Oct. 4, 1955 W. YOUNG 2,719,712

BALANCE MECHANISM FOR VERTICALLY SLIDING WINDOWS

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Fig. 1.

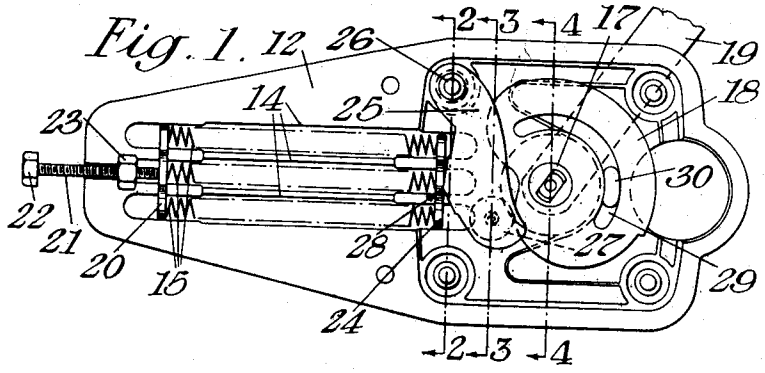


Fig. 5.

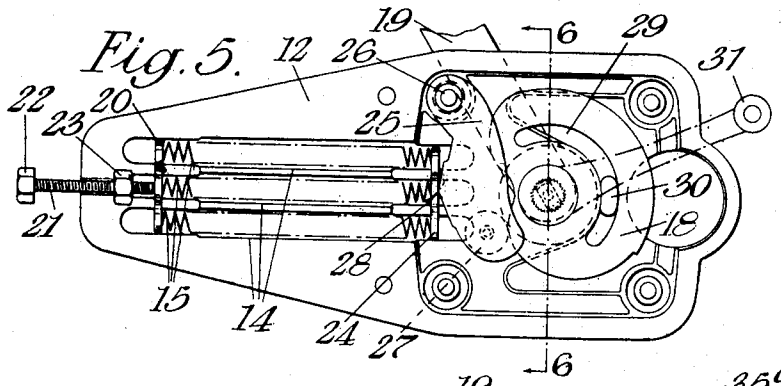
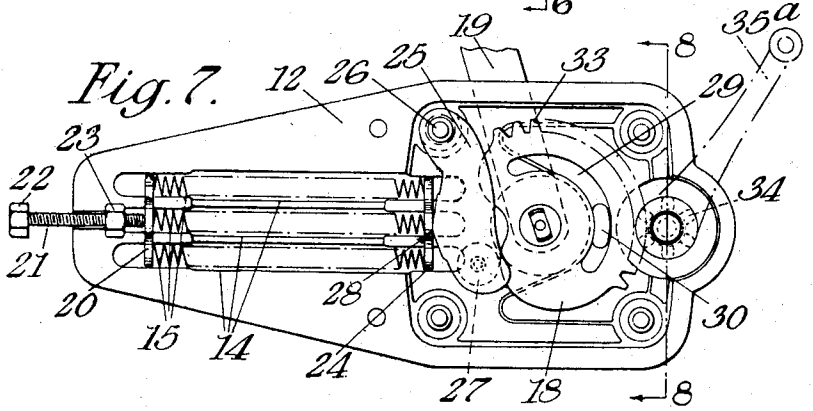


Fig. 7.



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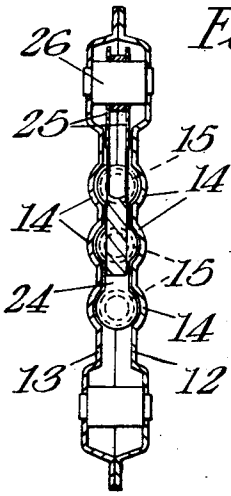

Fig.2.

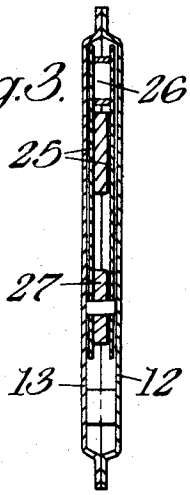

Fig.3.

