A. H. KNAPP.

SPRING-BALANCES FOR WINDOW-CURTAIN FIXTURES.

No. 187,867. Patented Feb. 27, 1877.

Fig. 1.

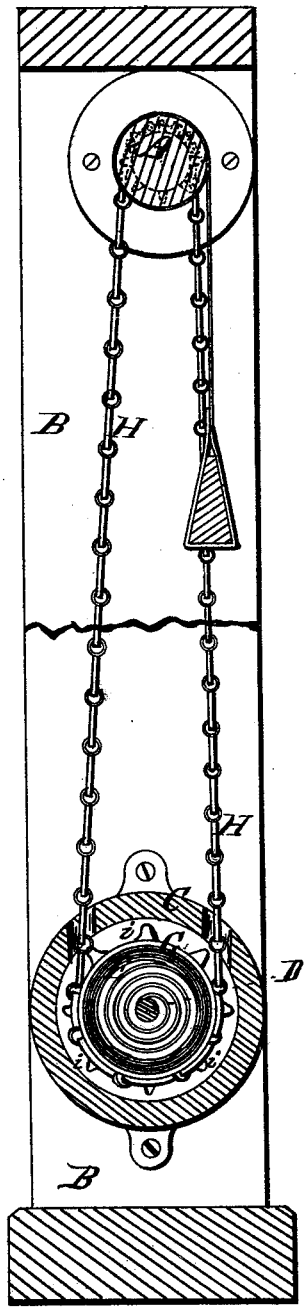


Fig. 2.

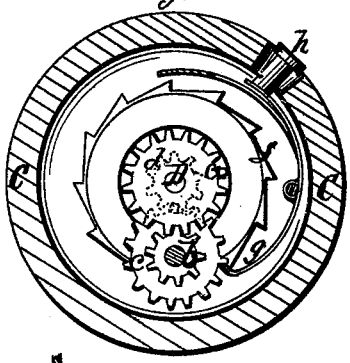


Fig. 3.

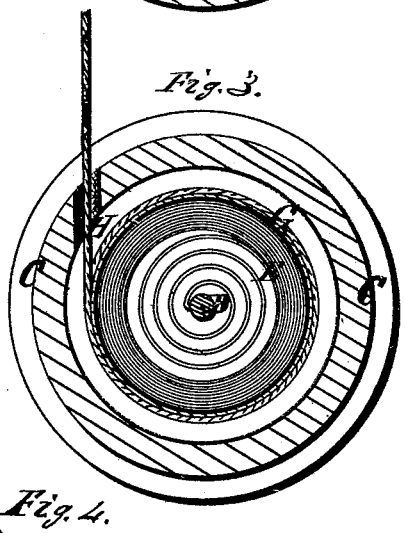
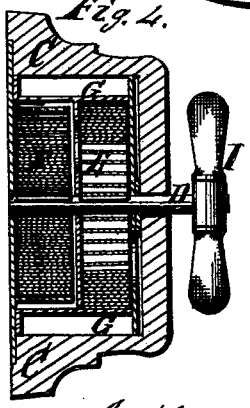


Fig. 4.



WITNESSES

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A. HAYDN KNAPP, OF NEWTON, MASSACHUSETTS.

IMPROVEMENT IN SPRING-BALANCES FOR WINDOW-CURTAIN FIXTURES.

Specification forming part of Letters Patent No. **187,867**, dated February 27, 1877; application filed February 29, 1876.

To all whom it may concern:

Be it known that I, A. HAYDN KNAPP, of Newton, in the county of Middlesex and State of Massachusetts, have invented an Improved Spring-Balance for Window-Curtain and Shade Fixtures; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making a part of this specification—

Figure 1 being a vertical section of the spring-balance through the winding-drum, showing, also, a curtain-roller and connecting-chain in connection therewith; Fig. 2, a vertical section through the spring-balance in another plane, to show the gear-connection between its spindle and drum, as sometimes used by me in addition to the spring and drum; Fig. 3, a vertical section, showing a modified construction of the spring-balance; Fig. 4, an axial section of the spring-balance, as in Fig. 3.

Like letters designate corresponding parts in all of the figures.

The nature of my invention consists in a separate spring-balance inclosed in a detached case, which is located in a position on the window-frame convenient to be reached for operating or controlling it, and connected with the curtain-roller by a chain, belt, or cord; also, in the combination of the balance-spring with a hand-winding spindle, both ends of the spring moving simultaneously, but differentially, in the same direction, the outer end of the spring coiling or uncoiling on the spindle more or less, as the weight of curtain to be balanced thereby is greater or less; and in a geared connection between the spring winding-drum and the spindle, whereby a single turn of the spindle enables the curtain or shade to be wound or unwound several turns upon the roller, all substantially as herein specified.

