Dec. 31, 1929. E. KREISSIG 1,741,525

SPRING COUNTERBALANCING MEANS

Filed May 29, 1928

Fig. 1.

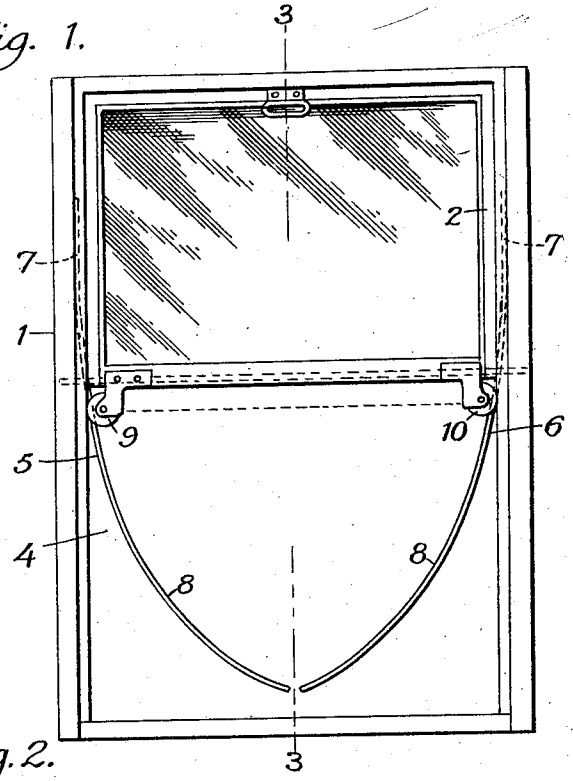


Fig. 3

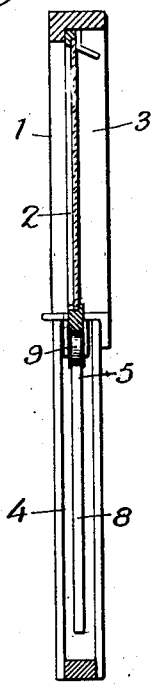
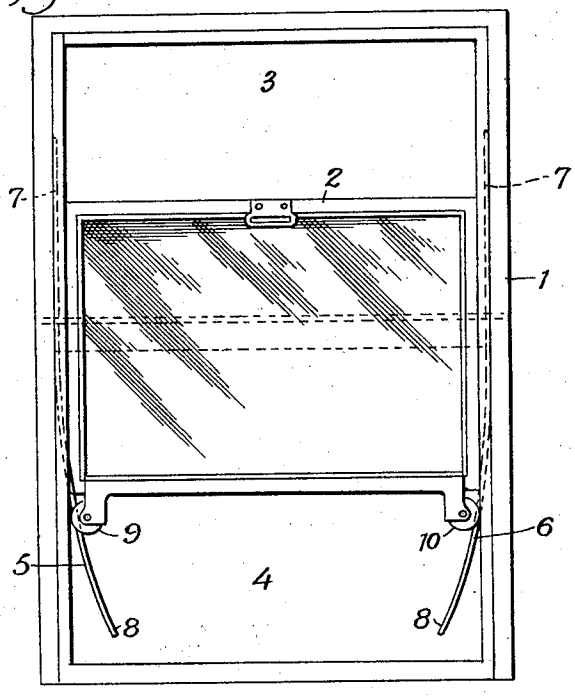


Fig. 2.



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UNITED STATES PATENT OFFICE

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SPRING COUNTERBALANCING MEANS

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This invention relates to spring counterbalancing or supporting means, and the object of the invention is to provide a novel spring arrangement by means of which sliding sashes or other weights or objects of changeable level are supported in equilibrium in any position to which they are adjusted.

In the accompanying drawing,—

Figure 1 is a view in elevation showing the application of the invention to a sliding sash, such as a disappearing sash of car window type, the sash appearing in closed position and the adjacent side of the sash receiving compartment being removed.

Figure 2 is a view similar to Figure 1 showing the sash in partly open position.

Figure 3 is a vertical front-to-rear section on line 3—3 of Figure 1.

Referring now more particularly to Figures 1 to 3, inclusive, 1 designates a window frame or casing, and 2 a sash slidably mounted therein. The sash is designed to cover or uncover an opening 3 in the upper portion of the window frame and, on its opening movement, to recede into and be received in a compartment 4 in the base portion of the window frame. The window construction in this respect may be similar to that employed in railway and street cars, buses and the like.

