March 16, 1943. E. A. MADER 2,314,003

COUNTERBALANCED LOUVER CONSTRUCTION

Filed June 14, 1940 2 Sheets-Sheet 1

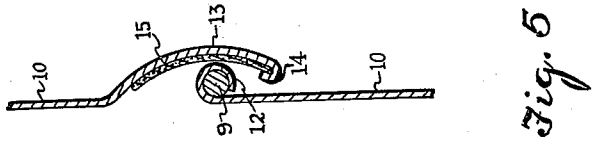

Fig. 5

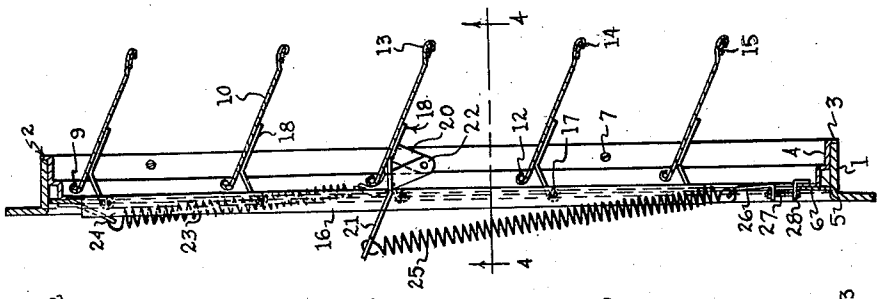

Fig. 3

