R. T. AXE.

SASH BALANCE.

APPLICATION FILED NOV. 9, 1907.

915,405. **Patented Mar. 16, 1909.**

2 SHEETS—SHEET 1.

Fig. 1.

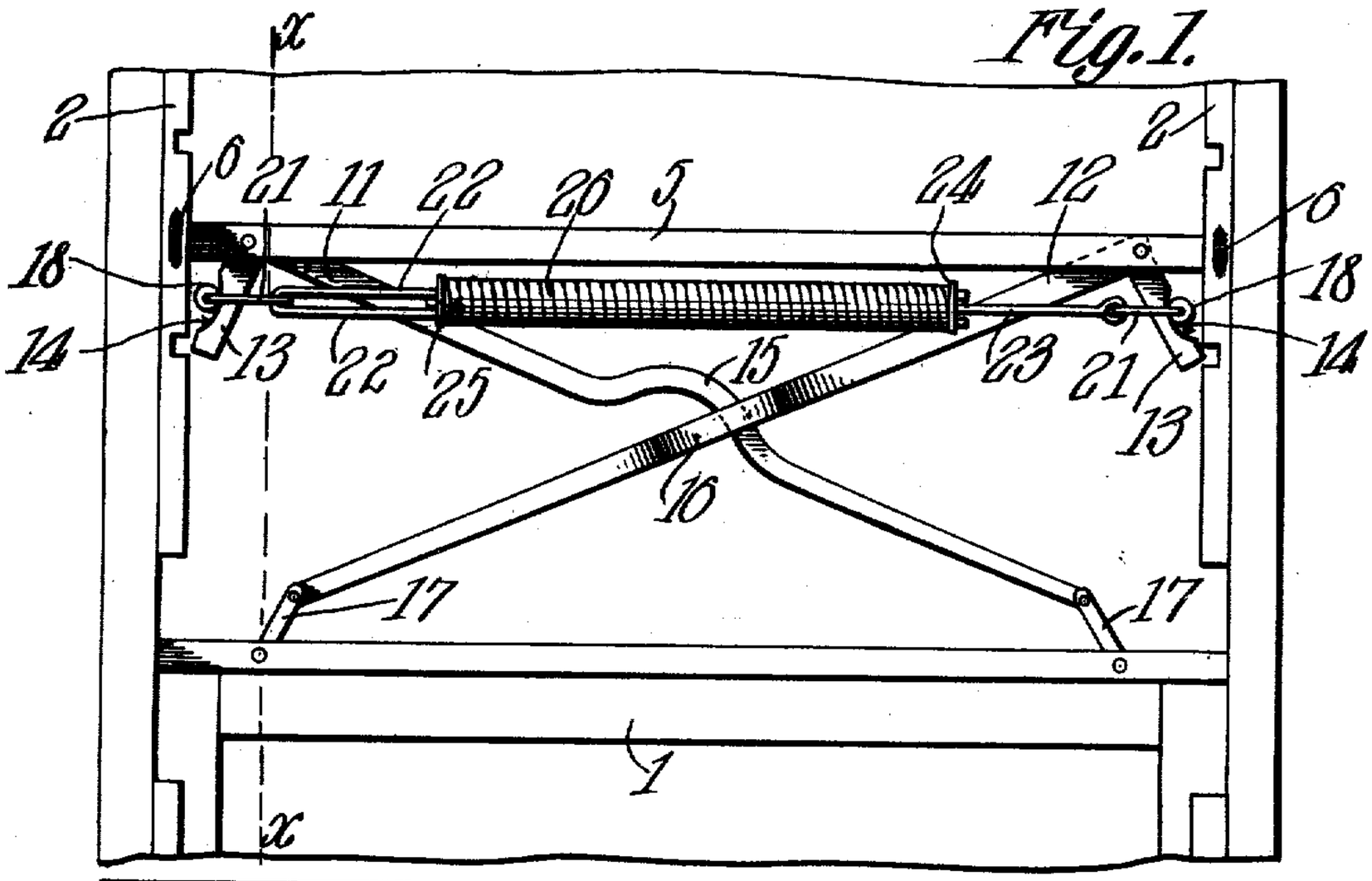

Fig. 2.

