March 27, 1962 A. M. STARCK 3,026,560

SASH BALANCE DEVICE

Filed March 5, 1959

FIG. 1

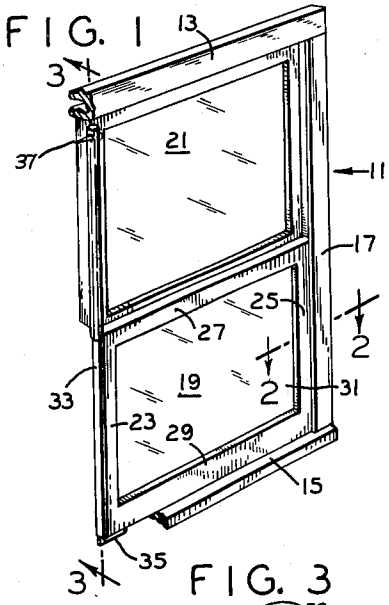


FIG. 4

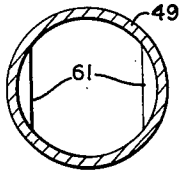


FIG. 5

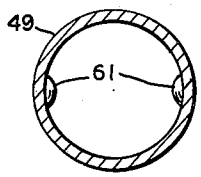


FIG. 6

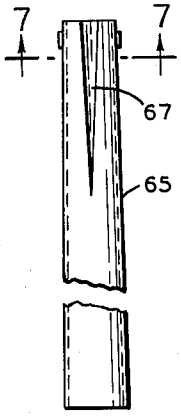


FIG. 7

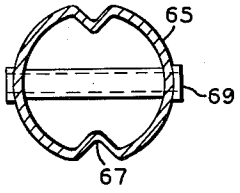


FIG. 3

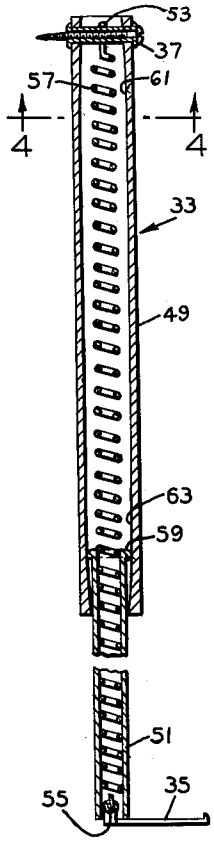


FIG. 2

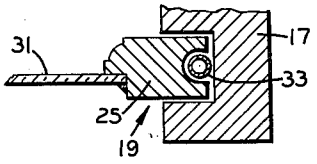


FIG. 8

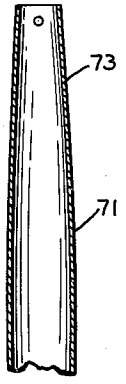
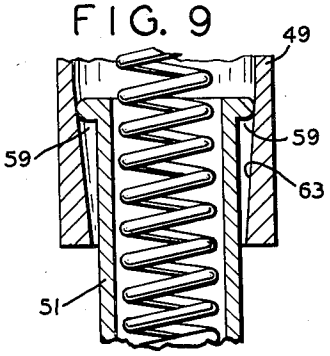


FIG. 9



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SASH BALANCE DEVICE

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6 Claims. (Cl. 16—197)

This invention relates to sash windows and more particularly to sliding window sashes employing a balancing system for the sash.

Since the introduction of the balance method of suspending sliding window sashes three major systems have come into widespread use. The most widely used system is that employing a weight, a pulley and a cord for connecting the window sash to the weight. The weight is free to move in a vertical recess concealed behind the window jambs and acts to counterbalance the weight of the sash. This system is satisfactory in operation but has several serious drawbacks. The labor costs for installing the system are prohibitive. In addition, when cords need replacing, access to the weight may be had only after considerable alteration of the frame, moldings, channels and the like. Another system that has enjoyed widespread use is the friction balance system. This system is very easily installed but its operation leaves much to be desired. Channels are used to provide the necessary frictional force to maintain the sash in substantially static equilibrium. In order for this system to operate initially and continue to operate in a satisfactory manner, the channels must be installed and maintained in substantially parallel relationship. Because of warping of the channels and guides it is difficult to maintain this system. Spring biased shoes have been used to minimize this defect but have not proved satisfactory in most cases. The third and seemingly most promising system is the spring balance system of suspending a window sash. This system, however, has proved to be the most disappointing of all. When the spring is extended or compressed to any great extent, the forces acting on the window sash are respectively too great or too small to effect the desired equilibrium. For example, when the window is closed and the spring tension is very great the sash has a tendency to move to an open position. On the other hand, when the window is open and there is very little spring tension, the sash has a tendency to move to a closed position. In addition, in many of such prior art devices, the springs are usually unprotected and rub against the window frames or sashes causing excessive wear and annoying noise, and eventually faulty operation.

