

Jan. 7, 1941.

B. A. BENSON

2,228,224

PORTABLE VENTILATOR

Filed June 30, 1938

3 Sheets-Sheet 1

FIG. 1.

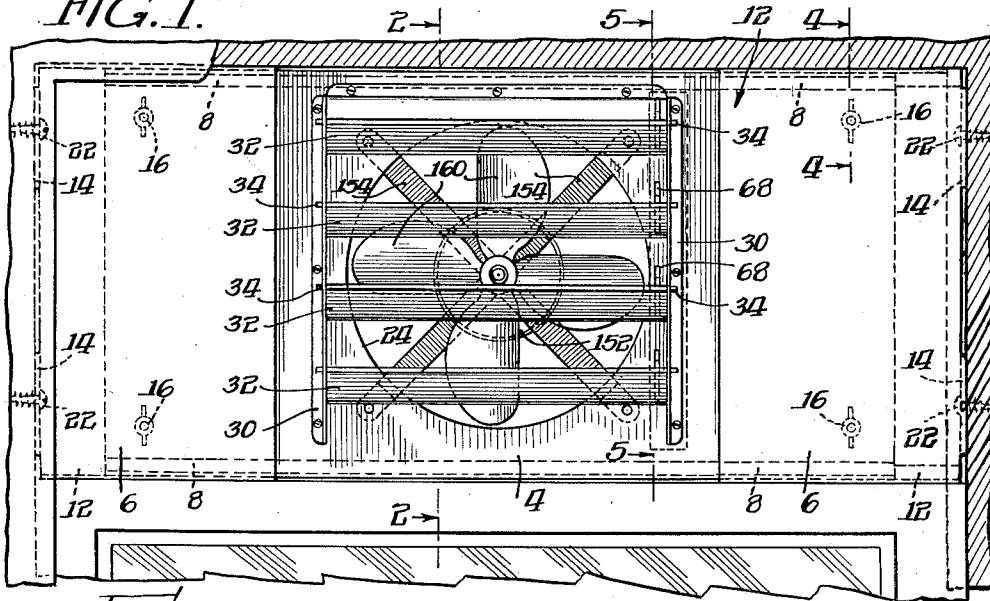


FIG. 2.

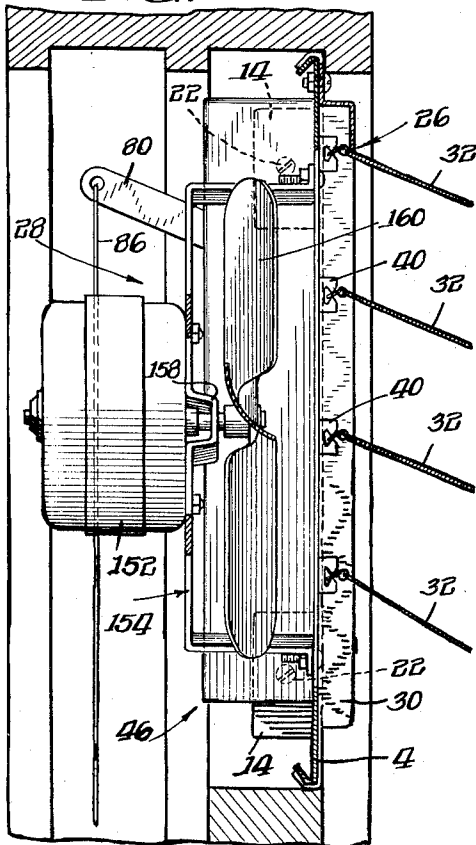


FIG. 3.

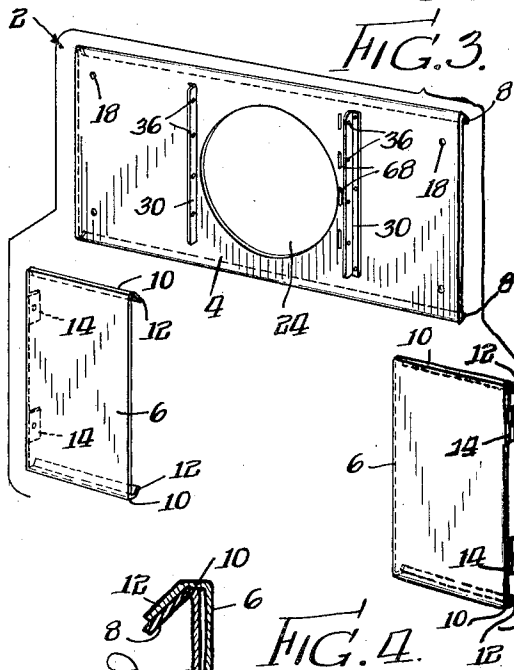


FIG. 4.

