(No Model.)

B. MARSHALL.

SASH BALANCE.

No. 454,616. Patented June 23, 1891.

Fig. 1.

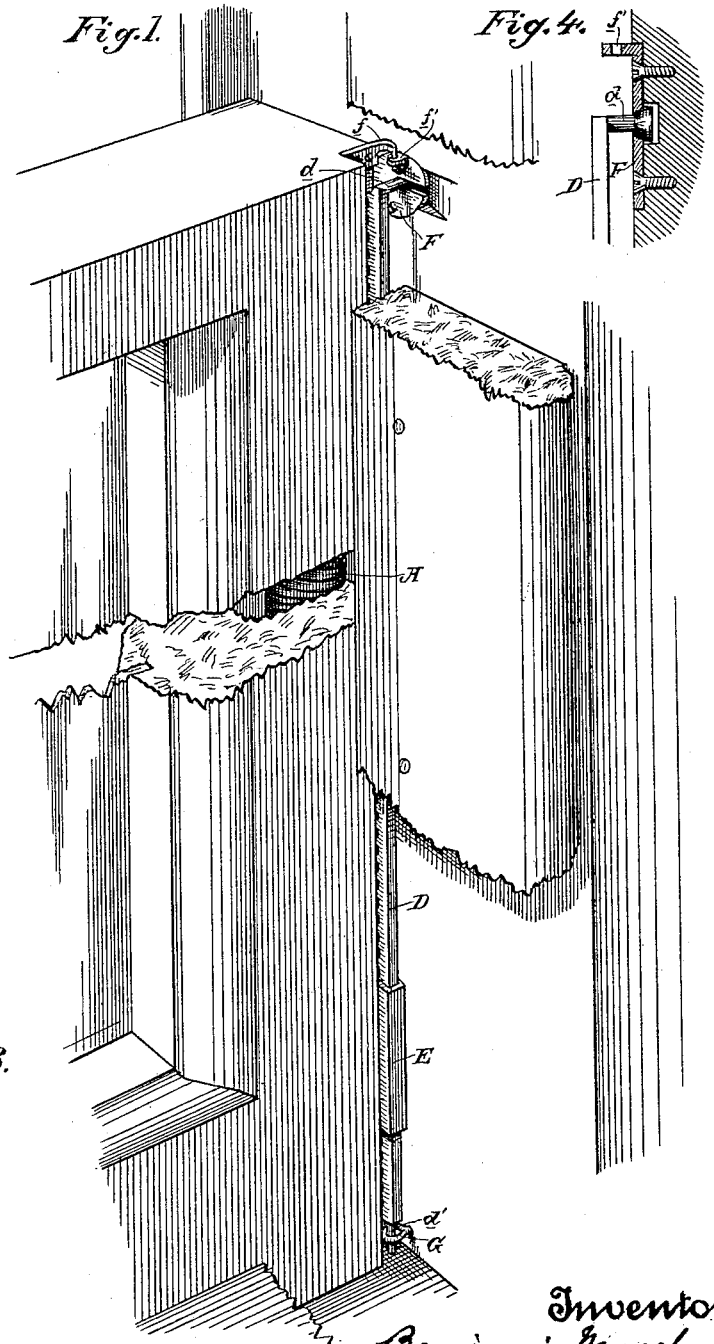


Fig. 4.

Fig. 2.

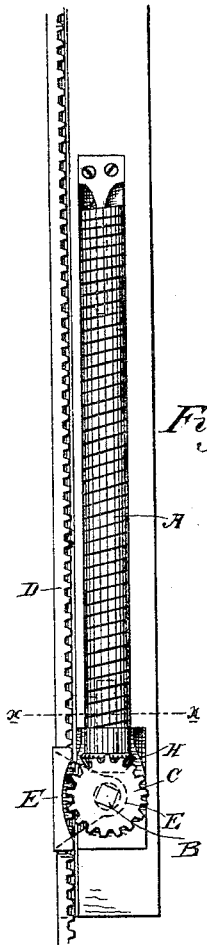
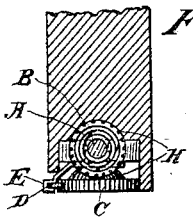


Fig. 3.



