(No Model.)

E. L. CHAMBERLAYNE.

COMPOUND SPRING BALANCE.

No. 343,946. Patented June 15, 1886.

Fig. 1.

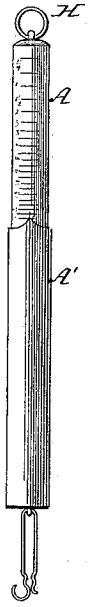


Fig. 2.

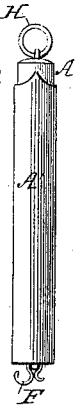


Fig. 3.

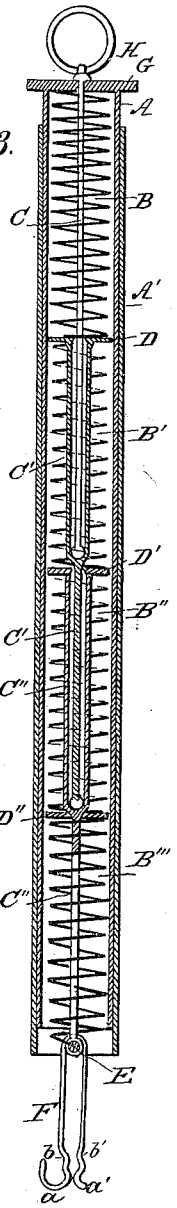


Fig. 4.

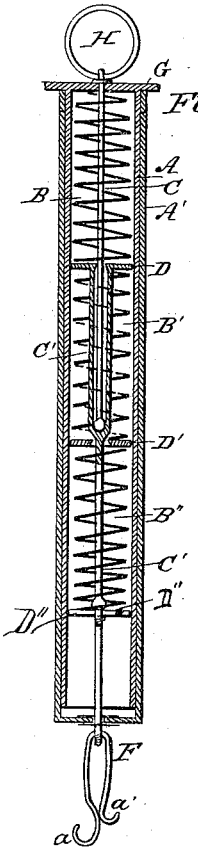


Fig. 5.

Fig. 6.

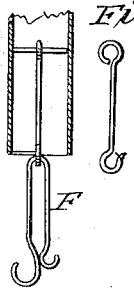


Fig. 7.

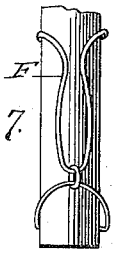
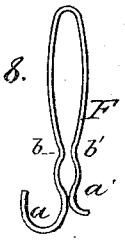


Fig. 8.



WITNESSES:

Fred G. Dieterich

W. R. Davis.

INVENTOR

Edward L. Chamberlayne

BY P. E. Doyle

ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD L. CHAMBERLAYNE, OF BUFFALO, NEW YORK.

COMPOUND SPRING-BALANCE.

SPECIFICATION forming part of Letters Patent No. 343,946, dated June 15, 1886.

Application filed February 15, 1886. Serial No. 192,013. (No model.)

To all whom it may concern:

Be it known that I, EDWARD L. CHAMBERLAYNE, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Compound Spring-Balances; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in compound spring-balances, in which two or more spiral springs of different strength and of varying degrees of tensile capacity are arranged in telescopic tubes or shells, to operate separately or in conjunction through the medium of tension-rods and disks, as will be hereinafter more fully explained.

The objects of my improvements are to provide in one convenient and compact form a balance which is equally adapted to the purpose of weighing coins, letters, packages for the mails, &c., as well as the more ponderous bodies. I obtain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1, A is an inside shell, and A′ an outside shell telescoped upon the inside shell.

Fig. 2 shows my compound balance with the clip-hook folded into the end of the shell.

Fig. 3 is an upright sectional view of my compound balance, in which A indicates the inside shell; A′, the outside shell. B B′ B″ B‴ indicate spiral springs. C C′ C″ indicate tension-rods. C′ and C″ indicate the tubular structure of the upper portion of the tension-rod. D, D′, and D″ indicate disks, and E indicates a cross-bar.

Fig. 4 indicates an upright sectional view of my compound spring-balance when only three springs are used in the combinations. E indicates the lower disk; F, clip-hook.

Fig. 5 shows plans of disks and their modifications.

Fig. 6 shows bail and clip-hook for "charm" balance.

Fig. 7 shows the small clip-hook folded up onto the shell.

Fig. 8 shows detail of clip-hook.

