

PATENT SPECIFICATION

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(54) IMPROVEMENTS RELATING TO VENTILATORS

(71) We, COLT INTERNATIONAL LIMITED, a British Company, of New Lane, Havant, Hampshire, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to ventilators and concerns louvred ventilators more particularly for wall mounting, and a louvre therefor.

An object of this invention is to simplify and standardise the construction of louvred ventilators giving varying degrees of protection against weather entry, as required.

Increase of such protection can be obtained by arranging the louvres in banks one behind the other and more commonly the banked louvres are arranged in zig-zag fashion, the louvres of adjacent banks sloping in opposite directions. Also, special arrangements can be adopted for separating and draining off water droplets in the air stream passing inwardly through the banks of louvres. One such arrangement is described and claimed in British Patent application No: 59103/68 (Serial No. 1,285,721) where two louvre banks are arranged with the banked louvres in zig-zag fashion to define air passages each having a bend on the inside of which a slot is formed, between a trailing edge portion of a louvre of the front bank of louvres and a leading edge portion of a louvre of the rear bank of louvres, the slot lying adjacent to and upstream of the bend and facing upstream in the air passage. Water droplets tend to pass through these slots and means is provided, including drainage channels extending along the trailing edges of the underside of the louvres in the rear bank of louvres to collect and drain off water droplets passing through the slots.

A further object of this invention is to provide a form of louvre which may be used to construct a ventilator having banks of louvres arranged as just described and

presenting said drainage channels.

A still further object of this invention is to provide a form of louvre which may be readily produced by means of a roll forming technique.

According to this invention, there is provided a louvre having an intermediate section interconnecting a channel formation presenting a channel side wall extending along one longitudinal edge of the louvre, to one side of said intermediate section, and a further formation presenting a hook extending along the other longitudinal edge of the louvre to the same side of said intermediate section as said channel side wall, and wherein said formations are so shaped and dimensioned that the louvre and a further identical louvre may be assembled together with the channel formation of one of the louvres fitted within the further formation of the other of the louvres and with its said channel side wall received within the hook of the further formation of said other of the louvres, the interfitting channel and further formations of the assembled louvres being such as to locate the two intermediate sections of the assembled louvres in Vee formation at a predetermined angle with respect to one another.

Preferably, said formations are straight sided and together present one pair of straight parallel sides.

Conveniently the intermediate section of the louvre is of flat sheet form, and said parallel sides of said formations are disposed at an angle of 45° with respect to a plane including said flat sheet form section.

A louvre according to this invention is conveniently formed of sheet metal by a roll forming technique.

This invention also comprehends louvred ventilators comprising louvres each according to this invention as hereinbefore defined and particularly, although not exclusively, such ventilators which are in accordance with British Patent application No: 59103/68 (Serial No. 1,285,721).

A specific embodiment of louvre according to this invention and specific embodi-

ments of louvred wall ventilators according to the invention will now be described by way of example with reference to the accompanying drawings in which corresponding parts are indicated by the same reference numerals throughout the various embodiments.

In the drawings:—

Fig. 1 is a cross-section of a louvre according to this invention,

Fig. 2 is a cross-section of a louvred ventilator according to this invention employing louvres as shown in Fig. 1,

Fig. 3 is a cross-section of a further louvred ventilator according to this invention employing louvres as shown in Fig. 1,

Fig. 4 is a partial cross-section of a louvred ventilator according to this invention employing a bank of louvres as used in the ventilator of Fig. 2 and two additional banks of louvres each louvre being as described with reference to Fig. 1 but having different positions of use to that of the louvres used in Fig. 2,

Fig. 5 shows a modification of the ventilator shown in Fig. 4,

Fig. 6 is a section on line 6—6 in Fig. 5,

Fig. 7 is a detail of the ventilator shown in Figs. 5 and 6,

Fig. 8 is a partial cross-section of a louvred ventilator as shown in Fig. 4 but having a fourth bank of louvres, and

Figs. 9, 10 and 11 illustrate a still further louvred ventilator according to this invention.

Referring to the accompanying drawings, Fig. 1 shows the cross-sectional shape of a louvre 90 according to this invention in one intended position of use. The louvre is a roll-formed sheet metal part and has an intermediate flat sheet form section 100 interconnecting a channel formation 101 presenting a channel side wall 106 extending along one longitudinal edge of the louvre, to one side of said intermediate section, and a further formation 102 presenting a hook 105 extending along the opposite longitudinal edge of the louvre to the same side of said intermediate section as said channel side wall. The formations 101 and 102 are straight sided, being only slightly rounded at the junctions of their straight sides in a manner not shown, except at 104. The hook 105 receives the side 106 of the formation 101 of an identical louvre when two such louvres are fitted together as hereinafter described.

