Aug. 21, 1951 J. P. JOHNSON 2,565,131

VENTILATOR

Filed May 12, 1948

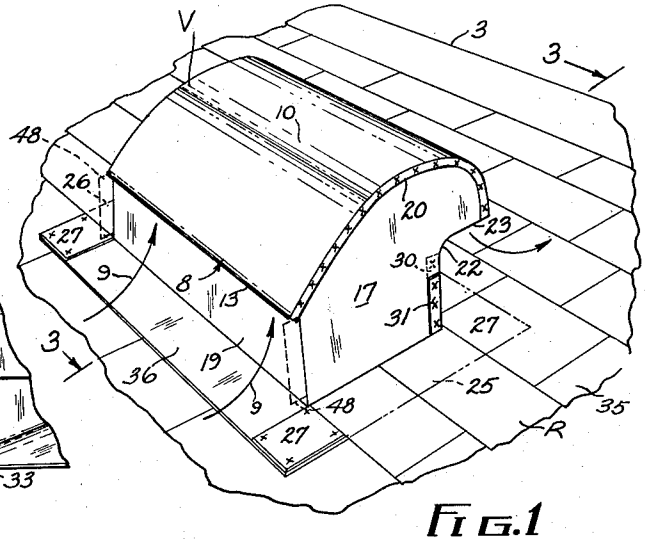


FIG. 1

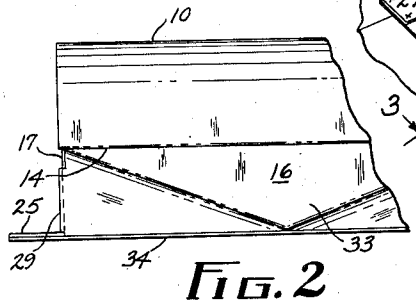


FIG. 2

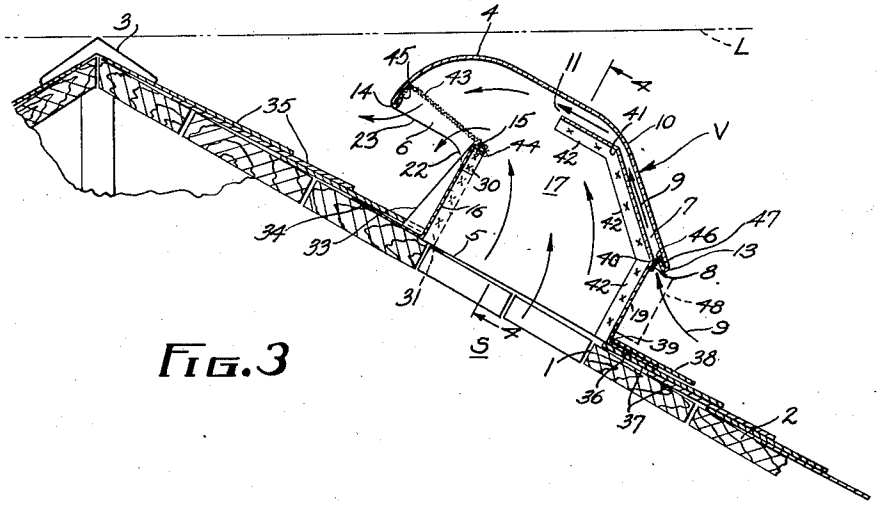


FIG. 3

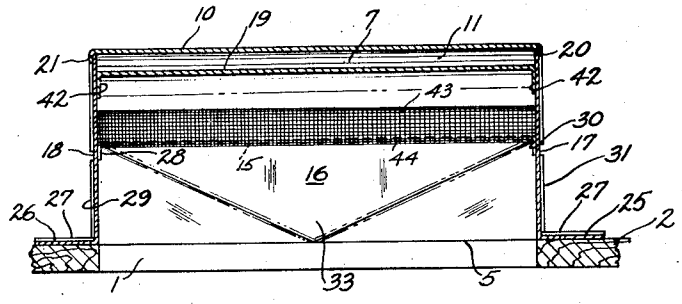


FIG. 4

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VENTILATOR

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8 Claims. (Cl. 98—42)

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This invention relates to roof ventilators and more particularly to improvements in that type of roof ventilator adapted to be installed on the sloping or gabled roofs of dwellings where the roof is sloping and ordinarily shingled or slated.