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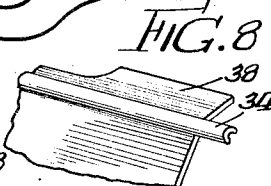
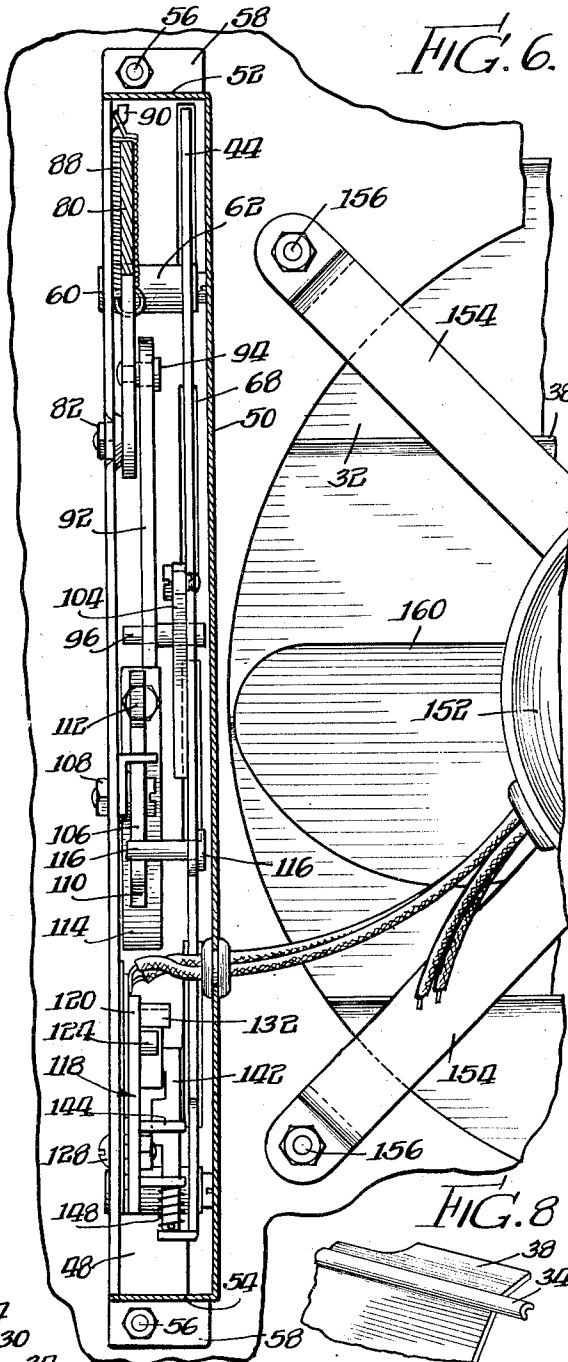
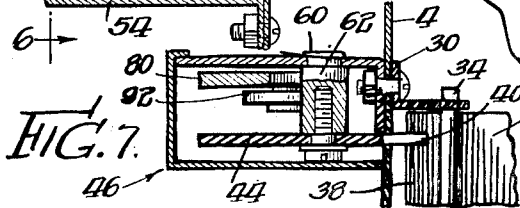
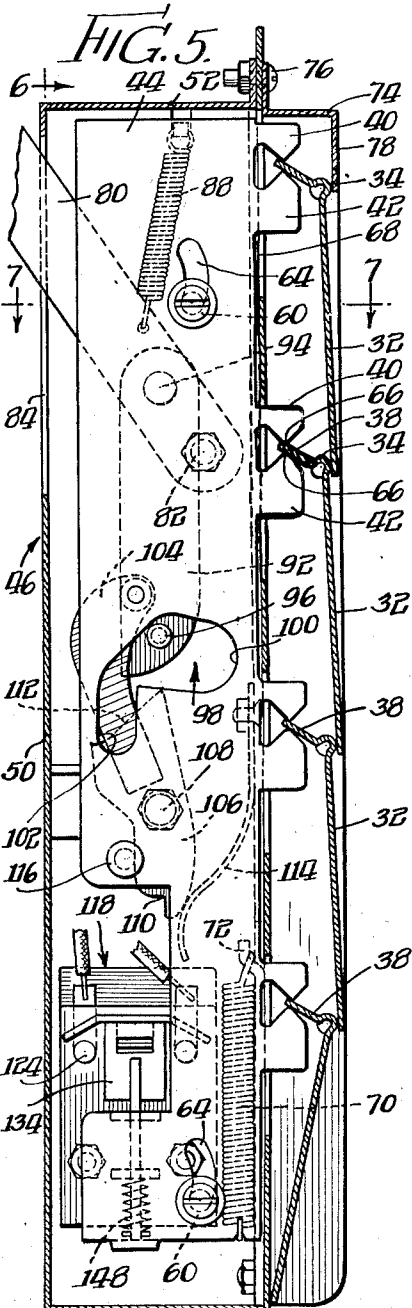
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3 Sheets-Sheet 2



