Jan. 6, 1953 E. A. MADER 2,624,265

SPRING COUNTERBALANCED LOUVER MECHANISM

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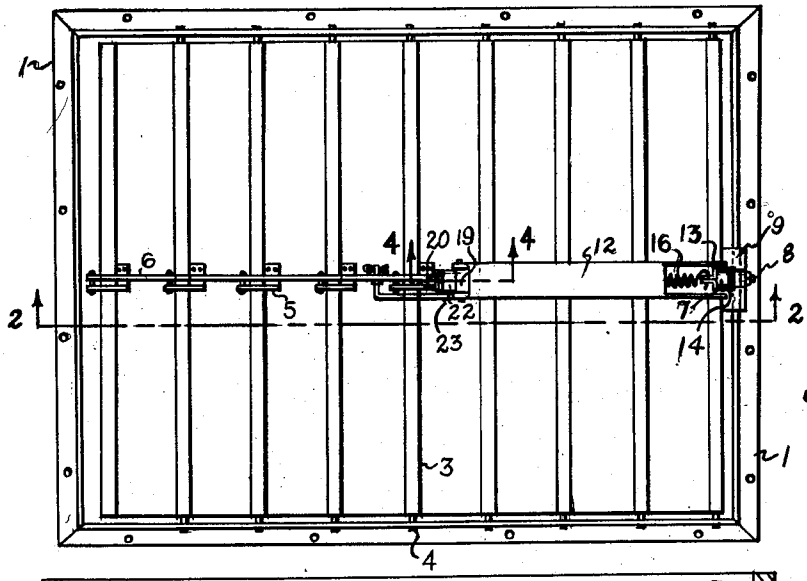

Fig. 1

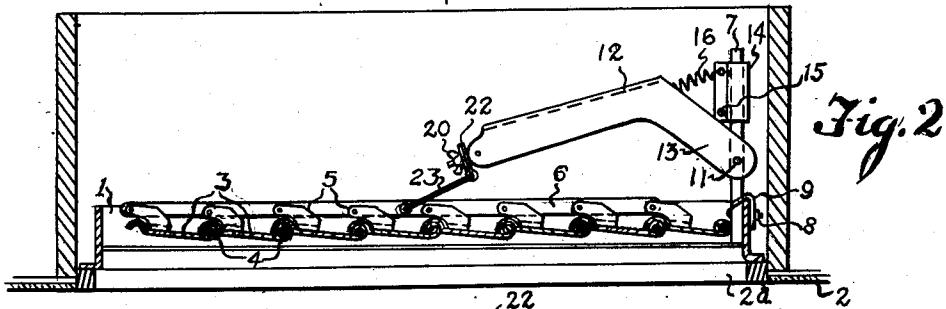

Fig. 2

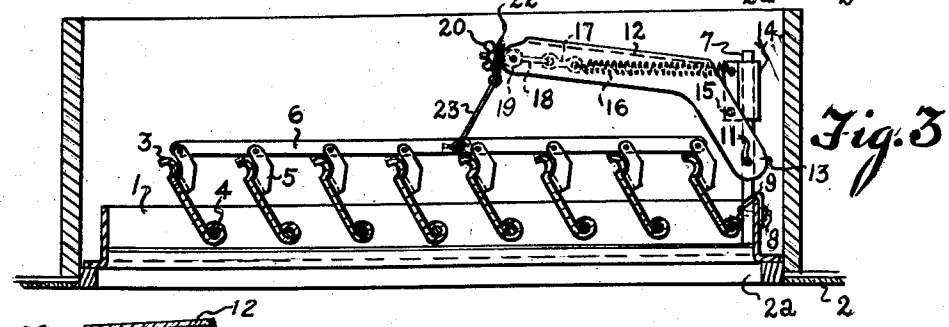

Fig. 3

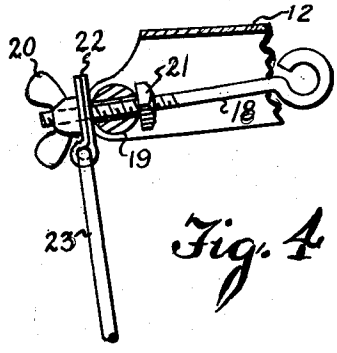

Fig. 4

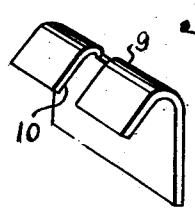

Fig. 5

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SPRING COUNTERBALANCED LOUVER MECHANISM

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8 Claims. (Cl. 98—119)

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This invention relates to pivotal louvers and particularly to counterbalancing provisions which minimize the force requisite for opening such louvers and assure a gradual and noiseless closing thereof.