The formations 101 and 102 are so shaped and dimensioned that the formation 101 fits within the formation 102 of the other louvre to locate the two louvres with their intermediate sections 100 in Vee formation at a predetermined angle with respect to one another. To this end, the side 106 of the

formation 101 is received within the hook 105 of the other louvre. The formations 101 and 102 together present a pair of straight parallel sides 108 and 109 and these sides make an angle of 45° with a plane including the section 100.

The formation 101 may constitute a drainage channel for collecting water droplets draining down the underside of the section 100 of the louvre and this applies regardless of whether the formation 101 is fitted within a formation 102 of another louvre or not, as will hereinafter appear.

Fig. 2 is a cross-section of a louvred ventilator according to this invention employing a single bank 114 of louvres 90 each as described with reference to Fig. 1. The ventilator has a frame 112 defining a ventilation opening across which is disposed a single bank of fixed horizontally disposed louvres 90 arranged one above the other with their sections 100 at an angle of 45° to the horizontal and positioned as shown in Fig. 1 with their channel formations 101 extending along the leading edge of the louvres on the underside of the louvres, so that the louvres overlap slightly in the frontal aspect of the ventilator as seen in the direction of arrow 20.

Because of their configuration in cross-section the louvres are quite strong in bending and resist deflection under wind loads. The leading edges of the louvres in this arrangement are of a thickened and accordingly neat appearance.

The louvres 90 may extend vertically instead of horizontally in this construction.

Fig. 3 is a cross-section of a louvred ventilator according to this invention employing a single bank 120 of louvres 90 each as described with reference to Fig. 1 but having its formation 102 at its leading edge. In this case, the louvres 90 are pivoted and spaced apart by an amount less than the width of the louvres, whereby the louvres can be swung down from an open position to engage against one another and close the ventilation opening. The louvres are pivoted at their trailing edges, constituted in this embodiment by the formations 101.

By making the louvres freely pivotable in an arrangement as now being described, a non-return shutter assembly e.g. for a powered extract ventilator results.

However, the louvres may be controllable as to position by means comprising a control rod 126 to which is connected radial operating arms 125 one on each of the pivots 121 as shown in Fig. 7.

The pivots 121 are formed also as connectors to connect with the louvres 90 and are moulded from nylon. Each pivot may have an integral cylindrical pivot pin 121a (see Fig. 6) journaled in a hole in the frame 112. The louvre 90 is a push fit in a slot in the

wall of a body part of the pivot formed with a blind bore which houses and is shaped to interfit with the formation 101 of the louvre. A similar slot may also be formed at an opposite location in the wall of the body part to receive another louvre when the pivot serves also as a connector to connect with two interlocked louvres. Such an arrangement is hereinafter specifically described with reference to Figs. 5 and 6.

The body part of the pivot is of six-sided external shape and its external surface is stepped to form an intermediate shoulder 121d (see Fig. 6). The arm 125 is mounted on the body part so as to locate against this shoulder and for this purpose it is provided with a hole of corresponding shape tightly to receive the body part.

Fig. 4 is a partial cross-section of a louvred ventilator according to this invention employing a bank 114 of louvres each as described with reference to Fig. 1 and having two additional banks 130 and 131 of fixed louvres 90 each as described with reference to Fig. 1, but having different positions of use. The louvres in the two banks 130 and 131 are fitted together in pairs in the predetermined zig-zag relationship dictated by the form of the interfitting and interlocking formations 101 and 102 at the trailing edge of the louvres in the bank 130 and the leading edge of the louvres in the bank 131 respectively.

The formations 102 at the leading edge of the louvres in the bank 130 overlap the corresponding formations 102 at the trailing edge of the louvres in the bank 114 to define slots 135 on the inside and upstream of bends 160 in air passages 161 defined between adjacent pairs of overlapping louvres 90 in the banks 130 and 114, for the separation of water droplets as described in our aforementioned British Patent Application No. 59103/68 (Serial No. 1,285,721). The formations 101 of the louvres in the bank 130 constitute drainage channels extending along the trailing edges of the underside of the louvres 130 to collect and drain off water droplets separated at and passing through the slots 135 to impinge on and run down the underside of the louvres 130. The channels 101 communicate at their ends with holes (not shown) in the frame 112 to lead the water into further drainage channels in the frame.