It is among the objects of my invention to provide a roof ventilator that is especially well adapted to the service required on a sloping, gabled roof of a dwelling. Another object is to provide a roof ventilator of the within type of high aerodynamic efficiency and which will take advantage of air movements exterior of the roof of a dwelling to enhance the movement of air from within the dwelling and below the roof thereof. Another object is to provide a ventilator of the within type that is pleasing in appearance and is weatherproof under substantially all weather conditions and, more particularly, will exclude rain whether wind driven or otherwise as well as snow and sleet. A further object is to provide a ventilator of the within type that is of attractive appearance, economical of construction, light in weight and easily installable. A further object is to provide a ventilator of the within type that satisfactorily excludes insects, birds, squirrels, chipmunks and other furred or feathered animals.

A further and more specific object is to provide a roof ventilator that will take advantage of gravity to induce the outflow of air from the space below the roof on which it is mounted and will also take beneficent advantage of the flow of air adjacent to the roof surface to supplement and aid the gravity flow through the ventilator. Another object is to provide a roof ventilator for a sloping or gabled or hip roof dwelling or similar structure that may be readily and conveniently positioned upon the roof in substantially any desirable place and more particularly in desirable relation to the ridge or peak thereof whereby to take advantage of the wind currents and flow of air to facilitate outflow of air from the ventilator. Another object is to provide flashing that will be easily incorporated with shingles or slate of the roof of a dwelling to facilitate the run-off of rain from the ventilator and from the roof opening therein or thereunder.

Other objects and advantages will appear from the following description of a preferred form of my invention reference being had to the accompanying drawings in which Figure 1 is a perspective view of my ventilator as installed on a sloping shingled roof as viewed from the lower right rear corner thereof; Figure 2 is a broken front elevation of my ventilator; Figure 3 is a longitudinal section taken in the plane of the line 3—3 of Figure 1, and Figure 4 is a transverse sectional view taken in the plane of the line 4—4 of Figure 3.

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As shown in Figures 1 and 3 my ventilator V, in the preferred form illustrated and disclosed herein, is adapted to cover a roof opening 1 in a sloping shingled roof 2 and preferably my ventilator is disposed near the ridge or peak 3 of the roof so that the highest point of the ventilator 4 is at about or but slightly below the height of the ridge or peak 3 as suggested with reference to the broken line L. Depending on the slope of the roof and as suggested in Figure 3, I have observed and believe that the ventilator operates at its best efficiency or best mean efficiency with respect to the movement of external air in all directions when it is positioned on the roof in relation to the ridge or peak 3 thereof, substantially as shown in Figure 3, with the ventilator positioned about its own gross longitudinal length down the roof from the ridge. As shown particularly in Figure 3 my ventilator facilitates the outflow of air from within the attic or space S below the roof to be ventilated; the air passing upwardly through the bottom inlet opening 5 of the ventilator, turning upwardly and leftwardly as viewed in Figure 3 and passing out through the upward and forward outlet opening 6 thereof. As also shown in Figures 1 and 3 my ventilator also comprises an ejector or booster passage 7 having its inlet opening 8 facing downwardly and rearwardly of the ventilator wherewith to accept air moving upwardly of the roof as suggested by the arrows 9. The passage 7 is defined in part by the rearward portion of the top cover element 10 of the ventilator and the passage has its outlet 11 adjacent the mid-portion of the interior of the top cover and preferably slightly forwardly of the longitudinal middle of the inlet opening 5 wherewith the flow of air through the passage 7, as suggested by the arrows 9 in Figure 3, continues beyond the outlet 11 of the passage 7 to and through the main outlet 6 of the ventilator thereby aiding, abetting and accelerating the movement of air through the ventilator by way of the inlet opening 5 and outlet opening 6.