The foregoing, together with the following specification of my improvements, will enable others skilled in the mechanical arts to which they pertain to make and use my compound spring-balances. The outside shell telescopes freely upon the inside shell. The two tubes or shells are made to move freely in and upon each other between certain fixed points. The upper end of the inside shell is closed by means of a cap which has a diameter something greater than the diameter of the outside shell, and thus it happens that when the outside shell is telescoped upon the inside shell the upper end of the outside shell engages the cap and prevents the inside shell from sliding entirely within the outside shell. The shells are prevented from being drawn entirely apart by means of a pin placed in the lower end of the inside shell, which is made to engage a suitable slot or shoulder in the upper end of the outside shell. The lower end of the outside shell may be closed, leaving only a slot of suitable size running across its entire diameter, or it may have simply a single cross-bar or two parallel cross-bars placed at suitable distance asunder, the end or ends of which are to be firmly and securely fastened to the sides of the lower end of the outside shell. A scale of weights is cut upon the side of the inside shell, as shown in the drawings, Fig. 1. The metric system of weights may also be shown in like manner on the opposite side, the springs having been duly graduated to that system. Now, by sliding down the outside shell the scale of weights will be disclosed in succession until the full capacity of the balance is shown. The spiral springs are placed in the inside shell, beginning with the most delicate spring in the system, which is placed at the top and is indicated by B, Fig. 3; but the drawings do not show the graduation of the size of the wires of which the different springs are composed, beginning with the most delicate spring, and so on to the spring capable of sustaining the greatest tensile strain. No two springs are exactly alike in this respect.

Beginning with the lightest spring, which is placed in the top of the inside shell, one end of its coil being firmly fastened to the under side of the cap, the other end of the coil being secured to the upper side of the disk D, Fig. 3, the manner of placing the springs and of securing the opposite ends of each will be readily understood by reference to the draw-

ings, Fig. 3. The upper end of the coil of the second spring is fastened to the under side of the disk D, its lower end being secured to the disk D′, or to the second disk, counting from the top of the shell downward. The upper end of the second coil of the spring is securely fastened to the under side of the disk D′, its other end being secured to the upper side of the disk D″, and so on in like manner the upper end of each succeeding spring in the series is secured to the under side of the preceding disk, while its opposite or lower end is secured to the upper side of the succeeding disk until the last spring is reached, the lower end of which is secured to the cross-bar E, as shown in Fig. 3, or to the upper side of the last disk, as shown in Fig. 4. Where the last spring does not reach to the bottom of the shell, a short extension-rod is attached to the under side of the lower disk, and is made to reach downward to the bottom of the shell, where it is fastened securely to the cross-bar or cross-bars, as indicated in Fig. 4.

The number of springs which may be used in the same combination is without limit.

The manner of placing the tension-rods and their peculiar mechanism and use is shown in the drawings, and may also be stated as follows: The upper end of the first tension-rod, C, Fig. 3, is attached in a suitable manner to the under side of the cap, and extends downward within the coil of the upper spring and passes freely through a slot in the disk D, and ends in a small ball, which has a diameter greater than the slot in the disk. The upper half of the second tension-rod, C′, Fig. 3, is tubular in formation, and is attached to the under side of the disk D, the tubular portion having a diameter sufficient to allow the ball termination of the first rod to pass freely up and down therein, while its lower half continues downward and passes freely through a slot in the disk D′, and terminates, like the first, in a small ball, which has a diameter greater than the slot in the disk. The ball of the second tension-rod passes freely up and down in the tubular end of the third tension-rod. The upper end of the third tension-rod is exactly the same in its mechanical construction with the second rod, and is attached to the under side of the disk D′, Fig. 3, and extends downward through a slot in the disk D″, and terminates in a small ball having a diameter greater than the slot in the disk.

The office of the tension-rods will be readily understood in connection with other parts of the mechanism and in the description further on.

It is unnecessary to call attention to the disks and the several modifications thereof, as shown in the drawings, any further than they are shown in connection with the other parts.

From the foregoing description it will be seen that the series of springs are intimately connected together, and that the upper end of the first coil is attached to the under side of the cap on the inside shell, and that the lower end of the last spring is connected to the cross-bar or cross bars E, Fig. 3, or to the last disk, and that the last disk is connected by tension-rod to the cross-bar or cross-bars, as shown in Fig. 4, and thus to the bottom of the outside shell, so that the series of springs hold the shells telescoped in and upon each other, and that any force applied to the shells to pull them asunder would bring tension on the springs.