In the drawings, A represents a curtain or shade roller; B, the side of a window-frame; C, the case of the spring-balance; D, the winding-spindle; E, the coiled spring; G, the drum or wheel turned by the spring, and upon which the chain, belt, or cord H is wound or passes. The spring-balance case C is secured to the window-frame B in apposition, and at a height to be conveniently reached by any person, thereby obviating the use of a cord to be suspended from the middle of the shade for drawing it down when above reach and the necessity of stooping to lift the shade when the window is low. To the spindle D a suitable handle or crank, I, (seen in Fig. 4,) is secured, for turning it, and thereby winding up or letting down the shade. By this the necessity of handling the shade and the liability of running it off upon the brackets are obviated. One end of the spring E is attached to the spindle D, and the other end thereof is secured to the inner periphery of the drum G, which turns free on the spindle, the spring being coiled up with sufficient force to counterbalance or overbalance the shade wound upon the roller A. There may be, however, a spring in the roller itself, in which case the spring E is additional to that of the roller-spring, and the force of the two springs counterbalance or overbalance the weight of the shade.

An additional advantage in the employment of the hand-winding spindle is gained by the use of gearing to connect the spindle and the drum, so that a single turn of the spindle by hand will produce two, three, or four revolutions of the drum; and by having the spool or pulley on the roller-shaft three or four times smaller in diameter than the drum the shade may be made to move three or four feet by a single turn of the spindle. Such gearing is shown in Fig. 2. A cog-wheel, *a*, is attached to the spindle D, and gears into a pinion, *b*, the axis or pivot of which is secured to the case, the said pinion *b* turning freely thereon. To this pinion another cog-wheel, *c*, is made fast, and turns therewith, gearing into a pinion, *d*, (shown in dotted lines,) attached to the head of the drum. Thus at every turn of the spindle D the drum G is necessarily caused to turn as many revolutions as the intermediate gearing multiplies the speed.

In addition to the convenience of this device, a considerably shorter spring is required, since the spindle turns in the same direction as the drum, though slower, and every turn of the spindle in winding up a shade saves the length of a coil of the spring, because such turning of the spindle advances the foot of the spring, and consequently the entire spring, in the direction in which it is moving

the curtain chain, belt, or cord. The friction of the gearing, especially if cut a little irregularly, obviates the necessity of a brake to hold the shade in any position. I also design to use a ratchet-wheel, *f*, and spring detent *g*, Fig. 2, to hold the shade at any height. A thumb-knob, *h*, projects from the detent out through the case to be pressed upon for lifting the detent from the ratchet-wheel. By the use of the ratchet-wheel and detent the necessity of carefully adapting the strength of the spring to the weight and length of the shade is avoided, since the curtain is thereby retained as by a stop, acting to prevent the drum, and, consequently, the curtain belt, cord, or chain, from moving, and with it the spring may be coiled up to overbalance the shade, and the latter be made to run up automatically to the height desired by simply pressing on the knob *h* and setting the ratchet-wheel free. The roller A and drum G are connected by the endless chain H, which preferably takes over projections *i i* on both the drum and roller-pulley, in order that no slipping may take place. A ribbon of cloth or very thin sheet metal may be used instead of a chain, there being perforations through it at equal distances apart, to fit over the projections on the drum and pulley. In case of light and small shades, a simple connecting-cord may be employed instead of the chain or perforated ribbon; and instead of the endless chain or cord, a single cord, winding both upon the balance-drum and roller-pulley or spool, may be used.

In the modification shown in Figs. 3 and 4 I employ a long spring, applicable to special uses, such as for taking up the cord on window-shades of shop and other high windows, the cord winding around the drum as fast as it is drawn down, thus keeping it out of the way. For this construction a good arrangement is a compound spring, the separate springs thereof being united by a connecting holder or holders, as described in the Letters Patent granted to A. H. Knapp and George W. Bailey, April 26, 1870.

In the drawings are shown two springs, E and F, thus connected, one on each side of the web of the drum G. This is a very compact construction, enabling a long spring to be placed in a small space.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A shade-balancing spring inclosed in a detached case, C, in combination with a shade-roller, A, and connecting cord or chain H, substantially as and for the purpose herein specified.

2. The combination of a hand-turning spindle, D, shade-balancing spring E, and revolving drum G, substantially as and for the purpose herein specified.

3. The combination of intermediate gearing *a b c d* with the hand-turning spindle D, spring E, and drum G, substantially as and for the purpose herein specified.

4. The combination of a ratchet-wheel, *f*, and detent *g* with the spindle D and spring-drum G of a detached spring-balance case, C, substantially as and for the purpose herein specified.

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Witnesses:
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