Fig. 5 shows a modification of the ventilator shown in Fig. 4 in which alternate pairs of louvres in the banks 130 and 131 are pivotable to control the size of the ventilation opening, and to close the ventilation opening altogether if required.

The pivots 140 are constructed on the same principle as the pivots 121 to connect with the pairs of louvres and at the same time to pivot them to the frame 112, as is

more clearly illustrated in Fig. 6 which is a section on line 6—6 in Fig. 5. The body part of the pivot 140 is of regular hexagonal shape on its outer surface and receives an operating arm 125 as shown in Fig. 7 which interconnects with a control rod 126 as before. In this case however, the bore 140a of the body part is not blind but extends through the pivot pin 121a so as to communicate the channel 101 with a further drainage channel 112a in the frame 112.

Fig. 8 is a partial cross section of a louvred ventilator according to this invention constructed as described with reference to Fig. 4 but having a fourth bank 150 of fixed louvres 90. The louvres in the banks 150 and 131 are fitted together in the predetermined zig-zag relationship dictated by the form of their interfitting and interlocking formations 101 and 102.

A louvred ventilator as shown in Fig. 8 is substantially entirely weatherproof.

A controllable ventilator having four banks of louvres as shown in Fig. 8 has the louvres 150 fixed to the frame 112 and not interfitted and interlocked with the louvres 131. Alternate pairs of louvres 130 and 131 are made pivotable as described with reference to Figs. 5 and 6.

A ventilator as described with reference to Fig. 4 may have a controllable bank 120 of pivotable louvres 90 positioned on its inward side and constructed as described with reference to Fig. 3. The louvres 120 would in this case open inwardly, that is to say their arrangement would be a lateral inversion of that shown in Fig. 3 and the louvres would be positioned on the left hand side of the ventilator as shown in Fig. 4.

A ventilator as described with reference to Fig. 2 allows the entry of more air compared with an equivalently sized ventilator in which the louvres have up-turned trailing edge portions. The sides 108 of the formations 102 provide straightening passages for the air flow as it exits between adjacent louvres and this also improves the air flow through the ventilator particularly if a bird guard grid is provided immediately behind the louvre bank.

The specifically described form of the louvres according to this invention in a ventilator according to this invention as described with reference to Fig. 4 enhances the water droplet separation effect described in British Patent Application No. 59103/68 (Serial No. 1,285,721).

A relatively high pressure, low velocity area 165 is created at the exit end of the slots 135 by the leading edge portions 101 of the louvres in the bank 114 which tend to confine the main air stream between the louvres in this bank to the lower portion of the air passages 161. This inhibits flow of air through the slots 135 without inhibiting the

passage of large water droplets through the slots. These droplets are thus less likely to be blown off the underside of the louvres in the bank 130 by the air streams through the slots 135 and, instead, run down into the channels 101 at the trailing edge of these louvres. The increased velocity of the main air streams through the passages 161 ensures that fine rain droplets entrained in the air streams are moving sufficiently quickly to separate tangentially at the bends 160 and strike against the underside of the louvres in the bank 130. The channels 101 at the trailing edge of these louvres not only capture and lead off separated droplets but again tend to separate the main air streams from the underside of the louvres in the bank 130 so that the main air streams also are less likely to re-entrain water droplets from the underside of the louvres in the bank 130.

Instead of roll forming the louvres they may be extruded or fabricated in any convenient way and from any suitable material. Thus, for example, the louvres may alternatively be of sheet form plastics material.

Figs. 9, 10 and 11 illustrate a modification of the ventilator described with reference to Fig. 2.

The louvres 90 are, in this case, supported in spaced relation and in their required orientation by a pair of channel members 150, and the channel members 150 are held in their assembled relation with respect to the louvres by the frame 112.

The louvres 90 have a slotted connection with the members 150. Thus one flange 151 of each member 150 has slits 154 at intervals to receive the sides 108 of the formations 102 of the louvres with the hooks 105 located against the outside of the flange, and the other flange 152 of each member 150 has a pair of slits 156 at intervals which define tabs 157 which are received within the formations 101 so as to be flat against the inside of the front wall of these formations.

The tabs 157 are swaged inwardly so that the front walls of the formations 101 lie flush with the outside of the channel members 150.

