July 2, 1940.

C. T. LUDINGTON

2,206,040

BUILDING

Filed Dec. 23, 1938

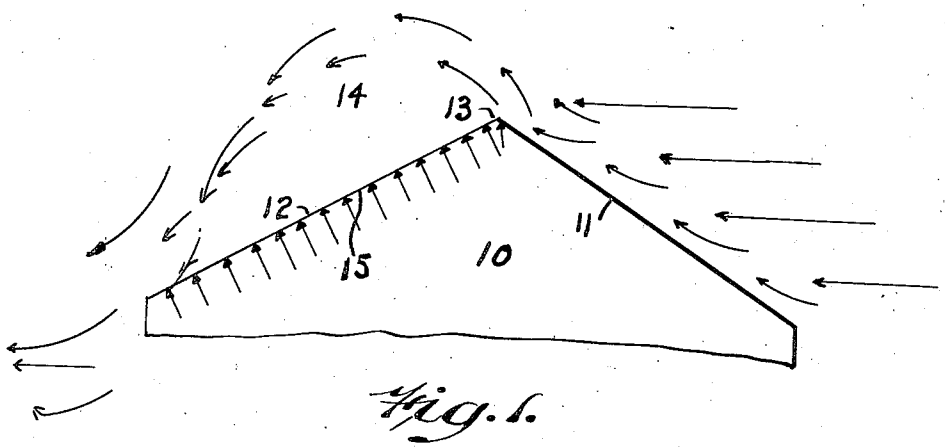


Fig. 1.

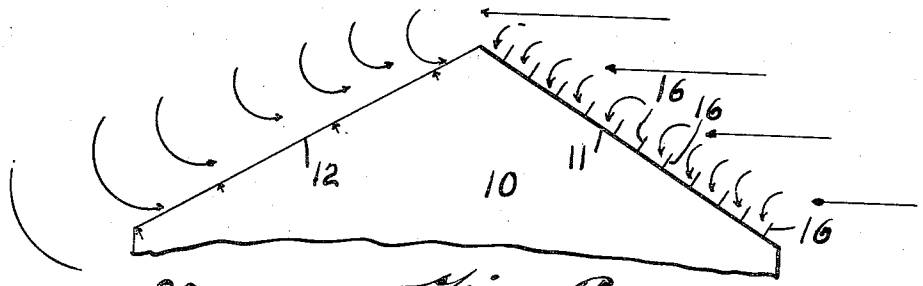


Fig. 2.

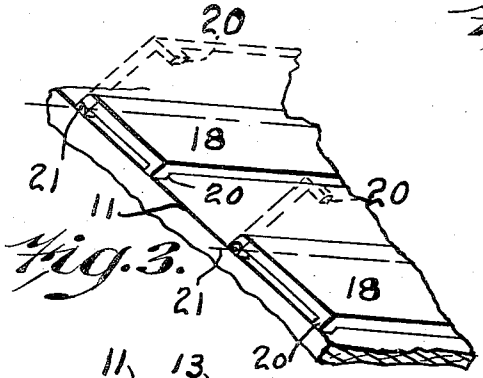


Fig. 3.

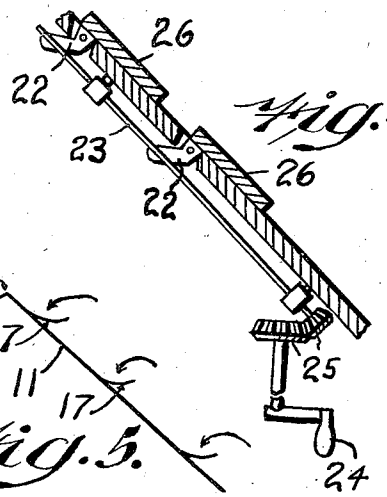


Fig. 4.

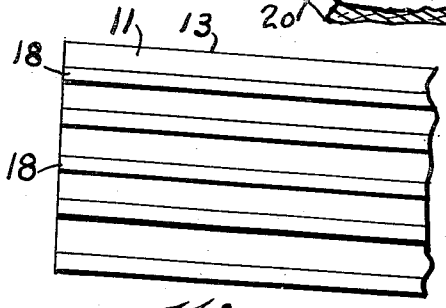


Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE

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BUILDING

Charles Townsend Ludington, Ardmore, Pa.

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7 Claims. (Cl. 108—1)

This invention relates to buildings, and particularly to improvements in roofs for building structures.

In every hurricane or other violent wind action it is a common experience that the roofs are frequently the major damage. This is usually because the contours and configurations thereof conduce toward a relatively smooth airflow analogous to that over the wing, or an airfoil of aircraft, in which although there is pressure on the windward side of the roof, the airflow is such as to induce a vacuum over the lee side such that the roof is pulled off.

It is among the objects of this invention; to obviate the disadvantages of the prior art constructions of roofs; to provide means for minimizing the smooth flow of the relative air stream over such roofs to preclude the creation of roof removing negative pressure on such roof; to provide a roof with means within the control of the householder for guarding the house against the effects of an approaching hurricane or similar disturbance; to provide a roof of such construction as to be cheaper without sacrifice of strength relative to wind effects; and many other objects and advantages will become more apparent as the description proceeds.

In the accompanying drawing forming part of this description:

Fig. 1 represents a diagrammatic elevation of a peaked roof of a building showing an illustrative airflow over and relative thereto indicating by normal short arrows the magnitude and direction of the pressure created on the lee side of such roof.