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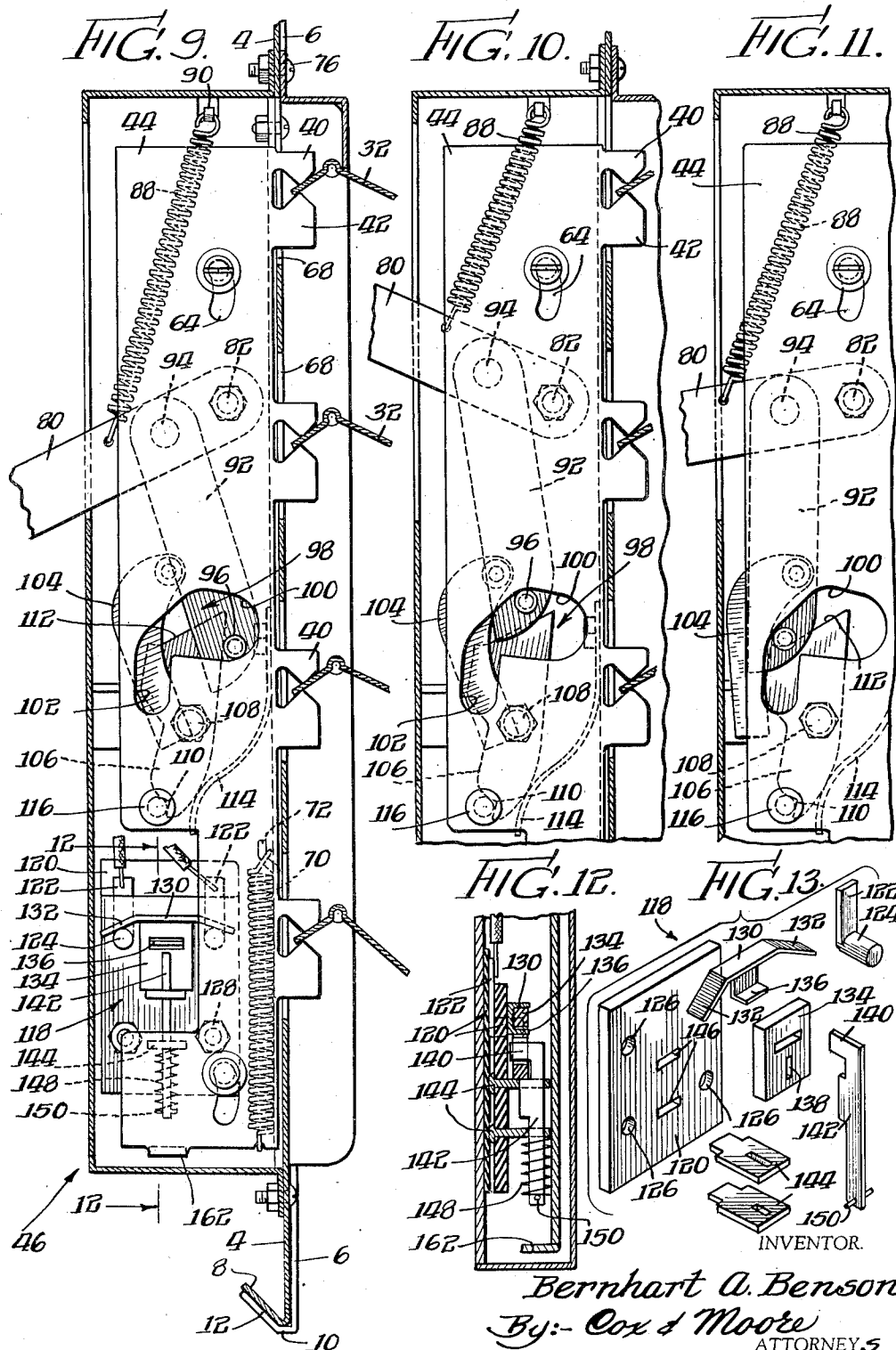
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PORTABLE VENTILATOR