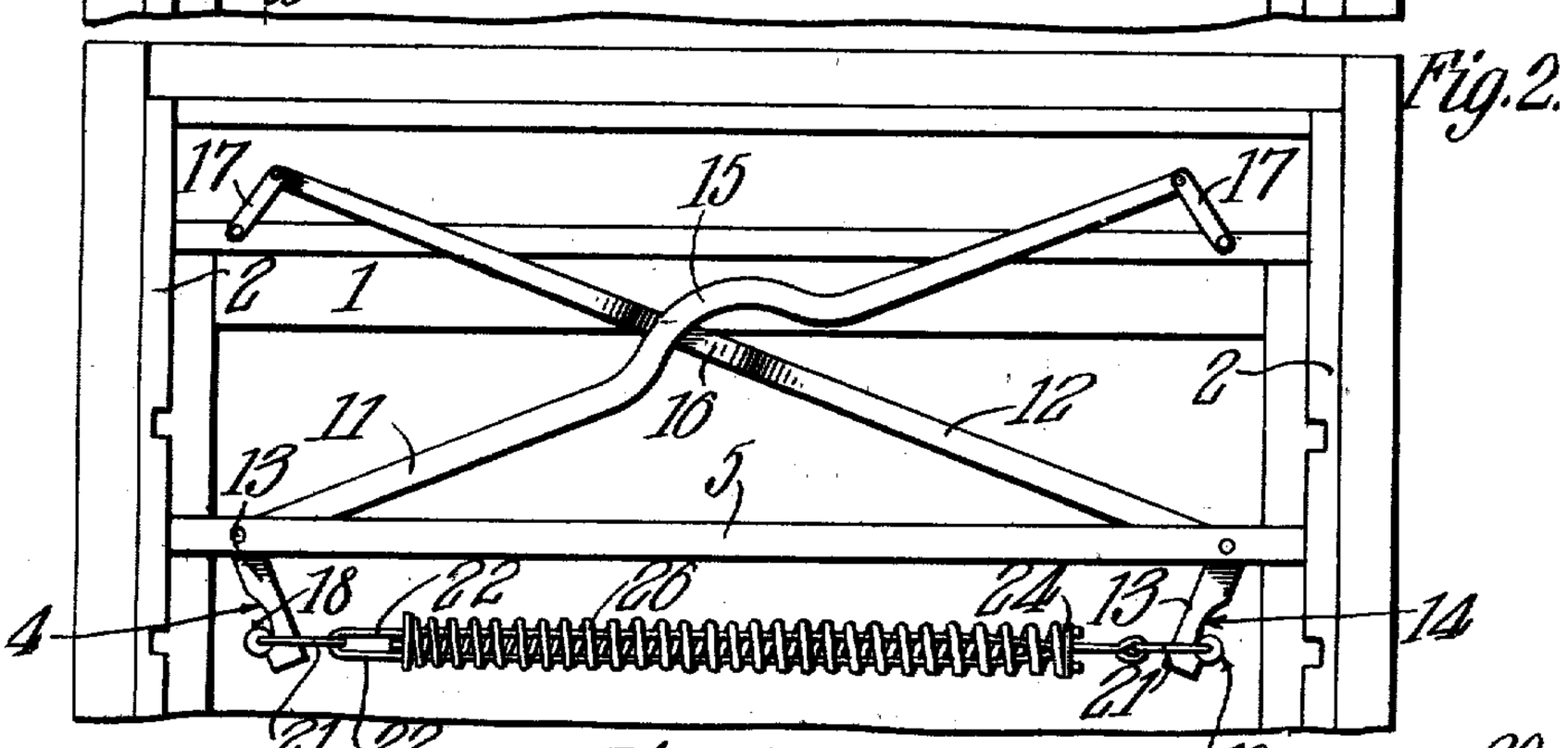

Fig. 3.