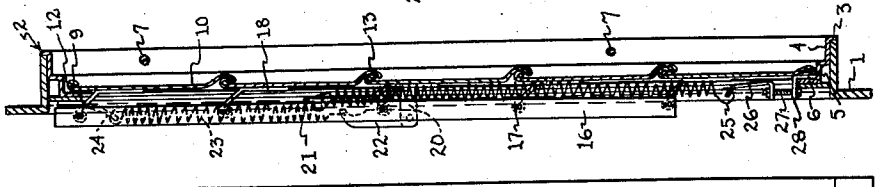

Fig. 2

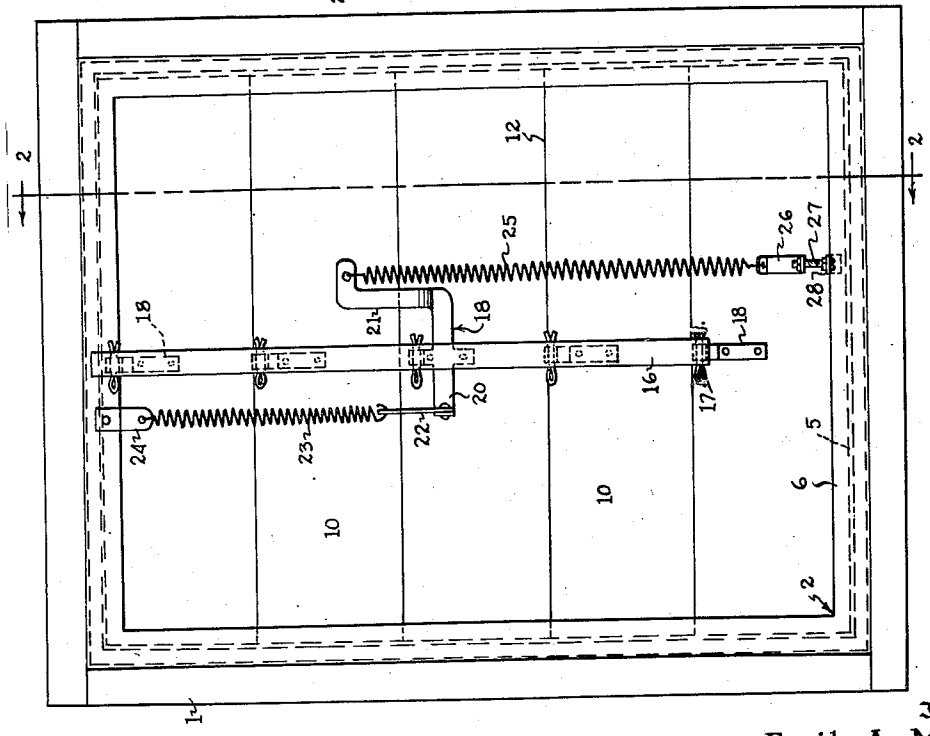

Fig. 1

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Fig. 4a

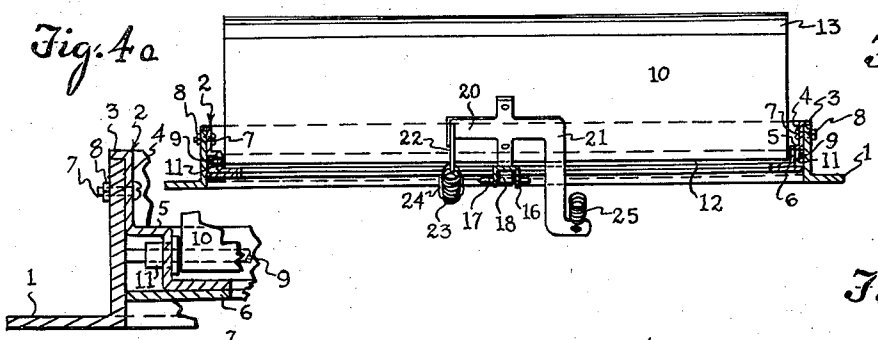
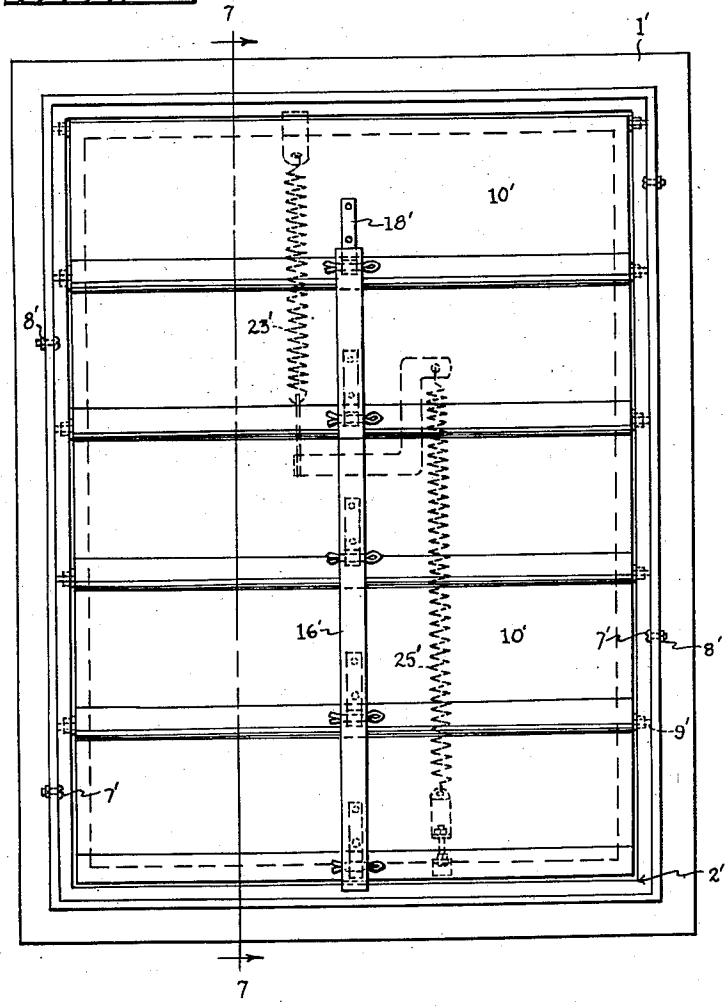