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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

2,228,224

PORTABLE VENTILATOR

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Application June 30, 1938, Serial No. 216,651

8 Claims. (Cl. 98—94)

This invention relates to a ventilator of the type employing an electric fan, and more particularly to a portable, window ventilator of said type.

5 It is an object of applicant's invention to provide a compact and efficient fan ventilator which is of simple construction from the manufacturing standpoint, and, although inexpensive, is yet rugged and pleasing in appearance.

10 Another object of the invention is the provision of inexpensive and efficient means operating the ventilator while simultaneously controlling the electric fan.

15 A further object of the invention is the provision of a portable fan ventilator in which the shutter blades or slats are positively held against vibration in both their open and closed positions.

Applicant's invention further contemplates the provision of an adjustable fan ventilator 20 of such construction that the maximum number of parts thereof may be inexpensively produced from sheet metal by stamping or pressing operations and wherein, notwithstanding the sheet metal construction, vibration is effectively prevented.

25 A still further object of the invention is to provide a portable, window ventilator which is adjustable for different sizes of openings and, when adjusted, cooperates with the window sash and/or frame to completely close and render weatherproof the window opening in which it is installed.

30 Other and further objects and advantages of the invention will be apparent from the following description when taken in connection with the accompanying drawings, wherein:

35 Fig. 1 is a view in elevation showing the ventilator secured in operative position in a window opening.

40 Fig. 2 is a vertical section taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is a view in perspective showing the adjustable parts of the ventilator frame.

45 Fig. 4 is a fragmentary view in vertical section taken substantially along the line 4—4 of Fig. 1.

Fig. 5 is a vertical section taken along the line 5—5 of Fig. 1.

50 Fig. 6 is a fragmentary section along the line 6—6 of Fig. 5.

Fig. 7 is a fragmentary, horizontal section taken along the line 7—7 of Fig. 5.

Fig. 8 is a fragmentary end view in perspective of one of the slats.

55 Figs. 9, 10 and 11 are vertical sections similar

to Fig. 5 but showing the several elements in different positions of operation.

Fig. 12 is a fragmentary, vertical section along the line 12—12 of Fig. 9.

Fig. 13 is an exploded view in perspective of 5 the fan control switch.

As shown in Figs. 1 and 3, the ventilator of the present invention comprises a sheet metal frame 2 which includes a main body portion 4 and adjustable end wings 6. The main body 10 portion 4 is provided at its upper and lower edges with inwardly turned and inclined flanges 8 extending from end to end thereof. Each adjustable wing is provided along its upper and lower edges with rearwardly extending, horizontal 15 flange portions 10 and integral, inclined flange portions 12 extending inwardly from the flange portions 10. The attaching lugs 14 are formed integrally with the side wings 6 and extend rearwardly from the outer side edges of the wings 6. The wings 6 are adjustably mounted at opposite ends of the main body portion 4 with their horizontal flange portions 10 in slid- 20 able engagement with the opposed edges of the main body portion and with their inclined flange portions 12 in slidable engagement with the inclined flanges 8 of the main body portion. 25

Vibration-preventing means, such as wing screws 16 received in spaced openings 18 in the main body portion 4, lock the wings in adjusted 30 positions relative to the main body portion. The openings 18 may be threaded to receive the screws 16 or nuts 20 at the openings 18 may be welded or otherwise secured to the main body portion 4 to receive the screws 16. 35

The frame 2 may be secured—preferably in the upper portion of the window opening in which is normally received the upper window sash—by means of suitable screws, bolts or the like 22 passing through the attaching lugs 14 40 into the window frame.