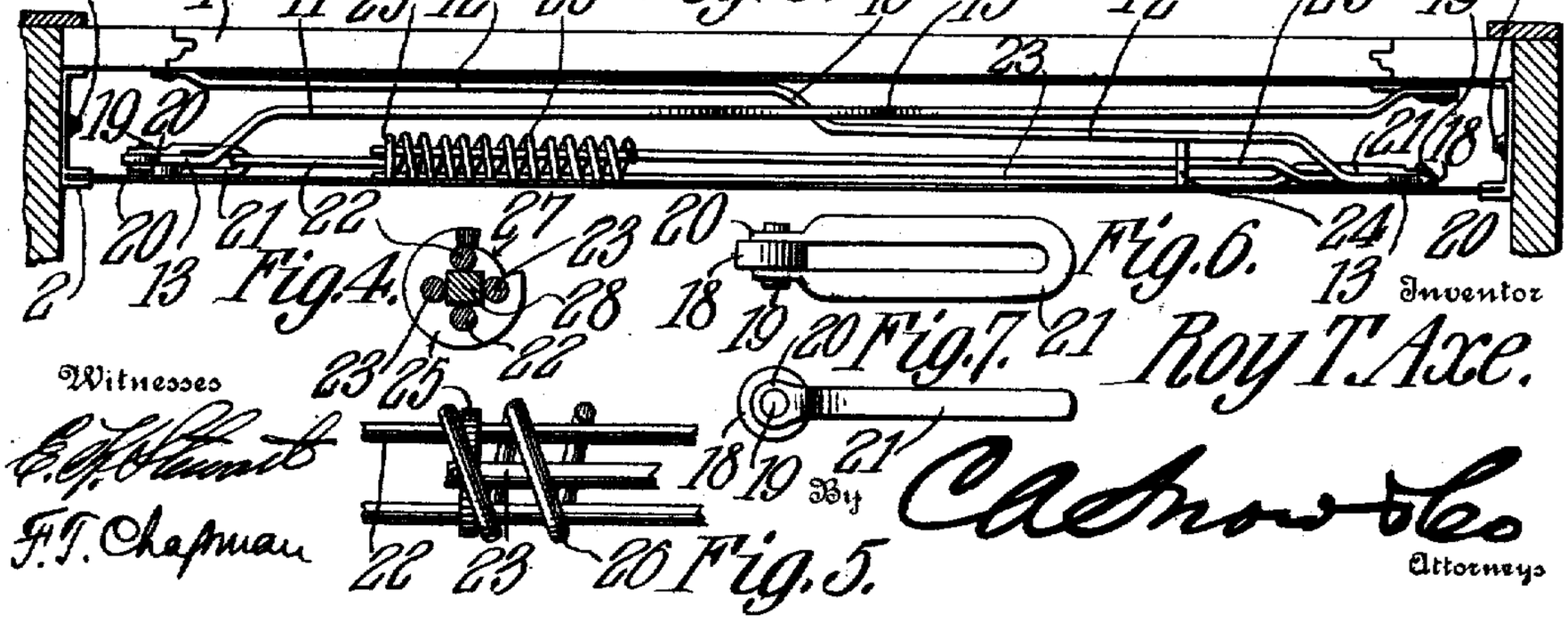

Fig. 4.

Fig. 6.

Fig. 7.

Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 8.