In view of the foregoing an object of my invention is to provide an improved system for resiliently suspending a window sash to produce substantially uniform static force on the sash throughout its movement in a linear plane.

Another object of my invention is to provide an improved system for suspending a window sash which system utilizes the spring balance principle in conjunction with an improved friction balance principle.

Still another object of my invention is to provide a spring balance system for suspending a window sash which system includes variable frictional means compensating for the forces or lack of forces on the window sash.

A further object of my invention is to provide a spring balance system for suspending a window sash, which is easy to install and service, low in cost and arranged to operate effectively throughout the movement of the window sash.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combinations of elements, and arrangements of parts which will be exemplified in the constructions hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawing in which:

FIGURE 1 is a fragmentary perspective view of a window sash and frame assembly incorporating an embodiment of my invention, with certain parts of the assembly omitted for purposes of clarity;

FIGURE 2 is a sectional view of the assembly taken along lines 2—2 of FIGURE 1;

FIGURE 3 is an enlarged sectional view of the telescoping tubes taken along lines 3—3 of FIGURE 1;

FIGURE 4 is an enlarged sectional view taken along lines 4—4 of FIGURE 3;

FIGURE 5 is a view similar to FIGURE 4 showing another embodiment of my inevntion;

FIGURE 6 is an elevation view of a portion of a telescoping tube showing a further embodiment of my invention;

FIGURE 7 is an enlarged sectional view taken along lines 7—7 of FIGURE 6;

FIGURE 8 is an elevation view of a portion of a telescoping tube showing still another embodiment of my invention; and

FIGURE 9 is an enlarged sectional view showing a portion of the embodiment of FIGURE 3.

Referring now to FIGURE 1 of the drawing, a window frame and sash assembly is generally indicated at 11. The window frame is of the conventional type and includes a headboard 13, a bottom sill 15 and a vertical side jamb 17 on either side, only one of which is shown. A lower sash generally indicated at 19 and an upper sash generally indicated at 21 are mounted for vertical movement between the side jambs. For the purposes of avoiding duplication in the description of the assembly and operation of the device, discussion will now be limited to the lower sash 19, it being understood that the same applies as well to the upper sash 21. The sash 19 is of rectangular form having side rails 23 and 25 connected at their extremities by top and bottom rails 27 and 29 with means for securing a glass pane 31 therebetween. A balance device 33, only one of which is shown in FIGURE 1, is mounted on either side of the sash 19, and is connected to the bottom of the sash rail 29 by means of a fastening member 35 and to the side jamb by means of a screw 37 or other suitable fastening device. The side rails 23 and 25 of the sash 19 are preferably grooved as shown in FIGURE 2 to accommodate the balance devices 33.

Referring now to FIGURES 3 and 9, the balance device 33 may be seen to comprise an upper tube 49 and a lower tube 51 which are preferably arranged in telescoping relationship. These tubes may be made of any suitable material, including plastic, wood and the like, but are preferably made of metal such as aluminum or steel. The upper and lower tubes 49 and 51, respectively, are provided with fastening rivets, or the like, 53 and 55 for retaining a spring or other resilient means 57 in operable relationship. As best seen in the enlarged sectional view of FIGURE 9, the lower tube 51 is provided with an annular rim or lip 59 or other suitable protrusion for frictionally engaging internal frictional tracks 61 and 63 provided respectively at the upper and lower ends of the upper tube 49. For example, these internal tracks may run approximately one quarter the length of the tube at the top and bottom thereof, but will vary for a

specific application depending upon the sash weight, spring constant, or overall vertical movement of the sash. In addition, the frictional tracks preferably taper along this length, as shown, to provide varying amounts of frictional force upon engagement with the lip 59 and are preferably of the form shown in FIGURE 4.