The peculiar mechanism of the clip-hook will be better understood by reference to the drawings, Fig. 8. It consists of a long loop-like shank with an upper and lower pinch or bite. The lower bite is made to touch the back of the shank of the hook, while the shank of the hook has a short bend in the opposite direction from the hook, and the loop end of the shank has a short bend in the same plane toward the bend above the hook, bringing the second bite very near, but not near enough to touch, as shown in the drawings. The clip-hook hangs astride the cross-bar, when only one cross-bar is used. When two parallel cross-bars are used, the clip-hook hangs astride an extra cross-bar placed above and at right angles to the parallel cross-bars. All cross-bars are firmly attached at their ends with the lower part of the outside shell. When the lower spring does not reach the bottom of the shell, a short extension-rod is used, as shown in Fig. 4, and the clip-hook hangs in the ring at the bottom of the short extension, the said extension-rod being firmly attached to the cross bar or bars.

When the clip-hook is not wanted for use, it is pushed up into the end of the shell and held in place by the pressure of the bow of the loop against the sides of the opening, or by the spring or pinch on the cross-bar of the back and shank part of the hook. When the hook is wanted for use, it is instantly brought down to place by a slight pull upon the curve of the hook, which remains below the end of the shell.

In the case of very small balances, which may be constructed so as to be worn as "charms" upon watch-guards, &c., the clip-hook is folded upon the outside of the shell, as shown in the drawings, Figs. 6 and 7. In this form of construction a small bail is used, after the manner of the bail of a kettle, and attached to the lower end of the outside shell, as shown in Fig. 7, and the clip-hook is placed astride this bail. The clip-hook is folded by giving it a half-twist and laying it upon the side of the shell, as shown. The two hooks reach a little more than half-way round the shell, and hold on with just sufficient force to keep the clip-hook in place. I also construct a small pan, (not shown in the drawings,) which may be attached to the clip-hook, for holding such articles as cannot be conveniently suspended by the hook to be weighed.

I do not limit myself in the construction of my compound spring-balance to the exact forms herein indicated. Now, it is manifest that if

the balance is held by the ring at the top of the cap, and a weight be suspended from the clip-hook, tension will be exerted by the weight on the cross-bar, and through the cross-bar to the springs within the shells, and that as the spring at the top is the most delicate it will yield first and the outside shell will be brought down, thus uncovering the scale and indicating the weight of the article suspended. The upper spring, if the weight of the article be sufficient, will continue to yield until the disk D encounters the small ball at the end of the tension-rod C; but the ball, having a greater diameter than the slot in the disk, cannot pass, and hence it will happen that no further tension can be exerted upon the first spring. At this instant, if the weight is sufficient, further tension must be borne by the next spring, which begins to operate, while the outer shell will continue to descend until the second disk, D′, encounters the ball at the end of the tension-rod C′, at which point further tension on the second spring will instantly cease and tension will be taken up by the third spring, which now begins to operate, and so on to the last spring in the series. Additional tension on each spring instantly ceases when the lower disk attached to that spring comes in contact with the ball at the end of the tension-rod, except in the case of the last spring or lower spring in the series, when further tension is arrested by the pin in the side at the bottom of the inside shell coming in contact with a corresponding slot or shoulder near the top of the outside shell. The full capacity of the balance will be reached at a point slightly above the pin and shoulder point of contact of the shells. On removing the weight from the hook the springs will instantly resume their original positions, telescoping the shells in and upon each other.

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

1. In a compound spring-balance, the combination of the inside shell, A, with the outside shell, A′, the spiral springs B B′ B″ B‴, the tension-rods C C′ C″, the disks D D′ D″, the cross-bar E, and the clip-hook F, as and for the purposes substantially as described.

2. In a compound spring-balance, the combination of the clip-hook F, constructed in the manner as shown in the drawings, with the short bends *a a′ b b′*, forming a bite, *b b′*, with the cross-bar E, the spiral springs B B′ B″ B‴, the disks D D′ D″, the tension-rods C C′ C″, the clip-hook F, and the ring H, as and for the purposes substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

E. L. CHAMBERLAYNE.

Witnesses:

ALMON Z. BARROWS,

CHAS. B. KNOWLTON.