The main body portion 4 of the frame 2 is provided with a preferably circular ventilator opening 24 adapted to be opened and closed by a shutter or closure means 26 and to have air 45 circulated therethrough by means of an electric fan 28.

The shutter 26 preferably comprises sheet metal angle irons or supports 30 riveted or otherwise secured to the main body portion 4 to extend 50 in a vertical direction on opposite sides of the opening 24. Blades, vanes, or slats 32, preferably of sheet metal, are each formed along their upper edges with substantially semicircular ribs or ridges 34 which extend beyond its side edges 55

to form pivots received in suitable openings 36 in the supports 30.

Each slat is formed at its upper edge with a laterally directed flange, lug, or finger 38 operatively received between the spaced fingers 40 and 42 of a slide bar 44. As shown in Fig. 5, the lug 38 of the lower slat 32 extends rearwardly or laterally from the main portion of the slat at an angle which is less than the angle between the lug 38 and the main portion of each slat thereabove so that when the operating slide bar 44 is in its upper position the lower edge of the lower slat 32 will firmly engage the front face of the main body portion 4 of the frame 2 and the lower edges of each upper slat will firmly engage the longitudinally extending rib or ridge 34 of the next lower slat.

The slide bar 44 forms part of a shutter operating and fan controlling mechanism 46. This mechanism is preferably mounted within a sheet metal housing formed by a sheet metal angle iron or bracket 48 welded or otherwise secured to the rear face of the main body portion 4 of the frame 2 adjacent the ventilating opening 24 and a two-sided sheet metal cover 50 having flanges 52 and 54 forming the top and bottom walls of the housing. The cover 50 may be secured to the main body portion 4 of the frame 2 as by means of bolts 56 passing through the frame and through flanges 58 formed integrally with the flanges 52 and 54.

The slide bar 44 of the operating mechanism 46 is slidably mounted within the housing for vertical reciprocating movement by means of pins or bolts 60 secured to the bracket 58 and spacers 62 carried by said pins or bolts 60, the pins 60 passing through arcuate slots 64 in the slide bar 44. The spacers 62 may of course be formed integrally with the pins or bolts 60.

The fingers 40 and 42 are formed with aligned, knife-like edges 66 engaging the lug 38 and defining oppositely inclined surfaces of substantial extent, which surfaces engage the opposed faces of the lug 38 when the slat is in its open position or its closed position so as to prevent movement or vibration of the slat relative to the operating fingers 40 and 42 when the shutter is in either of its adjusted positions. Each pair of operating fingers 40 and 42 is received in the passes through a slot 68 in the frame 2.

A coil spring 70, secured at one end to a lug 72 struck from the frame 2 and its other end to the lower edge of the slide bar 44, provides means for returning the slide bar 44 to its upper position and for applying to the blades or slats of the shutter a vibration-preventing force, which, when the blades or slats are in closed position, causes the lower blade or slat to resiliently and firmly press at its lower edge against the frame and each upper slat to resiliently and firmly press against the next lower slat.

A cover 74 for the upper edge of the shutter preferably comprises a Z-bar of sheet metal secured by a bolt 76 extending through one of its flanges to the body portion 4 of the frame 2 and having its depending flange 78 resiliently and firmly engaging the rib or ridge 34 of the upper slat 32. The cover 74 extends between the supports 30 and therefore acts to completely close the upper edge of the shutter.

By reason of the pressure engagement between the cover flange 78 and the upper slat 32; between each of the upper slats 32; and between the lower slat 32 and the frame, the ventilating opening 24 is completely sealed by the shutter

and vibration of the element effectively prevented.

The slide bar or operating member 44 is moved to its lower position causing opening of the shutter by means of a lever 80 pivoted at one end as at 82 to the bracket 48 and extending outwardly of the housing through an elongated slot 84 in the cover 50. The pull cord, chain or the like 86 (Fig. 2) depends from the free end of the lever 80 to provide means for manually manipulating said lever. A coil spring 88, secured at one end to a lug 90 struck from or formed on the bracket 48 and at its other end to the lever 80, normally urges and maintains the lever 80 in its raised position at the upper end of the slot 84.

A link 92, maintained by gravity in a vertical position, is pivotally connected as at 94 above the pivot 82. The link 92 is provided, adjacent its lower end, with a laterally extending pin 96 received in a slot or groove 98 in the slide bar 44. The slot or groove 98 is formed to provide an opening 100 extending forwardly from the normal position of the pin 96, as seen in Fig. 5, and an opening 102 extending first rearwardly and then downwardly with respect to the normal position of the pin 96.