In the preferred form of my ventilator the top cover member 10 has a rearwardly and downwardly sloping portion terminating at the opening 8 throughout the whole transverse dimension thereof in a beaded edge 13 which stands above the surface of the roof a considerable distance, preferably of the order of about three or four inches. From a point about opposite the longi-

tudinal middle of the inlet opening 5 the cover preferably extends substantially parallel with the plane of the roof to a point about opposite the forward edge of the inlet opening where the cover takes a long radius curve forwardly to its forward transverse terminal edge 14, see also Figure 2, which preferably like the rearward edge 13 is also beaded and inturned both for stiffness, finish and otherwise as will presently more fully appear. Preferably the forwardly curved portion of the cover 10 is curved on an arc struck from about the point 15 as a center; the point 15 lying in the top transversely extending, preferably straight, turned edge of the forward and upwardly facing front wall 16 of the ventilator.

Underlying, supporting and combined with the top cover 10 of my ventilator are side walls 17 and 18, the above mentioned front wall 16 and a rear wall 19. The side walls 17 and 18 are preferably of the same shape with their upper edges curved to conform with the curved and sloping shape of the cover 10 and are secured to the cover as by being spot welded to and within overlying flanges 20 and 21 respectively turned and bent downwardly at the transverse ends of the cover wherewith a weather-tight relation of cover and sides is obtained, see Figs. 1 and 4. As best shown in Figs. 1 and 3 the side walls 17 and 18 are notched at their forward and lower corners as at 22 to a height along the edge 23 but slightly lower than the top edge 15 of the front wall 16. Thus the edges 14 and 15 and the portions of the side walls adjacent the edges 23 define the outlet opening 6 of the ventilator. The side walls 17 and 18 also have outwardly extending bottom flashing flanges 25 and 26 respectively which extend transversely away from the walls approximately a few inches wherewith to underlie a substantial part of the width of adjacent shingles to flash the roof opening. The flashing flanges 25 and 26 extend fore and aft beyond the fore and aft edges of the side walls approximately the same distances they extend laterally therefrom whereby to form substantially square overlaps and preferably spot welded bonded joints 27 with corresponding extensions of the flashing flanges of the front and rear walls yet to be described but shown best in Figs. 1 and 3.

The front wall 16 has rearwardly turned end flanges 28–31 at each of its ends joined to the forward vertical edges and adjacent parts of the side walls 17 and 18 in the notched portions thereof as by spot welding; the lower flange 31 at the "right" end of the wall 16, see Fig. 1, preferably lying exteriorly of the wall 17 and the upper "right" flange 30 lying interiorly of the wall 17, see Figs. 3 and 4, to accommodate the curve of the notch of the side wall and to join the walls securely and in weather-tight relation to each other. At the "left" end of the wall 16 the flanges 28 and 29 are similarly joined to the wall 18, see Fig. 4, in the same way for the same reasons. Preferably the front wall 16 is cricketed as at 33 wherewith its lower mid-portion lies forwardly of its upper mid-portion, Figs. 2, 3 and 4, wherewith to have a flattened somewhat snow-plow like external configuration to invite drainage from its middle toward and around its ends and to tend to divert down drafts rightwardly and leftwardly rather than upwardly into the outlet opening 6 of the ventilator. Joined with the front wall is a lower flashing flange 34 adapted to lie under adjacent roof shingles 35 and be joined in overlapping bond as at 27 with the side flashing flanges 25 and 26 at the right and left forward corners of the ventilator. Preferably the lower

edge of the front wall 16 is turned and spot welded to the flashing flange 34 and otherwise joined thereto in fluid tight relation wherewith to exclude water from entering the roof opening 1 adjacent thereto.