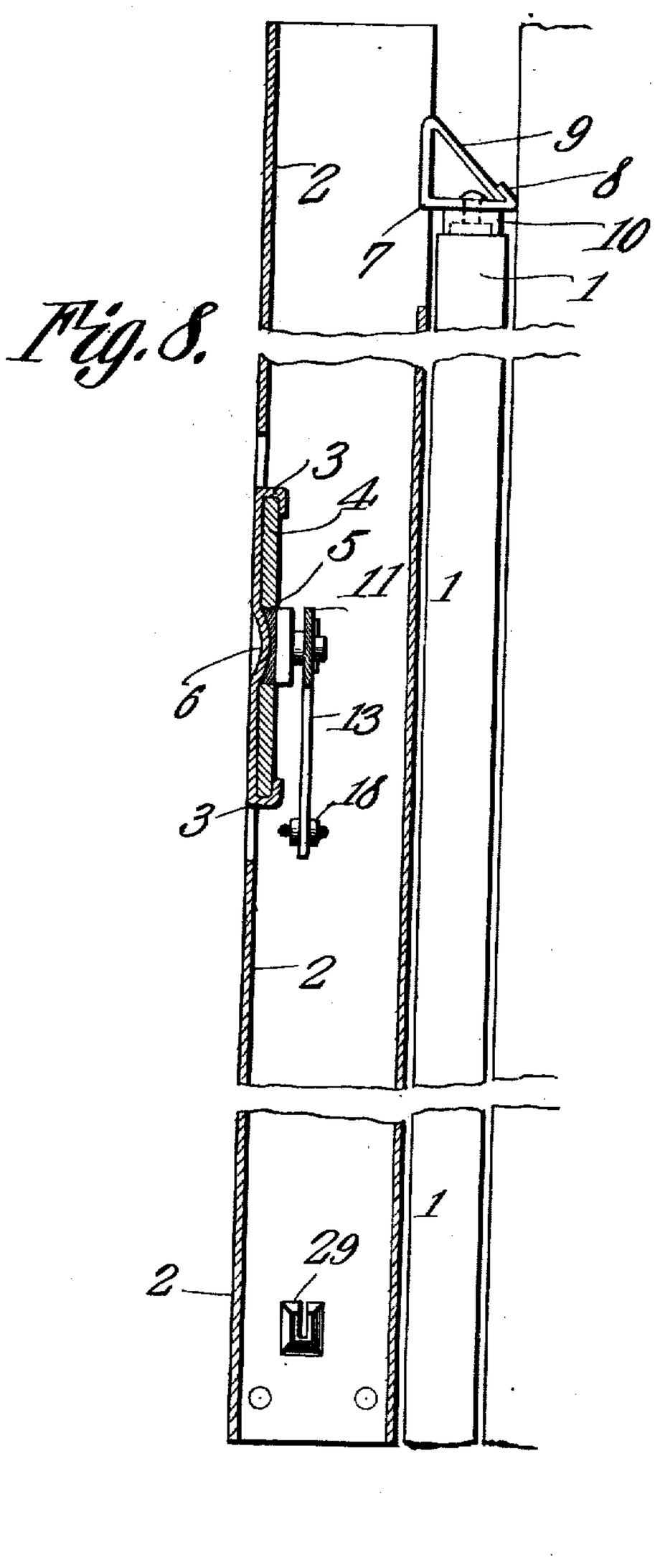
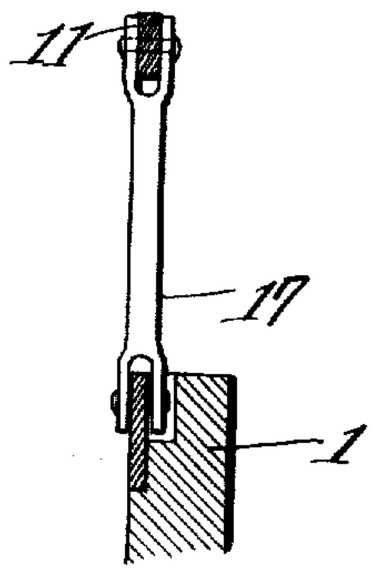


Fig. 9.



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UNITED STATES PATENT OFFICE.

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SASH-BALANCE.

No. 915,405. Specification of Letters Patent. Patented March 16, 1909.

Application filed November 9, 1907. Serial No. 401,523.

To all whom it may concern:

Be it known that I, ROY T. AXE, a citizen of the United States, residing at Juniata, in the county of Blair and State of Pennsylvania, have invented a new and useful Sash-Balance, of which the following is a specification.

This invention has reference to improvements in sash balances designed for use, more particularly, with car windows, wherein the window on being released will tend to rise from the lowermost to the uppermost position and may be locked at any intermediate position desired.

The invention comprises a compression spring arranged for easy adjustment of its strength and acting upon angle levers in such manner as to cause them to balance the window sash from a lowermost position where the spring is under the greatest degree of compression to the uppermost position where it has still expansive force enough to maintain the window in its uppermost position. The relation of the spring and levers is such that the weakening of the spring as it expands is compensated for by the increased leverage exerted thereby upon the levers. The spring mechanism is housed in the car frame above the car window out of sight.