In the embodiment set forth in FIGURE 5 the frictional track 61 is shown as a semi-circular member. The semi-circular member may be an indentation in the wall of the tube 49 or may be fabricated as a separate unit and then attached to the tube in any suitable manner. As shown in FIGURES 6 and 7, the tube 65 may be provided with a frictional track which takes the form of a triangular indentation 67. The spring fastening device employed may be a hollow rivet 69 as shown. In FIGURE 8, the tube 71 is provided with a portion 73 of smaller cross-sectional area at the top and bottom thereof. In the embodiments set forth in FIGURES 5 through 8 the various frictional tracks are arranged to engage the lip 59 of the lower tube so as to provide a suitable frictional force therebetween.

In operation, when the window is closed, the sash 19 is in the position shown in FIGURE 1 and the telescoping tubes 49 and 51 are positioned as shown in FIGURE 3. In this position the spring or resilient means 57 is fully extended and the force on the sash 19 is a maximum. The sash 19 has a tendency to rise thus opening the window, but the frictional force between the telescoping tubes 49 and 51 is now at a maximum and of such magnitude as to nullify the spring lifting force. The sash 19, therefore, remains in a closed position but may be easily opened as desired. When the sash 19 is raised to a position about one quarter of the way up, the lip 59 no longer engages the frictional track 63 and the window sash is counter-balanced by the spring force alone. When the window sash 19 is raised to a point which is three quarters of the way up, the spring force acting on the sash is substantially reduced and the sash has a tendency to fall to a lower position. However, the frictional force created by engagement of the lip 59 on the lower tube, with the frictional track 61 on the upper tube nullifies this effect and assists in holding the sash up. Thus the arrangement, according to my invention, results in producing substantially static equilibrium of the window sash throughout its linear movement. When the embodiments set forth in FIGURES 5 through 8 are employed, my device operates in substantially the same manner.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. A balancing device for a sliding window sash element mounted in a window frame and adapted to be connected between the frame and sash element comprising, in combination, two telescoping tubes, one adapted to be connected to the window frame and the other to the sash element, resilient means for biasing said tubes to a telescoping position, the inner of said telescoping tubes being enlarged at its telescoping end, and the outer tube being formed with a frictional engaging portion on its inner surface at its lower and upper ends to achieve frictional engagement with said enlarged end of said inner tube whereby the supplemental friction thereby effected will act to maintain said tubes in their respective extended and telescoped positions against the action of gravity and said resilient means when said enlarged end engages said lower and upper ends, respectively.

2. A balancing device for a sliding window sash element mounted in a window frame and adapted to be connected between the frame and the sash element comprising, in combination, a first tube telescoping within a second tube and both being of substantially equal length, one adapted to be connected to the window frame and the other to the sash element, a spring within both of said tubes connected to bias said tubes to a telescoped position, said first tube having an enlarged peripheral frictional portion at the telescoping end thereof, said second tube having a decreasing internal diameter toward its lower and upper ends for frictional engagement with said enlarged peripheral end portion of said first tube whereby the supplemental friction thereby effected will maintain said tubes in their respective extended and telescoped positions against the action of gravity and said spring when said peripheral frictional portion engages said lower and upper ends, respectively.

3. In a window and frame construction incorporating sliding window sash elements, the combination comprising a balancing device attached at one end to said frame and at its other end to said sliding window sash, said balancing device comprising first and second substantially cylindrical tubes arranged with said first tube telescoping into said second tube, resilient spring means contained within said telescoping tubes and affixed at opposite ends to each tube, an enlarged peripheral portion at the telescoping end of said first tube, said second tube having a decreasing internal diameter toward its lower and upper ends for frictional engagement with said enlarged peripheral end portion of said first tube whereby the supplemental friction thereby effected will maintain said tubes in their respective extended and telescoped positions against the action of gravity and said resilient spring means when said peripheral portion engages said lower and upper ends, respectively.

4. In a window and frame construction incorporating sliding window sash elements, the combination including a balancing device, said balancing device comprising a first tube attached at one end to said sliding window sash and a second tube attached to said frame, said first tube telescoping within said second tube, a spring contained within said telescoping tubes and affixed at opposite ends to the respective ends of said telescoping tubes, said first tube having an enlarged peripheral frictional portion at the telescoping end thereof, said second tube having lower and upper ends decreasing in internal diameter for frictional engagement with said enlarged peripheral end portion of said first tube whereby the supplemental friction thereby effected will maintain said tubes in their respective extended and telescoped positions against the action of gravity and said resilient spring means when said enlarged peripheral portion engages said lower and upper ends, respectively.

5. The combination of claim 4 wherein the ends of said second tube include an inwardly projecting wedge.

6. The combination of claim 4 wherein the ends of said second tube include an indentation on the wall of said second tube.

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