It is common practice to gravitationally establish and maintain the closed position of pivotal louvers and to employ air pressure or suction induced by an associated fan to swing and hold the louvers open. Various counterbalancing provisions have been made for reducing the opening effort and cushioning closing travel of the louvers.

An object of the invention is to provide a spring counterbalancing mechanism for louvers, affording in a simple manner a more rapid and accurate regulation of the counterbalancing effort than has been heretofore available.

Another object is to provide a unit comprising a regulable counterbalancing spring and a mounting for such spring, which unit may be quickly and easily applied to louver mechanisms of various types and sizes, reducing manufacturing diversity.

Another object is to adapt the aforementioned unit to be concealed or substantially concealed by the louvers to which the unit is applied.

Another object is to transmit the counterbalancing effort of a coiled spring to a pivotal arm whereon such spring is longitudinally extended and to regulate leverage exerted by such spring on the arm.

Another object is to provide a leverage-regulating anchorage element for one end of said coiled spring and to afford regulation of the tension of the spring in anchoring its other end.

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

Fig. 1 is a top plan view of a set of louvers equipped with my novel counterbalancing unit, illustrating a closed position of such set.

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

Fig. 3 is a similar sectional view showing the louvers in fully opened position.

Fig. 4 is a fragmentary vertical sectional view of the counterbalancing unit taken on the line 4—4 of Fig. 1.

Fig. 5 is a perspective detail of an attaching element for said unit.

In these views, the reference character 1 designates a rectangular frame, of angle bar construction, set into and fitting an opening 2a in a

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ceiling 2 and forming a passage for the upflow of air through such opening. To control such flow, a set of similar horizontally elongated louvers 3 are pivoted as indicated at 4 in said frame, lapping each other in their horizontal closed positions, as appears in Figs. 1 and 2. To the free margin of each louver is rigidly secured an upstanding bracket 5, and the louvers are interconnected to swing in unison by a tie rod 6, disposed centrally above the louvers and transverse to their axes.

Describing now the counterbalancing unit wherein my invention particularly lies, a post 7 vertically upstanding upon an end of the frame 1 is clamped to such end by a bolt and nut 8. Any tendency of such post to rock on said bolt is prevented by a metal plate 9 (see Fig. 5) held tightly against the frame by said bolt and nut, the upper portion of said plate being bent down to extend across and within the frame and having a notch 10 wherein the post is snugly fitted. Pivoted on the post at 11 is one end of an elongated louver-lifting arm 12 which projects centrally above the louvers transversely to their axes, and hence overlies the tie rod 6. Said arm preferably forms a channel, opening downwardly or toward the louvers and may be a sheet-metal stamping. To form its pivotal end portion the arm has extensions 13 from the sides of its channel which extensions straddle the post 7 and are preferably diverged downwardly at an obtuse angle to the main length of the arm. Vertically slidable on the post, above the pivot 11, is an anchorage element 14 which may be clamped at selective elevations by a bolt and nut 15. An elongated coiled spring 16, anchored at one end to the element 14, extends through the channel of the arm and is connected through a fusible link 17 to an eye-bolt 18 adjustably mounted on the free end of the arm. It is preferred to extend said eye-bolt transversely and slidably through a pin 19 disposed between and swiveled in the side walls of the arm, a wingnut 20 being threaded on the bolt forwardly of the pin to regulate the sliding relation of the bolt to the pin, and a lock nut 21 being tightened forwardly against the pin to resist loosening of the wingnut. By thus swivelly anchoring the forward end of the spring to the arm, various angular relations of the spring to the arm are accommodated with a minimum of friction, noise, and strain. Between the wingnut and swiveled pin is clamped a plate 22 carried by the bolt 18, and swivelly mounting the upper end of a lifting link 23 formed preferably of wire with its ends transversely bent to respec-

tively engage the plate 22 and mid-portion of the tie rod 6.