The invention will be best understood from a consideration of the following detail description, taken in connection with the accompanying drawings forming a part of the specification, in which drawings,

Figure 1 is an elevation of the sash elevating mechanism with so much of the sash and coöperating parts shown as is necessary for an understanding of the invention, the sash being shown in the lowered position. Fig. 2 is a similar view with the sash elevated. Fig. 3 is a plan view of the sash and operating mechanism with the casing shown in section. Figs. 4, 5, 6 and 7 are detail views of the window elevating mechanism. Fig. 8 is a section on the line *x*---*x* of Fig. 1, on a larger scale than Fig. 1. Fig. 9 is a detail sectional view showing one of the link connections between the levers and window sash.

Referring to the drawings, there is shown a window sash 1, such as is ordinarily used for car windows, and it therefore needs no particular description. In the window casing above the top of the sash when in its lowermost position there are secured on opposite sides of the casing channel strips 2 of substantially U-shape, and about midway of the length each channel strip has ears punched out of the same and bent in opposite directions, as shown at 3, to form clips for the reception of the head 4 at each end of the strip 5 extending entirely across the window opening. Between these clips 3, the corresponding side of the channel strip 2 is depressed, as shown at 6, toward the strip, to form a clamping lock which will hold the strip in place without danger of its rattling. On the opposite side of each channel iron from the clips 3 and near the top thereof there is punched out a member 7 bent horizontally away from the strip 2 and terminating in a hooked end 8; above the member 7 there is punched out another member 9, the free end of which engages under the hook 8. The members 7 and 9 constitute a stop for the window sash in its upward movement, and to ease the impact and prevent noise, the member 7 carries a rubber buffer 10.

Pivotally secured to the strip 5 near each end thereof are two angle levers 11 and 12, each with a short angle arm 13 having the outer face formed with a curved recess 14, as shown. The arm 11 has its longer end bent about midway of its length, as indicated at 15, and the lever 12 is also bent, as indicated at 16, but in a direction at right angles to the direction of bend of the lever 11, so that these two levers, though crossed intermediately, may change their relative positions without interference. The free ends of the longer arms of the levers 11 and 12 are respectively connected by links 17, such as shown in Fig. 9, to the sash 1 near the opposite ends of the top rail thereof. Engaging each shorter arm 13 at the outer curved portion thereof is a roller 18 journaled on a pin 19 secured in ears 20 formed on the ends of the legs of a U-shaped link 21. Each link 21 engages in the closed end of a rod bent on itself to form two parallel legs, as shown at 22 and 23, the pair of rods 22 being arranged at right angles to the pair of rods 23. The pair of rods 22 carry at their free ends a disk 24 to which they are permanently connected, and the rods 23 carry at their free ends the disk 25 to which they are permanently connected. Each disk is mounted to slide freely upon the respective pair of rods to which it is not connected, and between these disks is mounted a helical spring 26, that is a coiled spring having the active turns equi-distant from the central

