ventilator having open and closed positions in which each louvre (15) is pivotally supported at opposite ends for opening and closing movements between one opposite pair of side members (16) of a frame of the ventilator defining a ventilation opening (14) to be controlled by the louvres characterized in that the louvres are also supported, at at least one location between their ends, on pivot arms (40) carried from an intermediate frame member (42) spanning the ventilation opening (14) between a further opposite pair of side frame members (17, 18) of said ventilator frame.

2. A ventilator as claimed in claim 1 in which the louvres (15) are supported at a plurality of locations between their ends on pivot arms (40) carried from a plurality of said intermediate frame members (42) spaced apart along the lengths of the louvres (15).

3. A ventilator as claimed in claim 1 or 2 in which the pivot arms (40) extend sufficiently from the intermediate frame member (42) or members (42) and are inclined with respect thereto such that the louvres (15) are free to open through an angle of substantially 90° .

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4. A ventilator as claimed in any preceding claim including a bodily movable control member (46) for opening and closing the louvres (15), the control member being connected with the louvres by a series of links (56), there being a separate link (56) for each louvre, each link (56) being pivoted at its opposite ends respectively to the louvre (15) and to the control member (46), the link-louvre pivots (56') being position close to the pivot arm-louvre pivots (40') at one location in the lengthwise direction of the louvres (15).

5. A ventilator as claimed in claim 4 in which the control member (46) is supported by, and is slidable on, the intermediate frame member (40) at said one location in the lengthwise direction of the louvres (15).

6. A ventilator as claimed in claim 5 in which the louvres (15) are formed as extruded sections with transversely spaced, lengthwise extending hollow formations (24, 26) which house the louvre end and pivot arm-louvre pivots (22, 40') and the link-louvre pivots (56') respectively, all with a push-in fit.

7. A ventilator as claimed in claim 6 in which the louvre end pivots (22) are fixed with respect

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to the louvres (15) and bear directly in said one opposite pair of side frame members (16), the louvre end pivots (22) acting to position the louvres (15) between said one opposite pair of side frame members (16).

8. A ventilator as claimed in any preceding claim having a body presenting a base flange (11) for flashing the ventilator to a roof or wall (W), the base flange (11) being formed on a base (10) having a wall (12) extending away from the base flange (11) on one side thereof and defining said ventilation opening (14) through the base (10), said wall (12) having lip portions (12') overhanging the base flange (11), and an outer body part (20) composed of straight, channel-sectioned members (16, 16, 17, 18) removably interconnected with one another at their adjacent ends, the channel-sectioned members (16, 16, 17, 18) each presenting a pair of walls extending away from the base flange to the outside of said ventilation opening defining wall (12) and each having its wall (e.g. 18') adjacent the ventilation opening defining wall (12) engaged under the overhanging lip portion (12') of the ventilation opening defining wall (12).

9. A ventilator as claimed in claim 8 in which

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the channel-section member walls (e.g. 18') adjacent
the ventilation opening defining wall (12) engage under
said overhanging lip portion (12') of the ventilation
opening defining wall (12) with lip portions

5 overhanging the channel-sectioned member floors.

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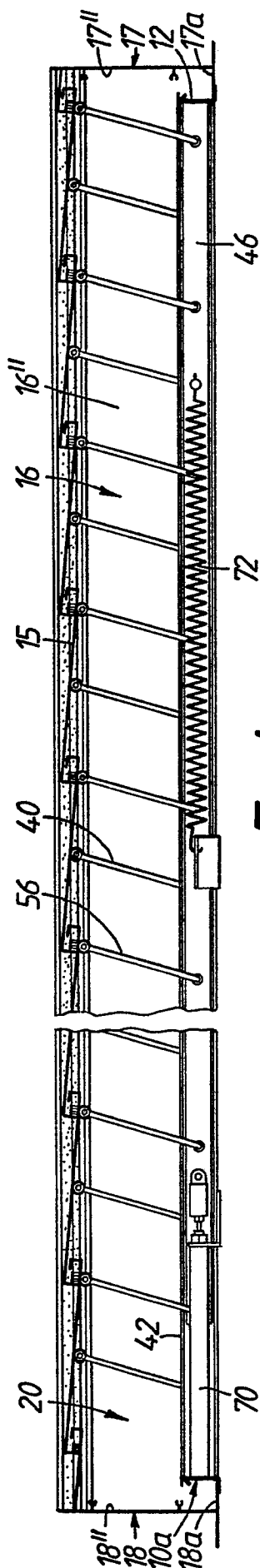


FIG. 1.