The spring balancing or supporting means comprises a pair of metallic spring strips 5 and 6, the upper ends 7 of which are fixedly secured to the inner faces of the jambs of the window frame at the opposite sides of the space 3, and the lower ends 8 of which are free from connection with the window frame and from each other and extend downwardly into the compartment 4. That portion of each spring which is free from connection with the frame is normally unstressed and curved on an arc, and the arcuately curved portions of the springs extend downwardly in converging relation to each other.

The sash 2 is provided at its lower corners with rollers 9 and 10 which lie in rolling contact with the free portions of the springs 5 and 6, and on the downward movement of the sash to open position the rollers force the portions 8 of the springs apart and in opposite directions toward the sides of the sash frame so as to gradually and progressively flatten out the curved portions of the springs against the jambs of the frame until, when the sash is in fully closed position, the springs will be fully flattened out against the jambs of the frame and lie between the same and the side rails of the sash.

Figure 1 shows the sash 2 in its raised or closed position in which it is held by the portions 8 of the springs engaging the rollers 9 and 10, which portions of the springs lie at an angle to the rollers and exert upward pressure thereon to sustain the weight of the sash. When the sash is moved downward, the portion of each spring below the point of contact of the sash roller therewith retains substantially its originally curved shape, while the portion of the spring above the roller has been elastically deformed, to such an extent that the initial curvature is destroyed and the curvature radius becomes infinite. At the point of contact with the roller, however, the spring still retains a certain inclination so that it exerts an upwardly directed slanting pressure against the roller, the vertical component of such pressures of the springs serving to hold the sash in equilibrium or to support its weight. As the sash is progressively lowered the portions 8 of the springs are displaced in the same manner and a correspondingly larger portion of each spring is brought into flat contact with the window frame and sash while at the points of contact of the rollers 9 and 10 with the springs the supporting pressure on the springs upon the sash is maintained, this continuing throughout the movement of the sash to fully open position. When the sash is raised more or less to closed position, the rollers 9 and 10 travel upwardly on the free portions of the springs which resume their curved position while maintaining at all times a supporting pressure upon the rollers. Thus it will be apparent that in any position of the sash the sash will be supported in a state of equilibrium and sustained in such position in a firm and secure manner. The construction is, however, such that the sash may be readily and conveniently raised or lowered without any material exertion of power, and

any tendency of the sash to tilt or cant and bind at any point in its range of movement is effectually overcome and prevented.

With the construction described, the springs 5 and 6 being normally unstressed, the energy which the sash on being lowered transmits to each spring is not absorbed by the energy increase of the entire spring, but to each section of the spring after it has been engaged by the roller 9 or 10 an increasing flexional tension is imparted until, when the spring has perfectly straightened out, it will lie flat against the sash. By this means the resistance of the springs to the downward movement of the sash, or, in other words, the lifting pressure of the springs on the sash, whereby it is maintained in equilibrium and supported, always remains the same, irrespective of the position of the sash and the points of engagement of the rollers 9 and 10 with the curved portions of the springs.

Having thus fully described my invention, I claim:—

1. The combination with a stationary supporting element, and a movable element to be supported, of rollers on one of said elements, and springs fixed at one end to the other element and having arcuately curved free ends adapted to be engaged by said rollers on a relative movement of the elements so as to flatten out portions of the springs and place portions of the springs under stress.

2. The combination with a stationary supporting element, and a movable element to be supported, of springs fixed at one end to the stationary element and having arcuately curved free portions, and rollers on the movable element in running contact with the free portions of the springs.

3. The combination of a frame, a movable member slidable therein, springs fixed at one end to the sides of the frame and having arcuately curved free portions, and rollers upon the movable member engageable with the curved free portions of the springs and operative in a movement of said member in one direction to force the springs toward the sides of the frame.

4. The combination of a frame having an opening therein, a slidable member movable upwardly and downwardly in the frame, springs fixed at one end to the sides of the frame and having arcuately curved free portions extending convergently in the frame in the direction of movement of the sliding member, and rollers upon the sliding member for engagement with the curved portions of the springs and operative to force such portions of the springs toward the sides of the frame.

5. The combination with a window frame, and a sash slidably mounted therein, of balancing and supporting members for the sash comprising plate spring strips secured at one end to the sides of the frame and between the same and the sash and having arcuately curved free ends extending below the sash when the latter is more or less closed on inwardly and downwardly converging lines, portions of the sash being adapted, in an opening movement of the sash, to flatten out the free portions of the springs as the sash is closed and to place the adjacent angularly arranged portions of the springs under tension, by means of which a predetermined spring resistance to the movement of the sash is maintained in all positions of the sash.

6. In sash supporting means of the character set forth in claim 7, rollers at the lower corners of the sash and projecting below the bottom of the sash to engage the curved portions of the springs for the purpose described.

In testimony whereof I affix my signature.

ERNST KREISSIG.