Witnesses,
L. Strouse
H. F. Ascheck

Inventor
Benjamin Marshall
By Dewey & Co.
Atty

UNITED STATES PATENT OFFICE.

BENJAMIN MARSHALL, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE MARSHALL IMPROVED WINDOW FURNITURE COMPANY, OF SAME PLACE.

SASH-BALANCE.

SPECIFICATION forming part of Letters Patent No. 454,616, dated June 23, 1891.

Application filed January 3, 1891. Serial No. 376,651. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN MARSHALL, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Sash-Balances; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of sash-balances in which a spring is employed and which operates a pinion engaging a rack.

My invention consists in certain improvements in this class of devices, and especially upon that sash-balance heretofore patented by me, No. 420,425, January 28, 1890. These improvements, which will be fully explained hereinafter, may be briefly stated to be the connection of the pinion and rack, which, while holding the two together, permits the proper travel of the former on the latter; the peculiar attachment of the rack; the location of the spring, when desired, in the sash-stile, and the connections rendering this location practicable. The objects of these improvements will also be fully set forth.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view showing my balance applied. Fig. 2 is an edge view of the sash showing the balance in elevation. Fig. 3 is a cross-section on line *x x* of Fig. 2. Fig. 4 is a detail of plate F.

The essential parts of the sash-balance and their general operation are now well known. A is the torsional spring, one end of which is to be attached to a fixed bearing in the sash, and the other end is connected with a rotary turn-rod B, which carries a pinion C, engaging a rack D. As the sash is moved the spring affects and is affected by the rotation of the pinion, so that the latter travels in the rack and the spring is wound. The rack is carried by either the casing or the sash, and the pinion is carried by either the sash or casing, one being on one part and the other on the other part. It has been my practice to carry the pinion on the sash and secure the rack to the casing. Now in any arrangement heretofore the pinion and rack were not otherwise connected than by the meshing of their teeth. There resulted a disadvantage from this, in that as allowance had to be made for the shrinking of the wooden parts and the necessary slight freedom of the sash no very intimate engagement could be had and the pinion could not run closely in the rack. Undue noise resulted, and in some cases the engagement of the rack and pinion was not insured, as where the sash became very loose. It therefore became of importance to effect a positive connection between the two parts, which, while allowing the sash its proper play and making provision for shrinkage, would yet hold the pinion closely in the rack under all circumstances. This connection has naturally to be a sliding one, and may be formed of any frame or piece secured on one and fitting the other. I have here shown the sleeve or band E, which is firmly secured to the pinion-frame or housing, and embraces and slides on the rack. This sleeve holds the teeth of the two parts closely in mesh. The rack has, of course, to be so connected to its support as to permit the free movement of the sleeve upon it, and for this purpose it is best to secure it at each end. This connection of these two parts results in another very decided advantage—namely, the intimate connection and holding together of all the parts of the sash-balance, making a single article of it, and adapting it to be sold complete and fitted to the sash, requiring then only the attachment of the rack to the casing.

Now as far as the connection of the rack and pinion is concerned to effect the above results, it is immaterial whether the rack be carried by the casing or by the sash or the pinion be carried by the sash or by the casing, as it is applicable to either location of sash-balance and will be of advantage alike in either case.