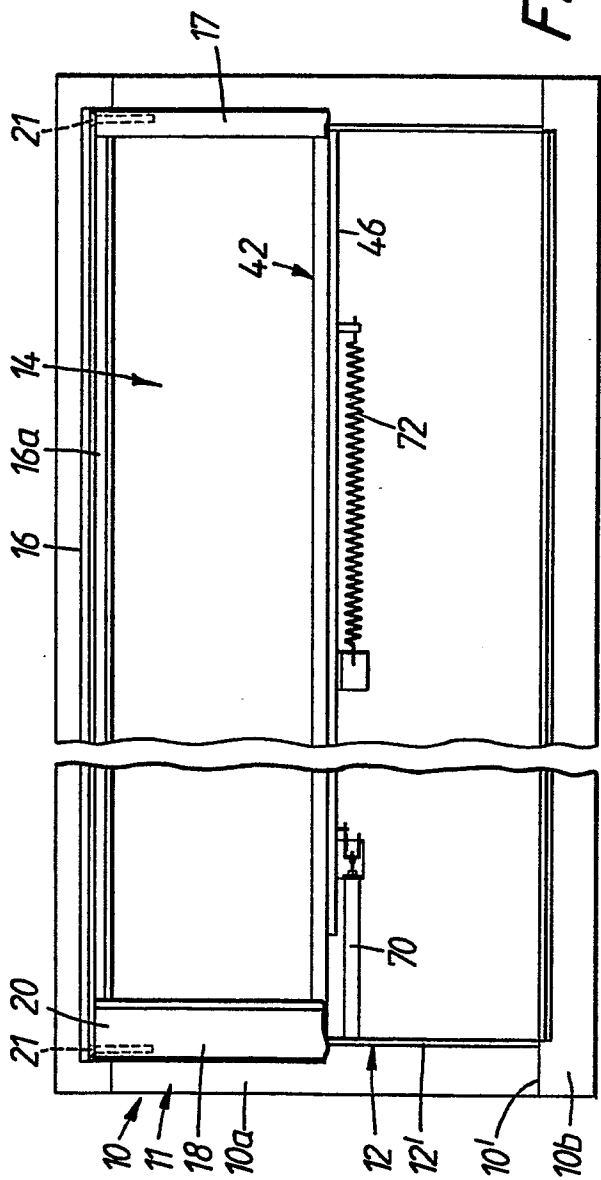
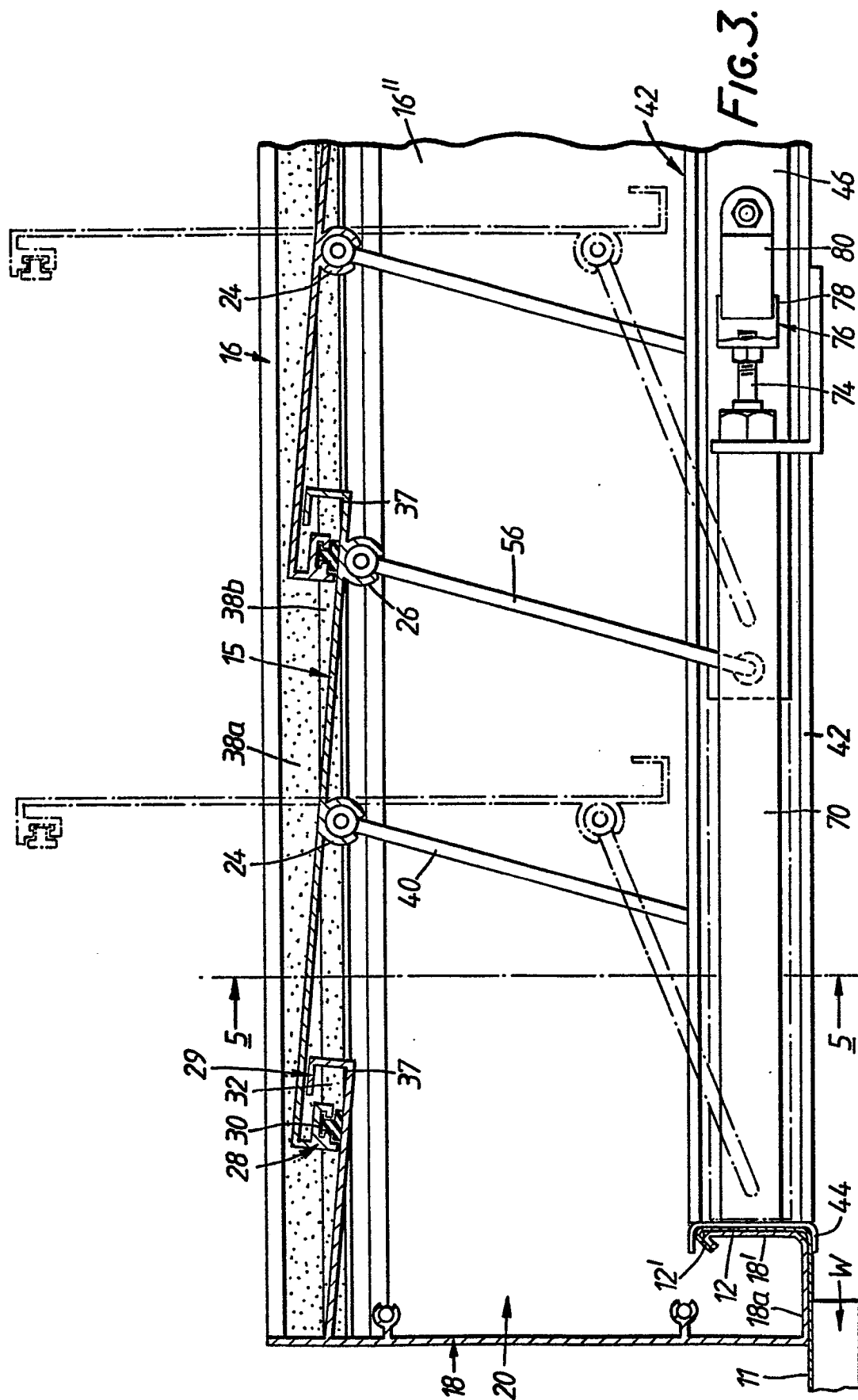