When assembled with the members 150, the louvres are positively located by the tabs 157 and slits 154 and held against relative movement so as to prevent rattling. Thus the louvres are a push fit in the slits 154, 156 of the members 150.

A ventilator as just described has the advantage that it is quickly assembled without the use of rivets or the like to fix the individual louvres 90 in position relative to the frame 112.

The assemblage described with reference to Figs. 9, 10 and 11 may be used as a part of a bank of louvres in a larger ventilator which may employ further similar parts assembled

side by side and/or in stacked relation.

WHAT WE CLAIM IS:—

1. A louvre having an intermediate section interconnecting a channel formation presenting a channel side wall extending along one longitudinal edge of the louvre, to one side of said intermediate section, and a further formation presenting a hook extending along the other longitudinal edge of the louvre to the same side of said intermediate section as said channel side wall, and wherein said formations are so shaped and dimensioned that the louvre and a further identical louvre may be assembled together with the channel formation of one of the louvres fitted within the further formation of the other of the louvres and with the said channel side wall received within the hook of the further formation of said other of the louvres, the interfitting channel and further formations of the assembled louvres being such as to locate the two intermediate sections of the assembled louvres in Vee formation at a predetermined angle with respect to one another.

2. A louvre as claimed in claim 1 wherein said formations are straight sided and together present one pair of straight parallel sides.

3. A louvre as claimed in claim 2 wherein the intermediate section of the louvre is of flat sheet form, and said parallel sides of said formations are disposed at an angle of 45° with respect to a plane including said flat sheet form section.

4. A louvre as claimed in any preceding claim wherein the louvre is formed of sheet metal by a roll forming technique.

5. A louvred ventilator having louvres each as claimed in any one of the preceding claims.

6. A louvred ventilator having a frame and louvres each as claimed in any one of claims 1 to 4, pivoted to the frame; wherein the channel formation of each louvre extends generally along the pivot axis of the louvre to constitute a water drainage channel at the trailing edge thereof, the drainage channel communicating at least at one end through a bore of its louvre's pivot at that end with a drain passage in said frame.

7. A louvred ventilator having at least one bank of louvres each louvre being as claimed in any one of claims 1 to 4, wherein the channel formations of the louvres constitute drainage channels for collecting water droplets draining down the underside of the louvres.

8. A louvred ventilator having a frame and a bank of louvres each louvre being as claimed in any one of claims 1 to 4 fixed to the frame, said channel formations of the louvres extending along the leading edge of the louvres on the underside thereof.

9. A louvred ventilator having a frame and

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passage of large water droplets through the slots. These droplets are thus less likely to be blown off the underside of the louvres in the bank 130 by the air streams through the slots 135 and, instead, run down into the channels 101 at the trailing edge of these louvres. The increased velocity of the main air streams through the passages 161 ensures that fine rain droplets entrained in the air streams are moving sufficiently quickly to separate tangentially at the bends 160 and strike against the underside of the louvres in the bank 130. The channels 101 at the trailing edge of these louvres not only capture and lead off separated droplets but again tend to separate the main air streams from the underside of the louvres in the bank 130 so that the main air streams also are less likely to re-entrain water droplets from the underside of the louvres in the bank 130.

Instead of roll forming the louvres they may be extruded or fabricated in any convenient way and from any suitable material. Thus, for example, the louvres may alternatively be of sheet form plastics material.

Figs. 9, 10 and 11 illustrate a modification of the ventilator described with reference to Fig. 2.

The louvres 90 are, in this case, supported in spaced relation and in their required orientation by a pair of channel members 150, and the channel members 150 are held in their assembled relation with respect to the louvres by the frame 112.

The louvres 90 have a slotted connection with the members 150. Thus one flange 151 of each member 150 has slits 154 at intervals to receive the sides 108 of the formations 102 of the louvres with the hooks 105 located against the outside of the flange, and the other flange 152 of each member 150 has a pair of slits 156 at intervals which define tabs 157 which are received within the formations 101 so as to be flat against the inside of the front wall of these formations.

The tabs 157 are swaged inwardly so that the front walls of the formations 101 lie flush with the outside of the channel members 150.

When assembled with the members 150, the louvres are positively located by the tabs 157 and slits 154 and held against relative movement so as to prevent rattling. Thus the louvres are a push fit in the slits 154, 156 of the members 150.

A ventilator as just described has the advantage that it is quickly assembled without the use of rivets or the like to fix the individual louvres 90 in position relative to the frame 112.