Fig. 2 represents a similar diagrammatic elevation of the same peaked roof as Fig. 1, with the invention in an illustrative form disposed in the form of upstanding flaps or the like on the windward side to cause turbulence thereon to minimize the smoothness of flow and indicating by the few shorter normal arrows the minute nature of the pressure created on the lee side with the spoiler flaps of the invention raised.

Fig. 3 represents a purely illustrative fragmentary perspective of a pair of flaps mounted on a roof.

Fig. 4 represents a fragmentary section through a form of roof with spoiler flaps pivotally mounted thereon, and arranged for manual actuation by a householder of the like.

Fig. 5 represents a fragmentary diagrammatic illustration of the side of a peaked roof with a modified form of flap mounted thereon and arranged for angular relation relative to the roof.

Fig. 6 represents a fragmentary side elevation of one side of a peaked roof with a purely illustrative form of flap arrangement and spacing in their retracted inoperative position.

In Fig. 1 a structure such as a building 10, has a peaked roof, as an example comprising a roof surface 11, which for illustrative purposes will be designated as the windward side, and a complemental roof surface 12 which will be designated the leeward side. Obviously in actuality it is impossible to so designate the roofs or surfaces as it canot be told which direction the wind may blow from, so that actually the roof portions will both be provided with the flap devices of the invention.

Assuming the strong wind blowing from the right, as in Fig. 1, it flows upwardly over the peak or apex 13, and by its flow creating a vacuum space 14 over roof element 12, thus causing an excessive internal pressure to be effective against the under side of the roof 12, as at 15 and blowing off the roof, in many cases. The general theoretical course of the airstream is indicated by the arrows externally of the roof.

It has been found that if short projections were disposed as at 16, generally perpendicularly of the roof surface, although perpendicularity is not essential, as indicated by the modification in Fig. 5 in which the flaps are slightly arcuate and angularly divergent from both the normal and the horizontal, as at 17, the incident air stream is caused to whirl or is otherwise subjected to drag or turbulence to sharply reduce its velocity as it passes over the peak 13, so that it generates but a minimized negative pressure on the lee roof and the urge outwardly on the roof is obviated.

The number, spacing, lengths and widths and other proportions of the flaps may be widely varied in accordance with the particular situations in contemplation. Thus it is contemplated that they may be so formed as to be permanent external projections for the purpose as indicated in Fig. 2. In this case suitable means for drainage and the like will be provided. In this connection it is also contemplated that the permanent projections may be sloped or slightly inclined on the roof surface so as to shed water or cause its easy drainage.

It is preferred however, in the interests of appearance, free drainage, and the like that the flaps be pivoted for either automatic or manual or mechanical elevation. Thus in Fig. 3, the roof 11 carries the flaps 18, mounted on the legs 20 at the lower end, and on transverse pivots 21 at the upper end. The flap proper is therefor slightly

spaced from the roof 11 and the wind can get under it so as to raise it on its pivot to substantial perpendicularity, as indicated in dotted lines in Fig. 3.

In Fig. 4, the roof 11 has suitable slots provided with drainage guards of any desired sort, (not shown) through which levers 22 extend for engagement with a threaded shaft 23 actuated by a crank 24 through gears 25 to control the attitude of the respective flaps 26 mounted on the levers. In this connection it is a feature of the invention to actuate the shaft 23 automatically by a motor, (not shown) coupled with a recording or other barometer so as to automatically raise the hurricane flaps when the barometer makes a marked change in pressures.

The advantages of the invention, the simplicity thereof and the fact that by its use certain cheaper constructions of roof may be resorted to will be apparent to those skilled in the art, owing to the fact that the present practice in roof construction requires a considerable expenditure for tying devices to fasten the roof down at all events. The fact that the flaps or "spoilers" are subject to wide variation in forms, shapes, etc., will also be obvious to those skilled in the art, and all such changes are to be construed as within the scope of the invention except as it may be otherwise specifically limited in the attached claims.

I claim as my invention:

1. In building constructions, a roof, means extending externally of the roof of such area as to impose substantially predetermined drag on an airstream moving relative to the roof, whereby unroofing differential pressures are predeterminedly substantially obviated.

2. In building constructions a roof, a plurality of external upstanding spaced flaps projecting from the roof, said plurality having such area as to impose a substantially predetermined drag on an air stream moving relative thereto whereby to predeterminedly reduce its effective smoothness of flow.

3. In building constructions a roof, a plurality of spaced flaps mounted removably for upstanding projection from said roof.

4. In building constructions, a roof, means on the roof in such numbers and of such area as to predeterminedly reduce the velocity of incident air to minimize the negative pressure characteristics of the air in movement relative to said roof.

5. In building constructions, a roof, flaps pivoted to the roof and movable when desired to project into the airstream incident on said roof to reduce the unroofing differential pressures incident to smooth airflow over said roof.

6. In building constructions a roof having two angularly divergent surfaces having a crest, means on one surface of such distribution and area as predeterminedly to reduce the velocity of the free flow of air relative to one side of the crest by causing turbulence therein to prevent the formation of negative pressure over the other said surface.

7. In building constructions, a flap, manual means for manipulating the flap to drag-creating free-flow-precluding and relatively free-flow-permitting relation to a roof of said building.

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