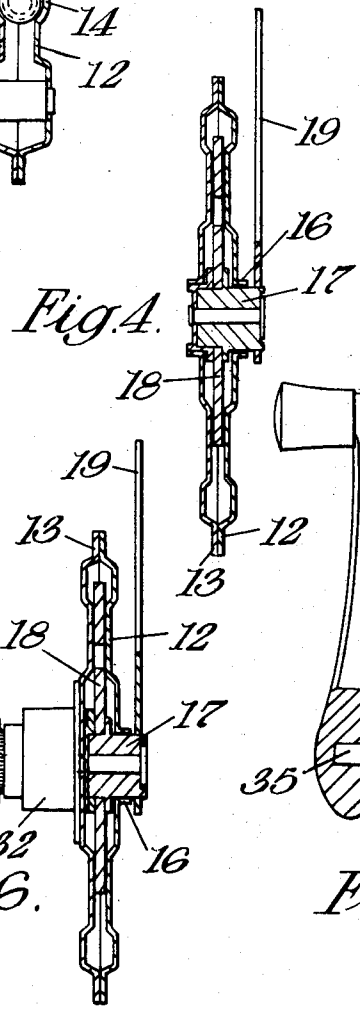

Fig.4.

Fig.6.

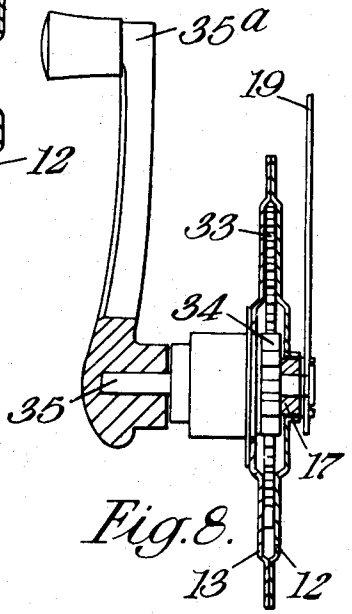

Fig.8.

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BALANCE MECHANISM FOR VERTICALLY SLIDING WINDOWS

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Application September 28, 1953, Serial No. 382,554

Claims priority, application Great Britain October 2, 1952

2 Claims. (Cl. 268—126)

This invention has reference to balance mechanism for vertically sliding windows and relates particularly to such mechanism of the type comprising a spring loaded cam enclosed within a casing and a lever operatively connected to the cam, said spring loaded cam and lever being adapted for connection, the one to a fixture and the other to the sliding window so that the cam is rotated when the window is raised and lowered, the profile of the cam being such that the window is substantially balanced by the spring loading in all positions.

The object of the invention is to provide an improved construction of window balance mechanism of the type set forth which will operate with just that little friction which is necessary to prevent the sliding window from opening or closing when subjected to vibration.

Another object of the invention is to provide improved mechanism of the type set forth whereby the requisite pressure can be imparted to the cam while maintaining the thickness of the mechanism casing such that it can be fitted in the available space in the bodywork of the vehicle or door in which the window is fitted.

According to the present invention window balance mechanism of the type set forth is provided with a slipper on which at least one spring bears and a fulcrumed cam, the slipper bearing at a point substantially centrally thereof on the rocking member and said member transmitting the spring loading to the cam.

The invention further consists in window balance mechanism as set forth in the preceding paragraph wherein the cam is loaded by means of a plurality of helical compression springs arranged in co-planary parallel formation and which bear uniformly on the slipper.

A window with the improved fittings applied thereto may be raised and lowered by applying pressure directly thereto, the movement of the window being transmitted to the cam through the lever.

The improved balance mechanism may however be provided with an operating handle by which said cam and lever can be rotated to raise and lower the window. The cam may be provided with a toothed quadrant with which meshes a spur wheel provided with an operating handle, the cam and the lever being rotated through the spur wheel and toothed quadrant to raise and lower the window by the operation of the handle.

Embodiments of the invention will now be described, by way of example, with reference to the annexed drawings wherein:

Figure 1 is an elevation of one form of the improved balance mechanism with the front half of the casing removed;

Figures 2, 3 and 4 are sections on the lines **2—2**, **3—3** and **4—4** of Figure 1 respectively;

Figure 5 is a view corresponding to Figure 1 but showing a handle for the direct rotation of the cam and raising and lowering of the window;

Figure 6 is a section on the line **6—6** of Figure 5;

Figure 7 is a further view corresponding to Figure 1 but showing a handle and gearing for the rotation of the cam and

Figure 8 is a section on the line **8—8** of Figure 7.

In the drawings like reference numerals denote the same or corresponding parts.

As shown in the drawings the casing containing the balance mechanism consists of two pressings **12** and **13** which are secured together by spot welding or otherwise.

Each pressing is provided with three co-planary parallel channels **14** so that the two pressings together form three parallel co-planary housings. In each housing is fitted a helical compression spring **15**. The pressings form a bearing **16** and fitted within said bearing is a short spindle or stud **17** on which the cam **18** and also a lever **19** are secured.