The assemblage described with reference to Figs. 9, 10 and 11 may be used as a part of a bank of louvres in a larger ventilator which may employ further similar parts assembled

side by side and/or in stacked relation.

WHAT WE CLAIM IS:—

1. A louvre having an intermediate section interconnecting a channel formation presenting a channel side wall extending along one longitudinal edge of the louvre, to one side of said intermediate section, and a further formation presenting a hook extending along the other longitudinal edge of the louvre to the same side of said intermediate section as said channel side wall, and wherein said formations are so shaped and dimensioned that the louvre and a further identical louvre may be assembled together with the channel formation of one of the louvres fitted within the further formation of the other of the louvres and with the said channel side wall received within the hook of the further formation of said other of the louvres, the interfitting channel and further formations of the assembled louvres being such as to locate the two intermediate sections of the assembled louvres in Vee formation at a predetermined angle with respect to one another.

2. A louvre as claimed in claim 1 wherein said formations are straight sided and together present one pair of straight parallel sides.

3. A louvre as claimed in claim 2 wherein the intermediate section of the louvre is of flat sheet form, and said parallel sides of said formations are disposed at an angle of 45° with respect to a plane including said flat sheet form section.

4. A louvre as claimed in any preceding claim wherein the louvre is formed of sheet metal by a roll forming technique.

5. A louvred ventilator having louvres each as claimed in any one of the preceding claims.

6. A louvred ventilator having a frame and louvres each as claimed in any one of claims 1 to 4, pivoted to the frame; wherein the channel formation of each louvre extends generally along the pivot axis of the louvre to constitute a water drainage channel at the trailing edge thereof, the drainage channel communicating at least at one end through a bore of its louvre's pivot at that end with a drain passage in said frame.

7. A louvred ventilator having at least one bank of louvres each louvre being as claimed in any one of claims 1 to 4, wherein the channel formations of the louvres constitute drainage channels for collecting water droplets draining down the underside of the louvres.

8. A louvred ventilator having a frame and a bank of louvres each louvre being as claimed in any one of claims 1 to 4 fixed to the frame, said channel formations of the louvres extending along the leading edge of the louvres on the underside thereof.

9. A louvred ventilator having a frame and



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a bank of louvres each louvre being as claimed in any one of claims 1 to 4 pivoted to the frame at their trailing edges constituted by their channel formations, the louvres being spaced apart by an amount less than the width of the louvres whereby the louvres can swing to engage one another to close the ventilator.

10. A louvred ventilator as claimed in Claim 9 wherein the louvres are freely pivotable.

11. A louvred ventilator as claimed in claim 9 wherein the louvres are controllable as to position.

12. A louvred ventilator having a frame and at least two banks of louvres each louvre being as claimed in any one of claims 1 to 4 the louvre banks being positioned one immediately in front of the other, the channel formation of each of the louvres of the front bank of louvres fitting within the further formation of a corresponding one of the louvres of the rear bank of louvres and locating the intermediate sections of the louvres in Vee-formation at a pre-determined angle with respect to one another.

13. A louvred ventilator as claimed in Claim 12 having a further bank of louvres positioned immediately in front of said two banks of louvres, the further formations at the leading edges of the louvres, in the front most bank of said two banks of louvres overlapping the trailing edge portions of the louvres in the further bank of louvres to define slots on the inside and upstream of bends in air passages defined between

adjacent pairs of said overlapping louvres in said front most bank and said further bank of louvres.

14. A louvred ventilator as claimed in claim 13 having a still further bank of louvres each louvre being as claimed in any one of claims 1 to 4 and being interfitted with and positioned to the rear of a corresponding one of the louvres of said rearmost bank of said two banks of louvres by means of said further formation thereof and the channel formation of said rearmost bank of said two banks of louvres.

15. A louvred ventilator as claimed in claim 13 wherein alternate pairs of interconnected louvres in said two banks of louvres are pivotable to control the size of the ventilation opening.

16. A louvre for a louvred ventilator, substantially as hereinbefore described with reference to, and as shown in Fig. 1 of the accompanying drawings.

17. A louvred ventilator substantially as hereinbefore described with reference to, and as shown in Fig. 2, or Fig. 3, or Fig. 4, or Figs. 5, 6 and 7, or Fig. 8 of the accompanying drawings.

18. A louvred ventilator substantially as hereinbefore described with reference to, or with reference to and as shown in Figs. 9, 10 and 11 of the accompanying drawings.

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