The rear wall 19 rises at right angles from an integral flashing flange 36, the latter being adapted to overlie the upper ends of adjacent shingles 35, and if desired to be sandwiched between underlying and overlying shingles 37 and 38 as shown in Fig. 3; a little caulking 39 preferably being inserted between the upper ends of the overlying shingles 38 and the lower part of the wall 19 to keep moisture from getting below the shingles 38. The flange 36 preferably extends rightwardly and leftwardly beyond the ends of the wall 19 where the ends of the flange are bonded or spot welded in and to the overlapping joints 27 at the rear of the ventilator with the side flashing flanges 25 and 26.

The several flashing flanges 25, 26, 34 and 36 overlapping and joining at the corners 27 lie substantially in a common plane, comprising a base from which the side walls and rear wall and the ends of the front wall rise at substantially right angles; the flashing as a whole being yielding enough to be interleaved, especially at and near the rearward corners, with the roof slate or shingles to exclude moistures and weather from the roof opening 5 over which the ventilator is disposed.

The rear wall 19 rises normal to the flashing and roof to a point, i. e. a line, 40 at about the height of the edge 13 of the cover 10 where the rear wall is inclined forwardly in substantial parallelism with the rearwardly sloping part of the cover 10 and spaced therefrom to define the lower and inner wall of the booster passage 7. The wall 19 is again bent at the point, i. e. line, 41 to persist in substantial parallelism with the top cover 10 (and in substantial parallelism with the plane of the flashing) and continues in this plane to the outlet 11 of the booster passage above mentioned and described. As best shown in Figs. 3 and 4, the rear wall 19 has a plurality of inturned end flanges 42 bearing on and attached as by spot welding, to the adjacent edge portions of the side walls 17 and 18 respectively wherewith to secure the parts together in a strong rigid mutually self-sustaining structure.

Completion of a finished ventilator, apart from coating, treating or painting, if any, the surfaces thereof, includes the provision of insect screens at the openings 6 and 8. At the opening 6 a sheet of screen 43 of length equal to the transverse length of the opening has its rearward edge folded and/or folded and crimped or otherwise secured to the bent edge 15 of the front wall 16 and has its forward edge secured in the turned bead 14 of the top cover 10. The screen 46 extending the full transverse length of the opening 8 has its rearward edge 47 crimped and secured in the turned bead 13 of the cover 10 and its body is preferably merely bent and forced into the passage 7 with its forward edge bearing on the wall 19 in resilient contact therewith; the screen presenting a concave outwardly facing configuration at the opening 8, barring entrance of insects to the passage 7.

As shown in Figs. 1 and 3 the rearward edge 13 of the cover 10 overhangs the upstanding lower portion of the wall 19 and is spaced rearwardly of the point or line 40 thereof wherewith to "trap" air flowing upwardly of the roof in the direction suggested by the most rightwardly of the arrows 9

in Figure 3. I have found it advantageous to dispose this trapping inlet opening 8 of the booster passage 7 a considerable distance above the plane of the shingled surface of the roof, as for example about three inches because, as I now believe, air movement upwardly of the roof is more free such a distance above the shingles than more proximate thereto. Possibly the butt ends of the shingles set up impeding eddies and retard air movement "up" the roof directly adjacent the surface of the shingles. In all events I have found an air movement at about the height mentioned that is good for my purpose and can be trapped and directed into the passage 7 wherewith to greatly augment the flow through the main inlet 5 and outlet 6 of my ventilator even when the external air movement is small. I also take advantage of the thermally induced air movement "up" the roof as when the summer sun heats the shingles and causes a thermal flow regardless of external air or wind movements as such.

To enhance the trapping of air moving up the roof toward the rear of my ventilator I also contemplate that the side walls 17 and 18 may advantageously have rearward extensions 48 shown in dotted lines in Figs. 1 and 3 wherewith to tend to induce upwardly moving air to enter the opening 8 rather than slip or spill around the rearward corners of the ventilator and to incline diagonal currents into the opening 8.