FIG. 2.



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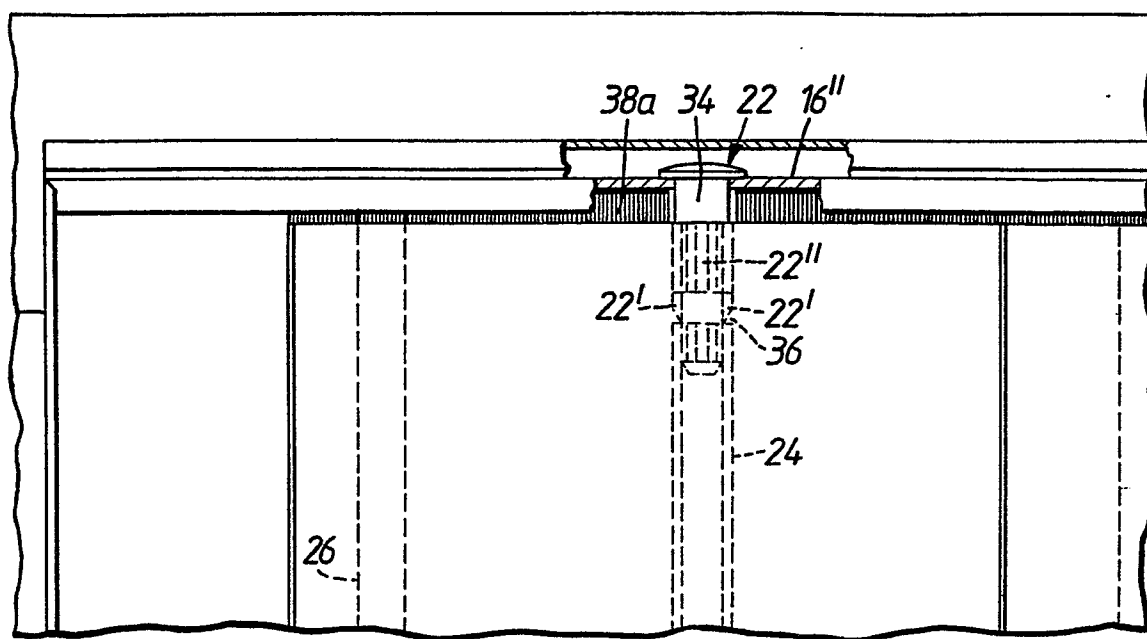


FIG. 4.

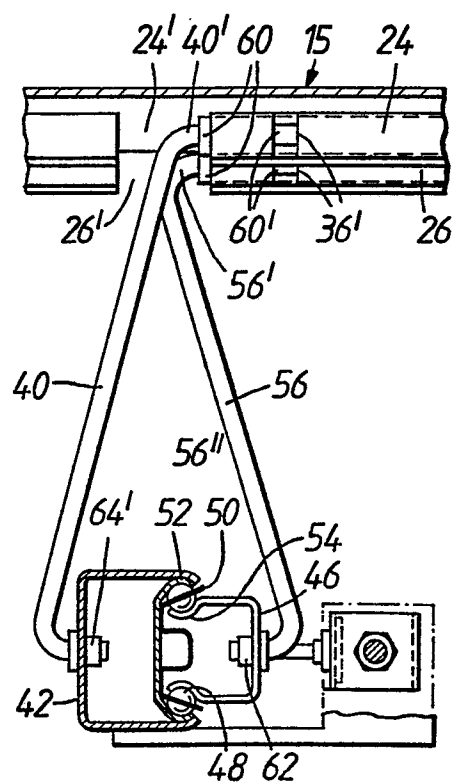


FIG. 5.

DOCUMENTS CONSIDERED TO BE RELEVANT

EPO Form 1503, 03.82

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document