A weighted link 104, pivoted to the slide bar 44 adjacent the slot 98, is maintained by the action of gravity in a position normally closing the opening 102 against the entrance of the pin 96 so that the pin 96 will engage the rear lower corner of the opening 100 and move the slide bar 44 downwardly as the lever 80 is rotated about its pivot 82. A latch or catch 106 is pivoted to the bracket 48 as at 108 and is provided at its lower end with a latch face or finger 110 and at its upper edge above the pivot 108 with a cam surface 112.

A resilient strip or spring 114, secured to the base flange of the bracket 48, engages the latch 106 adjacent its lower edge so as to normally urge the same in a clockwise direction, as seen in Figs. 5, 9, 10 and 11. A pin 116 secured to, and extending laterally with respect to, the slide bar 44, engages the latch face or finger 110 when the slide bar 44 has been moved to its lower position, as seen in Figs. 9 and 10.

A switch unit 118 is mounted adjacent the lower end of the bracket 48 and is controlled by the movements of the slide bar 44. This switch unit preferably comprises a pair of insulating strips or plates 120 between which is clamped a pair of terminal members 122 having contact buttons 124 projected through openings 126 in the outer strip 120. Bolts 128 passing through the insulating strips 120 secure the switch unit to the bracket 48. A movable switch member 130, having opposed contact engaging projections 132, is carried by an insulating block 134 mounted on the laterally extending lug 136 of the movable switch member 130. The insulating block 134 receives in a slot 138 the laterally bent end 140 of a switch operating strip or bar 142. The strip or bar 142 is slidably received in spaced insulating guide pieces or blocks 144 mounted in slots 146 in the outer insulating strip 120 and having their inner ends bent over into clamping engagement between this outer insulating strip 120 and the inner insulating strip 120. A coil spring 148 encircles the lower portion of the strip or bar 142 and is interposed between the lowermost guide piece or block 144 and the pin 150 carried at the lower end of the strip or bar 142 so as to normally urge this bar in a downward direction whereby the movable switch member 130 en-

gages, and completes a circuit between, the fixed contacts 124.

The switch unit 118 controls the energization and de-energization of a motor 152 forming a part of the electric fan 28, the shaft of which is concentric with the ventilating opening 24. The motor 152 is mounted on the frame 2 by means of crossed bars 154 secured at their opposite ends to the main body portion 4 of the frame 2 as by bolts or the like 156. At least one of the crossed bars 154 is offset centrally as at 158 to form a bearing support for the extending end of the motor shaft upon which are mounted the fan blades 160.

The movable switch member 130 is moved out of contacting engagement with the contacts 124 to break the motor circuit by means of a laterally bent lug 162 formed at the lower edge of the slide bar 44, which, as the bar 44 moves upwardly, engages the strip or bar 142 and moves it upwardly against the action of the spring 148.

The operation of the shutter operating, and fan controlling, mechanism 46 is substantially as follows: The unoperated position of the parts is as shown in Fig. 5, in which position the spring 70, acting through the slide bar 44, maintains the shutter blades or slats in tightly closed position sealing the ventilating opening 24.

As the lever 80 is moved downwardly about its pivot 82 in response to the manipulation of the cord 86, the pin 96, carried by the freely hanging link 92, is directed by the weighted link 104 into engagement with the rear lower corner of the opening 100. Continued downward movement of the lever 80 causes the pin 96 to move downwardly, thereby forcing the slide bar 44 downwardly against the action of the spring 70 and this slide bar, through its spaced pairs of operating fingers 40 and 42, causes the shutter blades or slats 32 to be moved into open position, as illustrated in Fig. 9.

As the slide bar 44 moves downwardly, the pin 96 moves forwardly along the bottom wall of the opening 100 so as to clear the forward edge of the latch or catch 106. When the bar 44 reaches its lowermost position, the pin 116 becomes aligned with the latch face or finger 110 and a spring 114 rotates the catch or latch 106 clockwise, as seen in Figs. 5 and 9 to 11, thereby causing the latch face or finger to engage the upper portion of the pin 116 and prevent upward movement of the slide bar 44 under the action of the spring 70. As the latch bar 44 descends, its lug 162 moves out of contact with the strip or bar 142 and permits this bar to move downwardly under the action of the spring 148 and move the switch member 130 into engagement with the contacts 124, thereby completing the circuit to the fan motor 152. Consequently rotation of the fan blades is initiated simultaneously with the movement of the slats 32 into open position. No reverse flow of air, carrying dust or other foreign matter, can therefore occur, for there is no time interval or lag between the opening of the shutter and the operation of the fan.