Preferably my ventilator is made of light gauge sheet aluminum stock albeit other materials familiar to roofers and sheet metal workers may well be employed with their known advantages and limitations. Preferably my ventilator may advantageously take substantially the proportions shown in the drawings, having regard however for my preference stated above that the inlet opening 8 of the syphon passage stand at or about three inches above the roof surface. The particular embodiment of my invention from which the within drawings were made with proportions that I have found advantageous stood about 6" high from flashing to top cover, had the edges 13 and 14 about 3" above the flashing, had the opening 5 about 6½" fore and aft, as viewed in Fig. 3, had the outlet opening 6 about 3" between the edges 14 and 15 with the edge 15 about 3" below the cover 10, and the syphon passage was about ½" to ¾" wide as viewed in Fig. 3. This ventilator had a transverse dimension of 14" which gave it an attractive external proportion and shape as well as a convenient correspondence with the usual spacing of roof rafters.

Tests on my novel ventilator located and operated on a sloping roof substantially as shown in Figs. 1 and 3 have shown a number of results indicative of the mode of operation and advantages of my invention. In a number of tests my ventilator was compared with a popular prior art type ventilator which had its outlet opening facing downwardly of the slope of the roof and contained no syphon or booster passage. In a series of such comparative tests involving a variety of wind velocities and directions my ventilator was operated with the booster passage alternately opened as hereinabove described and arbitrarily closed off to obtain the comparative measure of the results of the use of the booster passage. The tests were run under a variety of different inside and outside temperature conditions. The prior art type ventilator was of somewhat larger nominal capacity than the embodiment of my ventilator used in the test. Generally speaking my ventilator operated satisfactorily under all conditions under which it was tested and moved as I believe an unusually large quantity of air out of the space under the roof for the nominal capacity of the ventilator. At the same time and under the same conditions the prior art type ventilator very often showed negative results, the air moving into the space to be ventilated rather than out of the space. Under every test my ventilator with or without the use of the booster passage appeared to be superior in every respect to the prior art type ventilator. The use of the booster passage in substantially every instance added materially to the efficiency and performance of my ventilator often increasing the outflow of air as much as 50%. I have also observed that my ventilator operated efficiently in removing air from the space to be ventilated when the outside wind came from the direction across the peak of the roof adjacent to which the ventilator was mounted, that is from the left as viewed in Figure 3; my ventilator under these conditions giving a performance satisfactorily comparable to its performance when the wind was in the opposite direction, i. e. moving from the right as viewed in Figure 3.

The installation of my ventilator onto an existing roof requires essentially the mere cutting of the roof opening 1 with the removal of some of the adjacent shingles, the securing of the ventilator in its intended relation to the roof opening with the flashing flanges around the opening and overlying the shingles below the opening and thereafter the relaying of the shingles above and along side and/or around the flashing of the ventilator and lastly preferably caulking the cracks between the edges of the shingles and the adjacent parts of the lower portions of the walls of the ventilator.

While I have illustrated and described a preferred and slightly modified form of my invention changes and improvements will occur to those skilled in the art who come to understand the advantages thereof and the precepts of this specification and therefore I do not care to be limited in the scope of my patent to the particular preferred forms herein specifically disclosed nor in any manner incommensurate with the advances which my invention makes in the art.

I claim:

1. A roof ventilator comprising upstanding front, rear and side walls defining an inlet opening at the lower edges thereof adapted when positioned on a sloping roof to have its front wall facing upwardly of the roof, a top cover member overlying said walls and secured at least to said side walls, the forward portion of said top cover member overlying and spaced from said front wall and defining an outlet passage and outlet opening in relation thereto, said rear wall rising from its lower edge to a point or line from which it inclines upwardly and forwardly to overlie a substantial portion of said inlet opening, the top cover member being juxtaposed to and spaced from the said upwardly and forwardly extending portion of said rear wall and defining a booster passage therewith, said top cover member having its rearward edge terminating at about the height of the said point or line of said rear wall and rearwardly of the said upstanding portion of said rear wall wherewith to define an opening facing substantially downwardly and adapted to intercept and receive air moving toward said rear wall.