Fig. 4

Fig. 7



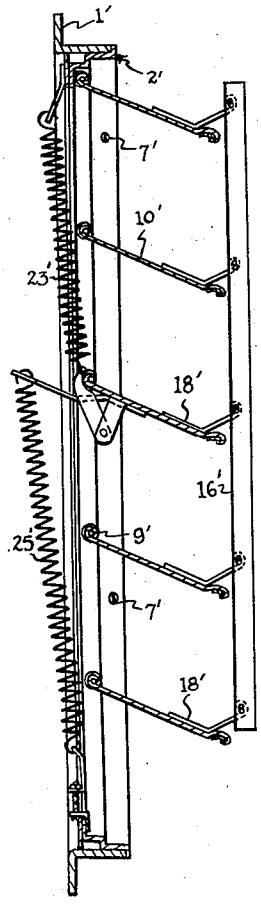


Fig. 6

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UNITED STATES PATENT OFFICE

2,314,003

COUNTERBALANCED LOUVER CONSTRUCTION

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Application June 14, 1940, Serial No. 340,552

9 Claims. (Cl. 98—116)

This invention relates to louvers and particularly counterbalanced pivotal louvers for ventilating use.

An object of the invention is to provide a set of interconnected pivotal louvers with a counterbalancing spring arrangement aiding opening of the louvers in response to air pressure, retarding their closing when said pressure is discontinued, and retaining them tightly closed when the pressure is absent.

Another object is to equip such a construction with an outer frame in which is detachably fastened an inner frame carrying the louvers and counterbalancing arrangement, whereby the outer frame may be permanently installed in a wall or the like without impeding ready removal of the louvers and associated mechanism for repair or other purposes.

Another object is to equip a set of pivotal louvers with a link-forming channel bar connecting them for actuation in unison, said bar engaging brackets individually carried by the louvers and inserted in the channel of said bar.

A further object is to equip such a construction with means for adjusting the counterbalance spring arrangement to meet various conditions affecting its operation.

A still further object is to provide a simplified means for attaching felt or other packing to and within an arched free edge portion of each louver, said portion overlapping the pivotal end of an adjacent louver and the felt establishing a seal and sound-deadening medium between the two louvers.

Further objects are to provide an inner and outer frame for a set of louvers, so constructed and assembled as to prevent any flow of air between such frames, and to so construct said frames that the length of pivot rods for the louvers need not be closely accurate.

These and various other objects are attained by the construction hereinafter described and illustrated in the accompanying drawings, wherein:

Fig. 1 is an interior view of the construction with the louvers closed.

Fig. 2 is a vertical sectional view of the same, taken on the line 2—2 of Fig. 1.

Fig. 3 is a similar view, showing the louvers open.

Fig. 4 is a horizontal section, taken on the line 4—4 of Fig. 3.

Fig. 4a is an enlargement of a portion of Fig. 4.

Fig. 5 is a vertical section, showing a portion of Fig. 2 enlarged.

Fig. 6 is an exterior view of a modification of the invention showing the louvers closed.

Fig. 7 is a vertical sectional view of the same showing the louvers in open position, the section being taken on the line 7—7 of Fig. 6.

Describing first the construction illustrated in Figs. 1–5, the reference character 1 designates a rectangular master frame formed preferably of angle bars and adapted to be permanently installed in a ventilating opening of a wall (not shown). Snugly fitted within the frame 1, is a relatively light rectangular frame 2 comprising parts 3, 4, 5, and 6, coextensive with said frame. The frame 2 is insertible in and removable from the master frame from the exterior side of the latter, the part 3 being a flange adapted to overlap and seat against the outer edge of the master frame to establish the proper inserted position of the frame 2. The part 4 extends inwardly from the flange 3, closely fitting the master frame. The part 5 is a hollow inward projection from the master frame and the part 6 is a weather strip carried by the frame 2 at its inner side and projecting inwardly beyond the part 5. The frame 2 is detachably secured in the frame 1 by bolts 7 and nuts 8. Pivot rods 9 carrying a set of horizontally elongated louvers 10 are terminally journaled in bushings 11 set into the portion 5 of the frame 2, the upper marginal portions of the louvers being rolled to form sleeves 12 each snugly receiving one of said rods. The lower margins of the louvers are arched as indicated at 13 and have return bent edges 14 engaging edges of felt packing strips 15 and holding the latter against the concave faces of the arches 13. The arched margin 13 of each louver (excepting the lowermost) seats, when the louvers are closed, on the sleeve 12 of the louver next below, the sound-deadening felt strips 15 forming a seating medium. As best appears in Fig. 5, the arched form of the margins 13 engaged by the felt tends to maintain the latter in snug engagement with said margins, even though only one edge of each felt strip is secured.