I have stated that the rack must be secured to its support properly. This fastening may be a rigid one, and when applied top and bottom the yielding of the rack in its own length will sufficiently provide for the necessary play of the sash to avoid cramping or binding; but it is better to secure the rack freely. For this purpose I secure to the casing above a perforated or socketed plate F, and below I form a socket or secure a screw-eye or staple G. The upper end of the rack is formed with

a suspending-hook *d* and the lower end with a point *d'*. The hook of the upper end is adapted to be readily fitted to the plate F, whereby the rack is suspended and bears the weight of the sash, and the lower point of the rack, fitting freely in the eye or staple G, prevents the rack from having undue movement, though still permitting it to swing slightly, and thus give the sash all the play necessary. The connection of the rack results in another advantage—namely, forming a hinge about which the sash can be turned for the purpose of window-washing. The upper and lower connections of the rack being pivotal ones, and said rack being connected through the sleeve E with the parts secured to the sash, will form the hinge pintle or shaft to permit the turning of the sash when the inside stop of the casing on the other side is removed. To further this connection and steady the sash when turned, I have an arm *f* on the sash adapted to come down into and pivot in a socket *f'* in the plate F.

It has been my custom to seat the spring A in a bore in the sash-rail, and as far as the improvements heretofore described are concerned this location may still be preserved and the advantages set forth be realized; but for some purposes I find that it will be better to seat the spring perpendicularly either in the casing or, preferably, in the sash-rail, and in this position I have herein shown it. The pinion lies in the old position, but receives the power of and affects the spring through the intervention of bevel-gears H.

The principal advantage of this improvement lies in the economy in the application of the device to the sash. I avoid having to bore the rail and weaken the tenons, and also avoid having to send a workman specially skilled to apply the balance to sashes in place, or to require new sashes to be sent to any particular place to prepare them for the device. Instead of this an extended groove need only be made in the sash-stile and the spring and connected parts dropped into it and properly secured.

When in place the rack connected by the sleeve with the other parts is in good position to be readily hooked to plate F and dropped in staple G, when the sash is fitted to the casing.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a sash-balance having a spring, a pinion and a rack formed of a straight rigid bar, a vertically-sliding sleeve between the pinion and rack and embracing the latter, whereby the rack and pinion are held together, substantially as herein described.

2. In a sash-balance, the combination of a spring-actuated pinion, a rigid bar or rack with which said pinion engages, said rack having a suspension connection at one end enabling it to swing, and a sleeve or band connected with the pinion and sliding on the rack, whereby the two are held together in their movement the one on the other, substantially as herein described.

3. In a sash-balance, the combination of a spring-actuated pinion, a rack with which said pinion engages, said rack having a suspension connection at one end enabling it to swing and a limiting-stop at its other end, and a sleeve or band connected with the pinion and sliding on the rack, whereby the two are connected and held together in their movement the one on the other, substantially as herein described.

4. In a sash-balance, the combination of a spring-actuated pinion, a rack with which said pinion engages, the plate F, having a socket from which one end of the rack is suspended, whereby it may swing, and a sleeve or band connected with the pinion and sliding on the rack, whereby the two are connected and held together in their movement the one on the other, substantially as herein described.

5. In a sash-balance, the combination of a spring-actuated pinion, a rack with which said pinion engages, said rack being pivotally connected with its support, whereby it may turn axially, and the sleeve or band connected with the pinion and sliding on the rack, whereby the two are connected and held together in their movement the one on the other, substantially as herein described.

6. In a sash-balance, the combination of a straight rigid rack-bar suspended vertically from the window-casing, a pinion in the sash engaging the rack, a vertically-disposed torsional spring within the sash-stile, and gearing between the spring and pinion whereby they are reciprocally affected, substantially as herein described.

7. In a sash-balance, the combination of a spring, the pinion, and gearing between said spring and pinion, whereby they are reciprocally affected, the vertical rack freely suspended at one end and with which the pinion engages, and a sleeve or band connected with the pinion and sliding on the rack, whereby the two are held together, substantially as herein described.

8. In a sash-balance, the combination of a spring-actuated pinion, a rack with which said pinion engages, said rack being pivotally connected with its supports, whereby it may turn axially, the sleeve or band connected with the pinion, the plate F, from which the rack is suspended, and the arm *f*, fitting and pivoted in a socket in the plate, substantially as and for the purpose described.

In witness whereof I have hereunto set my hand.

BENJAMIN MARSHALL.

Witnesses:
S. H. NOURSE,
WM. F. BOOTH.