When the described counterbalancing unit is properly adjusted, the louvers close under a gravitational force only sufficient to overcome any tendency toward rattling or flapping of the louvers in response to drafts or thermal air currents. Such air currents are more prevalent in some installations than in others and it is hence desirable that any set of ceiling louvers be individually adjusted at time of installation. Such an adjustment may be effected with great accuracy by tightening or loosening the wingnut 20 and thus regulating the spring tension. The coarser adjustment afforded by shifting the anchorage element 14 on the post 7 and thus regulating leverage exerted by the spring, may be accomplished with sufficient accuracy at the factory. This adjustment primarily serves to adapt the counterbalancing unit to a particular size or type of louvers, and it is to be understood that the described unit may be suited to numerous different sizes and weights of louvers by properly positioning the element 14. By adapting the arm 12 to form a housing for the coiled spring, the latter is less likely to accumulate dust or grease or to be distorted through rough treatment. It will be noted that the end portions 13 of the lifter arm avoid interference by said arm with the range of adjustment of the element 14.

What I claim is:

1. A louver mechanism comprising a frame having an opening affording air flow in a predetermined direction, a set of louvers controlling such opening, means individually pivoting said louvers to swing about parallel axes from their closure position in the approximate direction of air flow, means interconnecting the louvers for pivotal actuation in unison, an arm spaced from the louvers in the direction of air flow and extending approximately transversely to such direction, whereby said arm has an inner end relatively adjacent to the axis of said opening and an outer end relatively remote from such axis, a support for said arm, means pivoting the arm substantially at its outer end on the support and affording swinging of the arm to and from the louvers, a swinging actuating connection from the inner end portion of the arm to said interconnecting means, a coiled spring connected at one of its ends to the inner end portion of the arm for pivotally urging the arm in the direction of air flow, and an anchorage element for the other end of the spring carried by said support and adjustable on the support to and from the pivotal end of the arm to regulate the leverage spring-applied to the arm.

2. A louver mechanism as set forth in claim 1, said arm forming a channel opening toward the louvers, and said spring being at least partially housed in such channel.

3. A louver mechanism as set forth in claim 1, said support being a post carried by said frame, and said anchorage element being slidable on the post to affect its adjustment to and from the pivotal end of the arm.

4. In a louver mechanism as set forth in claim 1, means for anchoring said spring to the arm, including means for regulating the tension of the spring.

5. A louver counterbalancing unit comprising an elongated post for supporting such unit, a frame having an opening affording air flow in a predetermined direction, said post projecting from such frame in the approximate direction of air flow, means for clamping an end portion of the post to said frame, an anchorage element adjustable on and lengthwise of the post, an arm having a free end and pivoted substantially at its other end on the post between said clamping means and anchorage element, a coiled spring tensioned between said element and the free end of the arm, a set of louvers mounted in said frame to regulate said air flow, and means for operatively connecting said free end of the arm to said louvers.

6. In a louver-counterbalancing unit as set forth in claim 5, a second anchorage element mounted on the free end of said arm and rockable about an axis transverse to the arm, an adjusting screw extending freely through the second anchorage element transversely to said axis and connecting said spring to the free end of the arm, and a nut rotatively threaded on said screw and imposing thrust on the second anchorage element to longitudinally shift the screw and regulate tension of the spring.

7. A louver mechanism as set forth in claim 1, said arm extending substantially transversely to the louver axes.

8. A louver counterbalancing unit comprising a frame having an opening affording air flow in a predetermined direction, a support for such unit projecting from the frame in the approximate direction of said air flow, means for clamping such support to said frame, an arm having a free end, means pivoting said arm substantially at its other end on the support, a set of louvers mounted in said frame to regulate said air flow, a connection from said free end to said louvers for opening the louvers, an elongated spring reacting between said support and arm for counterbalancing the louvers, an anchorage member for one end of the spring adjustable on the support to and from the pivoting means for the support for regulating the leverage exerted by the spring on the arm, and means connecting the other end of the spring to the free end portion of the arm, including means to regulate the spring stress.

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