2. A roof ventilator comprising upstanding front, rear and side walls defining an inlet opening at the lower edges thereof adapted when positioned on a sloping roof to have its front wall facing upwardly of the roof, a top cover member overlying said walls and secured to said side walls, the forward portion of said top cover member overlying and spaced from said front wall and defining an outlet passage and downwardly facing outlet opening in relation thereto, the forward edge of said top cover lying about as far above the plane of said inlet opening as the top edge of said front wall, said rear wall rising at least a few inches from its lower edge to a point or line from which it inclines upwardly and forwardly to overlie a substantial portion of said inlet opening, the top cover member being juxtaposed to and spaced from the said upwardly and forwardly extending portion of said rear wall and defining a booster passage therewith, said top cover member having its rearward edge terminating at about the height of the said point or line of said rear wall and rearwardly of said rear wall wherewith to define a downwardly facing opening, said front and rear walls being joined and secured at their transverse ends to said side walls.

3. A roof ventilator comprising upstanding front, rear and side walls defining an inlet opening at the lower edges thereof adapted when positioned on a sloping roof to have its front wall facing upwardly of the roof, flashing flanges extending outwardly from said walls in the plane of said opening and overlapping and joined beyond the corners of said walls, a top cover member overlying said walls and secured to said side walls at the upper edges thereof, the forward portion of said top cover member overlying and extending forwardly beyond said front wall and the upper edge thereof and defining an outlet passage and outlet opening in relation thereto, said side walls being notched at their lower and forward corners to approximately the height of said front wall and the height of the forward edge of said cover, said front wall being lying and secured to the forward edges of the notched portions of said side walls whereby said outlet opening is disposed in a plane substantially parallel to the plane of said inlet opening and said front wall having its lower mid-portion cricketed forwardly of its ends and top edge, said rear wall having its transverse ends secured to said side walls interiorly of said side walls.

4. The ventilator of claim 3 with an insect screen for said outlet opening having its ends in contact with said side walls above said notches and its side edges secured to turned edges of said cover and front wall respectively.

5. In combination a sloping roof having a ridge and a roof opening spaced from and adjacent to said ridge, a ventilator covering and communicating with said roof opening through the inlet opening thereof, said ventilator having a front wall rising from the roof adjacent said opening and proximate said ridge and having a cover member

overlying said front wall and spaced therefrom and defining an outlet passage therewith and rising to approximately the level of said ridge above the top edge of said front wall, said cover member also extending toward said ridge and having its forward edge terminating above said roof between the upper edge of said front wall and said ridge and delineating the outlet opening of said ventilator with said front wall, said ventilator having side walls secured to the transverse ends of said cover and front wall and having a rear wall secured at its transverse ends to said side walls, said rear wall having an upwardly and forwardly extending portion overlying at least part of said inlet opening and spaced from a rearwardly and downwardly extending portion of said cover and forming an auxiliary inlet passage therewith.

6. The combination of claim 5 in which said ventilator has wings adjacent to said auxiliary inlet passage and projecting from and extending rearwardly of said rear wall whereby air flowing up said roof is guided into said auxiliary inlet passage.

7. A ventilator adapted to educe air through a roof opening in a sloping roof, said ventilator having front, rear and side walls defining at the lower edges thereof an inlet opening corresponding to the roof opening, and a top cover member, said rear wall extending upwardly and forwardly to overlie at least a portion of said inlet opening, said top cover member being fastened to said side walls and extending forwardly of said front wall and defining with said front and side walls an outlet opening, and extending rearwardly above and spaced from said rear wall and defining with said rear wall a booster passage having a rearwardly disposed inlet opening.

8. The ventilator of claim 7 having the lower middle portion of the edge of said front wall extending forwardly of the plane of the corners and upper and side edges of said front wall and forming in said front wall a cricket whereby at least water flowing toward said front wall tends to be diverted around said ventilator; and having wings adjacent the inlet to said booster passage, said wings extending rearwardly of said rear wall, whereby air flowing toward said inlet is trapped and guided into said booster passage.

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