After the bar 44 has been moved to, and latched in, its lower position, the spring 88 returns the lever 80 and the freely hanging link 90 to an upper position as shown in Fig. 10, the pin 96 moving to this normal position along the forward part of the opening 100 in advance of the forward edge of the catch 106 and along the upper portion of the opening so that when the link 92 reaches this position the pin 96 overlies the cam surface 112 of the catch 106.

In order to close the shutter 26 and deenergize the fan 28, the lever 80 is again moved downwardly about its pivot 82 by manipulation of the cord 86. The pin 96, carried by the freely hanging link 92, now moves rearwardly and downwardly along the cam surface 112 of catch 106 which is now effectively held against rotation by the spring 114. The pin 96, in moving downwardly along this cam surface, forces the weighted link 104 counterclockwise to uncover the opening 102 and as the pin reaches the bottom of the cam surface 112 it becomes trapped between said surface and the rear edge of the opening 102. Further downward movement of the pin 96, caused by the continued downward movement of the lever 80, in turn causes rotation of the catch 106 in a counterclockwise direction against the force of the spring 114 and releases the pin 116 from the latch face or finger 110.

As soon as the pin 116 is released from the catch 106, the spring 70 quickly snaps the slide bar 44 to its upper position, thereby closing the shutter 26 and simultaneously through the lug 162 and the switch operating strip or bar 142, moving the switch member 130 out of engagement with its contacts 124 to break the circuit to the fan motor 152. The opening 102 is of a sufficient extent in the vertical direction so that even if the lever 80 is held in its lowermost position after the catch 106 has been released, the slide bar 44 will be returned to its uppermost position, as shown in Fig. 5.

It will be seen from the foregoing description that applicant has provided a compact and efficient portable fan ventilator which is of inexpensive yet rugged construction, and which is adjustable for different sizes of openings and when adjusted cooperates with the window sash and/or frame to completely close and render weather-proof the window opening in which it is installed.

Changes may be made in the form, construction and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its attendant advantages, and the right is hereby reserved to make all such changes as fairly fall within the scope of the following claims.

The invention is hereby claimed as follows:

1. A ventilator comprising a supporting frame, a shutter having a plurality of slats pivoted on said supporting frame, a reciprocable member carried by said supporting frame, means connecting the several slats to the reciprocable member whereby upon reciprocation of said member, said shutter is opened and closed, resilient means for moving said reciprocable member in one direction, means for latching said member against movement by said resilient means, manually operable operating means, and means connecting said operating means to said latching means when the reciprocable member is at one limit of its movement for releasing said latching means and connecting said operating means to the reciprocable member when said reciprocable member is at its other limit of movement for moving said member in the opposite direction.

2. A ventilator comprising a supporting frame, a shutter having a plurality of slats pivoted on said supporting frame, a reciprocable member carried by said supporting frame, means connecting the several slats to the reciprocable member whereby upon reciprocation of said member, said shutter is opened and closed, resilient means for moving said reciprocable member from a first extreme position to a second extreme position, shift-

able means carried by the supporting frame for latching said member against movement under the action of said resilient means, an operating lever, connecting means carried by said operating lever and adapted to engage said latching means for releasing said latching means and adapted to engage said reciprocable member for moving said reciprocable member from said second position to said first position, and means directing the connecting means into engagement with the latching means when the reciprocable member is in the first position and directing the connecting means into engagement with the reciprocable member when said reciprocable member is in the second position.

3. A ventilator comprising a supporting frame, a shutter having a plurality of slats pivoted on said supporting frame, a reciprocable member carried by said supporting frame, means connecting the several slats to the reciprocable member whereby upon reciprocation of said member said shutter is opened and closed, resilient means for moving said reciprocable member from a first position to a second position, means for latching said member against movement under the action of said resilient means, and operating means for releasing said latching means when said reciprocable member is in said first position and for moving said reciprocable member from said second position to said first position, said operating means comprising lever means, means for causing said lever means to be operatively connected to said latching means when said reciprocable member is in said first position, and means for causing said lever means to be operatively connected to said reciprocable member when said member is in said second position.