A channel bar 16 links together the louvers 10 for actuation in unison, said bar being pivoted by pins 17 to brackets 18 fixed on the interior faces of the louvers adjacent to their pivotal axes.

Describing now the spring counterbalancing provision for the louvers, the bracket 18 on the middle louver of the set is formed with a pair of arms 20 and 21 oppositely projecting laterally from said bracket and differing in length. The relatively short arm 20 is connected through a

swinging link 22 to the lower end of a louver-closing spring 23 anchored at its upper end to a bracket 24 secured to the weather strip 6. A louver-opening spring 25 is anchored at its upper end to the arm 21 and at its lower end to a link member 26 into which is threaded an adjustment bolt 27 for varying the spring tension, the bolt being carried by an anchorage bracket 28 secured to the weather strip 6.

A ventilating fan (not shown) is adapted to deliver air against the interior faces of the louvers, pressure of such air serving to open the louvers and hold them open, when the fan is operating. The spring 25 also tends to hold the louvers open, becoming increasingly effective for that purpose as the louvers open and the arm 21 swings inwardly to afford greater leverage. To assure this varying leverage effect, the arm 21 is of angular form (see Fig. 1), comprising a lower portion laterally projecting from the corresponding bracket 18 and an upper portion extending across and some distance beyond the pivotal edge of the louver carrying said bracket, the spring being connected to the upper end of said arm. Thus the spring 25 greatly reduces the air pressure required to open the louvers and prevents the latter from swiftly slamming shut when air flow ceases, and said spring exercises its maximum effect when the louvers are fully open, permitting them to open much more fully than the usual applied air pressure would permit. The bracket arm 21 through which the spring 25 is effective, is parallel with and in close proximity to the louvers when the latter are closed, and consequently has almost no effect on the closed louvers.

The spring 23 has its greatest leverage and exerts a maximum effect on the louvers in their closed position, preventing their rattling and assuring a reasonably tight closure. Said spring also compensates for the weight of the channel bar 16 which due to its location has a tendency to open the louvers. The upper end of the link 22 is formed with a notch 22a which permits said link to slightly overlap the pivoted edge of the louver mounting said link, as such louver assumes its open position, thus completely depriving the spring 23 of leverage and allowing a full response of the louvers to air pressure supplemented by the spring 25.

In the modification disclosed by Figs. 6 and 7, the master frame 1', inner frame 2', bolts 7', nuts 8', pivot rods 9', louvers 10', and springs 23' and 25' all conform to the description already given. The modification also interconnects the louvers 10' for actuation in unison by a channel-shaped link bar 16' and pivotally engages such bar with brackets 18' fixed on the louvers, such bar and brackets substantially duplicating those already described.

The link bar 16', however, is at the exterior side of the louvers and the brackets 18' are mounted upon the free edge portions of the louvers, rather than near the pivotal edges as in the first described construction. The modified construction operates similarly to that first described, the difference being merely in location of the swinging link bar and the brackets connecting said bar to the louvers. It is to be noted that the brackets 18 and 18' may be of precisely the same construction and hence may be used to mount a link bar either interiorly or exteriorly on the louvers.