longitudinal axis of the spring throughout its length. The spring 26 is always under some compression and power is stored in the spring by further compressing it, therefore this spring may be termed a compression spring. The expansion of the spring will move the disks away from each other and when the disks are forced toward each other the spring is compressed. One of the disks, say the disk 25, or both disks if need be, is provided with a peripheral recess 27 through which one end of the spring may pass, so that a greater or less amount of the spring may be included between the two disks, and so the expansive force of the spring is modified to suit conditions. A block 28 may be imprisoned between the pairs of rods 22 and 23 between the disks to keep these rods from approaching each other. Now, when the window sash is in its lowermost position, the lever arms 13 set in a diagonally outward position from the pivot points of the levers, and the rollers 18 then engage these arms near the upper terminus of the curved recess 14, or at a point near the pivot points of the levers. In this position, the pairs of rods 22 and 23 are pulled out from each other to the greatest extent, and the disks 24 and 25 are brought toward each other to their greatest extent, and the spring 26 is compressed also to the greatest extent. Now, the expansive force of the spring is such that under these conditions it will overcome the weight of the window and lift it until stopped by the buffers 10, the window being unimpeded in its upward movement. As, however, the levers pass from the position shown in Fig. 1 to the position shown in Fig. 2, the arms 13 move about the pivots of the levers until they project diagonally inward though still downward. In the meantime, the spring has expanded and the rollers 18 have traveled toward the free ends of the arms 13 in the curved recesses 14, increasing their distance from the pivot points of the arms 13. Thus, when the spring is under its greatest compression, and therefore exerts the greatest expansive force, this force is exerted comparatively close to the fulcrums of the levers, and as the spring expands, and therefore loses a part of its stored power, it acts upon the levers at a greater distance from the pivot points or fulcrums. Thereby the weakening force of the spring is compensated for by the greater leverage. The curvature of the recesses 14 is such that the rollers will not escape therefrom.

In order that curtains may be readily applied to the window, each channel strip 2 has formed in it at its lower end by a suitable upsetting of the metal a socket projection 29. In Fig. 8, this projection 29 is shown adapted to receive the spring end of a self winding roller for the curtain and it will be understood that the socket on the other side will be suitably shaped to receive the pintle end of the roller.

The spring 26 is initially constructed to be sufficiently strong for the heaviest sash it will be called upon to operate or balance. For lighter sashes, it is simply necessary to turn a few coils of the spring beyond the disk 25 until the spring 26 has such tension as to properly balance the sash. If, from any cause, the spring 26 should break, it will not interfere with the operation of the spring as a compression spring, since, even if broken into several pieces, it is still operative as a compression spring.

This invention provides a simple means for balancing the sash, or even, if desired, for overbalancing the sash, and the sash balance will work equally well whether the single spring be used or a spring made up of several pieces, so that the breaking of the spring does not in any way affect the operation of the structure. By the invention is also provided a ready means for adapting the spring to sashes of different weights. Furthermore, the invention provides a cheap and readily constructed support for the sash balancing mechanism.

I claim:—

1. A window provided with a sash balance comprising a compression spring, and connections extending from the window sash to both ends of the spring and acting simultaneously thereon in opposite directions.

2. A sash balance consisting of a helical compression spring, connections coupled to both ends of the spring and acting simultaneously thereon in opposite directions, and lever connections between the first named connections and the window sash.

3. In a window, a sash balance comprising crossing levers connected each at one end to an end of the window sash and at the other end provided with angle extensions, and a compression spring acting at its opposite ends upon the respective angle extension of the levers.

4. A window provided with a sash balance comprising angle levers each connected to the respective end of the window sash and each having its other end formed with a curved recess, links provided with rollers engaging in the curved recesses, and a compression spring connected at the ends to the links.

5. A car window provided with a sash balance comprising a compression spring, disk heads against which the ends of the spring engage, one of the disks being provided with a recess through which the coils of the spring may be extended to adjust the power of the spring, and connections between the spring and the window sash.

6. A car window provided with a sash balance comprising a compression spring, lever connections between the spring and the win-

dow sash, a bar supporting the levers, and supports for the bar comprising metal channel strips each with clips struck up therefrom to embrace the ends of the bar, and having other portions struck up therefrom and formed into stops for the window sash.

7. A car window provided with a sash balance comprising a compression spring, lever connections between the spring and the window sash, and constituting the sole support for the spring, a bar supporting the levers, and supports for the bar comprising metal channel strips each with clips struck up therefrom to embrace the ends of the bar and having other portions struck up therefrom and formed into stops for the window sash.

8. A window provided with a sash balance comprising a compression spring and connections between the spring and the sash, said connections constituting the sole support for the spring and said spring being at all times under compression.

9. A sash balance comprising a helical compression spring, slidable members extending longitudinally through the spring and engaging the opposite ends of said spring, and connections between the window sash and the end of each slidable member remote from that engaging the spring.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ROY TAYLOR AXE.

Witnesses:

CHARLES ALLEN JONES,

HOMER HARRY THOMPSON.