4. A ventilator comprising a supporting frame, a shutter having a plurality of slats pivoted on said supporting frame, a reciprocable member carried by said supporting frame, means connecting the several slats to the reciprocable member whereby upon reciprocation of said member said shutter is opened and closed, resilient means for moving said reciprocable member from a first position to a second position, means for latching said member against movement under the action of said resilient means, and operating means for releasing said latching means when said reciprocable member is in said first position and for moving said reciprocable member from said second position to said first position, said operating means comprising a lever pivoted on a fixed axis, a freely hanging link pivotally connected to said lever for bodily movement with said lever, a pin carried at the free end of said link, said reciprocable member having intercommunicating openings extending transversely with respect to each other, said latching means having a portion thereof disposed in the position in transverse alignment with one of said openings when said reciprocable member is in said first position so as to be engaged by said pin when the pin is moved along the said one opening, said pin being engageable with the wall of the other opening when said reciprocable member is in said second position, and means for directing said pin into the one or other of said openings in accordance with the position of said reciprocable member.

5. A ventilator comprising a supporting frame, a shutter having a plurality of slats pivoted on said supporting frame, a reciprocable member carried by said supporting frame, means con-

necting the several slats to the reciprocable member whereby upon reciprocation of said member said shutter is opened and closed, resilient means for moving said reciprocable member from a first position to a second position, means for latching said member against movement under the action of said resilient means, and operating means for releasing said latching means when said reciprocable member is in said first position and for moving said reciprocable member from said second position to said first position, said operating means comprising a lever pivoted on a fixed axis, a freely hanging link pivotally connected to said lever for bodily movement with said lever, a pin carried at the free end of said link, said reciprocable member having intercommunicating openings extending transversely with respect to each other, said latching means having a portion thereof disposed in a position in transverse alignment with one of said openings when said reciprocable member is in said first position so as to be engaged by said pin when the pin is moved along the said one opening, said pin being engageable with a wall of the other opening when said reciprocable member is in said second position, said latching means also having an additional portion extending into the said other opening for directing the pin into said one opening when said reciprocable member is in said first position, and means closing the said one opening when said member is in its second position for directing said pin into said other opening.

6. A ventilator comprising a supporting frame, a shutter having a plurality of slats pivoted on said supporting frame, each slat having a lug extending reversely from an edge thereof, a reciprocable member carried by said supporting frame and having spaced pairs of laterally extending slotted members of which each pair comprises spaced knife-like edges each defined by diverging surfaces, the lug of each slat being received between the knife-like edges of each pair of slotted members and engaging the outer defining surface of one member and the inner defining surface of the opposed member when the slat is in open or closed position thereby preventing rattling of the slats in both of these positions.

7. A ventilator comprising a supporting frame, a shutter having a plurality of slats pivoted to said supporting frame, a reciprocable member carried by said supporting frame, means connecting the several slats to the reciprocable member whereby upon reciprocation of said member, said shutter is opened and closed, resilient means for moving said reciprocable member from a first position to a second position, means for latching said member against movement by said resilient means and manually operable mechanism including means engaging said latching means when said reciprocable member is in said first position to release said latching means and engaging said reciprocable member when said member is in said second position to move said member to the first position.

8. A ventilator comprising a supporting frame having an opening therein, an electric fan carried by said frame for circulating air through said opening, a shutter for said opening, said shutter having a plurality of slats pivoted to the supporting frame, each slat having a lug extending reversely from an edge thereof, a reciprocable member carried by said supporting frame and having a plurality of pairs of spaced fingers for receiving

the reversely extending lugs of the several slats whereby upon reciprocation of said member said shutter is opened and closed, resilient means for snapping said reciprocable member from a first position in which the shutter is opened to a second position in which the shutter is closed, means for latching said member against movement under the action of said resilient means, a manually operable member, means for operatively connecting said manually operable member to said latching means to release said latching means when said reciprocable member is in said first position, means for operatively connecting said manually operable member to said reciprocable member when said reciprocable member is in said second position to move said reciprocable member to said first position, and switch means responsive to the snapping of said reciprocable member to the second position for de-energizing said fan upon the closing of said shutter and actuated by the reciprocable member in moving to the first position to energize said fan upon the opening of the shutter.

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