In the practice heretofore followed, heavy frames have been employed for mounting pivotal louvers, the latter being directly journaled in such frames, and being removable only individually and not without considerable difficulty. In installing such frames in wall openings, the louvers have been subjected to rough usage, tending to detract from or prevent their proper free operation. Such practice has also rendered difficult inspection, lubrication, and repairs of the louvers, it being common to permanently secure the frames in the wall openings. Mounting the louvers in a light inner frame readily detachable from a relatively heavy master frame eliminates the aforementioned difficulties. The inner frame and louvers are removed from the master frame while the latter is being secured in a wall opening, thus not only protecting the louvers from damage but also facilitating installation of the master frame. It is a simple matter, when desired, to remove the bolts 7 or 7' and thus permit the inner frame and complete louver mechanism to be removed from its position of use.

A further advantage of the described construction lies in a reduction of the necessary accuracy of parts and in facilitation of assembly. The pivot rods 9 or 9' project beyond the bushings 11 within the hollow portions 5 of the inner frame and the vertical members of the master frame prevent sufficient sliding play of said rods to permit their escape from the bushings. Considerable sliding play is, however, permissible, and need is eliminated for accurately forming said rods of a definite length.

It is to be noted (Fig. 1) that use of a channel-shaped link bar 16, receiving the free ends of the brackets 18 largely conceals said brackets, and thus improves the appearance of the installation while safeguarding said brackets from damage.

In the closed positions of the louvers, they occupy a close proximity to the weather strip 6, and the latter overlaps the ends of the louvers and further overlaps the top and bottom louver, closing any gaps through which there might be a slight air flow.

The invention is presented as including all such changes and modifications as come within the scope of the following claims.

What I claim is:

1. The combination with a pivotal closure biased by its own weight toward its closed position, of a spring additionally biasing the closure toward its closed position, means connecting said spring to the closure progressively reducing the leverage afforded the spring as the closure opens, and means biasing the closure toward its open position and applying a leverage increasing as the closure opens.

2. The combination with a pivotal closure biased by its own weight toward its closed position, of a spring additionally biasing said closure toward its closed position, means connecting said spring to the closure progressively reducing the leverage afforded the spring as the closure opens, a second spring biasing the closure toward its open position, and means connecting the second spring to the closure affording the spring a progressively increasing leverage as the closure opens.

3. The combination set forth by claim 2, said springs being coiled and extending under tension in approximately opposite directions from the closure.

4. In the combination set forth by claim 2, a common means for connecting both springs to the closure.

5. The combination with a closure pivoted sub-

stantially at one edge thereof and biased by its own weight toward its closed position, of a spring additionally biasing the closure toward its closed position, means connecting said spring to the closure progressively reducing the leverage afforded the spring as the closure opens, an arm fixed on the closure and projecting substantially from said edge thereof in a direction to swing substantially reversely to the closure, and a coiled tension spring extending from said arm substantially transversely to said edge and afforded increasing leverage by the arm as the closure opens.

6. The combination with a pivotal closure biased by its own weight toward its closed position, of a spring additionally biasing said closure toward its closed position, and a link pivoted at one end on the closure and connected at its other end to the spring and transmitting the effort of the spring to the closure and free to swing toward the pivotal axis of the closure to effect a reduction of the leverage afforded the spring, as the closure opens.

7. The combination with a closure pivoted substantially at one edge thereof and biased by its own weight toward its closed position, of a spring additionally biasing said closure toward its closed position, and a link transmitting the effort of the spring to the closure and movable toward said pivotal edge responsive to opening travel of the closure, said link being notched to accommodate said edge and to afford the link a position substantially depriving the spring of leverage.

8. The combination with a set of pivotal louvers, of a channel-shaped bar establishing a link between said louvers to provide for their actuation in unison, said bar having its channel opening toward the louvers, brackets respectively carried by the respective louvers and projecting into said channel, and means pivotally connecting the bar to said brackets.

9. The combination with a set of pivotal louvers biased by their own weight toward their closed position, of a link bar connecting said louvers for actuation in unison, and a pair of springs extended substantially transversely of said louvers at opposite sides of said link bar, one biasing the louvers toward their open position and deriving a leverage increasing as the louvers open and the other biasing the louvers toward their closed position and deriving a leverage decreasing as the louvers open.

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