In the end of the casing remote from the cam is fitted a spring carrier **20** on which bears the outer ends of the three springs and which can be adjusted to vary the compression of the springs by means of a screw threaded spindle **21** which has a head **22** and is screwed into a nut **23** held fast between the two pressings forming the casing. The spindle bears on the spring carrier centrally between the two ends thereof.

The other ends of the springs bear on a slipper **24**.

In such balance mechanism the slipper is shaped to fit and to be guided by the walls of the three housings in which the springs are accommodated.

Further there is fitted within the casing a rocking member formed of two similar plates **25** fulcrumed on a stud **26** accommodated in recesses formed in the pressings. Said plates embrace a part of the cam and carry therebetween a roller **27** which bears on the cam. The plates are angled to make contact points **28** which bear on or near the transverse centre line of the slipper, that is, the points are in or nearly in a transverse plane containing the axis of the central spring.

The cam has cut therein an arcuate slot **29** in which fit stops **30** formed in the two pressings, the stops co-operating with the ends of the slot to limit the rotary movement of the cam.

The casing is secured to the window body or fixed frame and the lever **19** is provided with a roller, not shown, fitted in a transverse channel secured to the vertically sliding window to be balanced by the balance mechanism.

In the construction shown in Figures 1 to 4 the window is pushed up and down as desired, the lever **19** rotating the cam during such movements. The pressure of the three springs is transmitted through the roller **27** to the cam and the profile of the latter is such that in all positions of the window the turning moment exerted on the cam by the springs substantially balances the turning moment thereon exerted by the window.

By the employment of a plurality of springs a considerable force can be transmitted to the cam and by arranging the springs in co-planary order the casing can be of such dimensions that it can fit within the limited available space in the bodywork in which the sliding window is fitted.

The fulcrumed member always bears on the slipper at or near its transverse centre line so that there is little tendency of the slipper to tilt. Further the walls of the housings in which the slipper is fitted serve as guides to prevent tilting of the slipper. Consequently there is little friction between the slipper and fulcrumed lever and there is no danger of the slipper and fulcrumed lever jamming and thereby preventing the smooth operation of the balance mechanism. The small friction in the operating parts is just that necessary to prevent the windows' opening or closing under vibration.

In the construction of balance mechanism shown in

Figures 5 and 6 the stud **17** is rotated by an operating handle **31**, the stud rotating the cam **18** and lever **19**. A locking device of known construction, housed in a flanged casing **32** secured to the face of one of the pressings, may be provided to prevent the opening of the window otherwise than by the operation of the handle, the stud **17** passing the casing and being encircled by a helical locking spring fitted therein.

In the construction shown in Figures 7 and 8 the cam is provided with a toothed quadrant **33** with which meshes a spur wheel **34** fast on a spindle **35** carrying an operating handle **35a**.

By the rotation of the handles the cam and lever **19** are rotated to raise and lower the window, the gearing giving a slower movement than is obtained by the previously described mechanism.

The counter-balancing mechanism may be duplicated for large windows and in addition the duplicated mechanism may be interconnected to each other by means of link work so that they are positively operated in unison. Where the counter-balancing mechanism is applied to a swept window the mechanism may be provided with any known construction of link work by which the window is so supported that it will be prevented from tilting.

I claim:

1. Balance mechanism for vertically sliding windows comprising a casing, a number of parallel compression springs housed in said casing, a slipper resiliently loaded by the compression springs, a cam, a lever operatively connected to the cam and a rocking member fulcrumed to the casing and bearing on a point substantially centrally of the slipper and also bearing on the cam so that the resilient loading of the springs is transmitted through said rocking member and cam to the lever, the casing and the lever being for connection, the one to a fixture and the other to the sliding window and the formation of the cam being such that the force transmitted to the lever through the slipper, rocking member and cam by the springs is substantially uniform in all positions of the lever.

2. Balance mechanism for vertically sliding windows comprising a casing, a number of parallel compression springs housed in said casing, a slipper resiliently loaded by the compression springs, a cam, a lever operatively connected to the cam, a rocking member fulcrumed to the casing and bearing on a point substantially centrally of the slipper and also bearing on the cam so that the resilient loading of the springs is transmitted through said rocking member and cam to the lever, a toothed quadrant rigid with the cam, a spur wheel meshing with the tooth quadrant and a hand lever rigid with the spur wheel and by the operation of which the cam can be rotated, the casing and the lever being for connection, the one to a fixture and the other to the sliding window and the formation of the cam being such that the force transmitted to the lever is substantially uniform in all positions of the lever.

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