(No Model.)

C. A. LIEB & E. LAVENS.

WEIGHING SCALE.

No. 392,617. Patented Nov. 13, 1888.

Fig. 5.

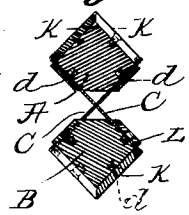


Fig. 1.

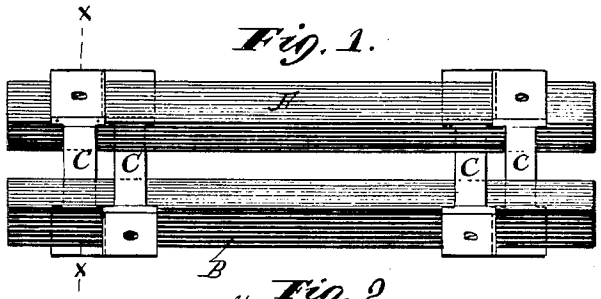


Fig. 6.

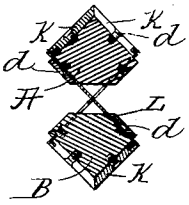


Fig. 2.

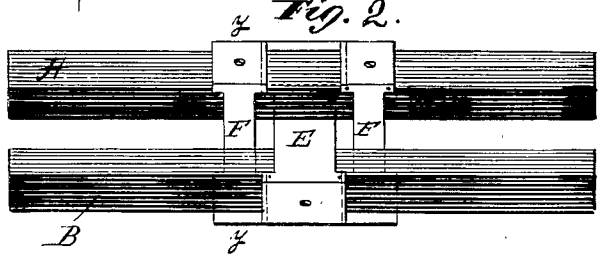


Fig. 7.

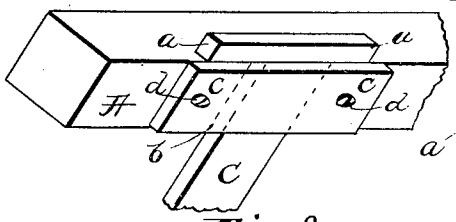


Fig. 8.

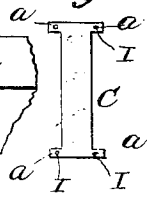
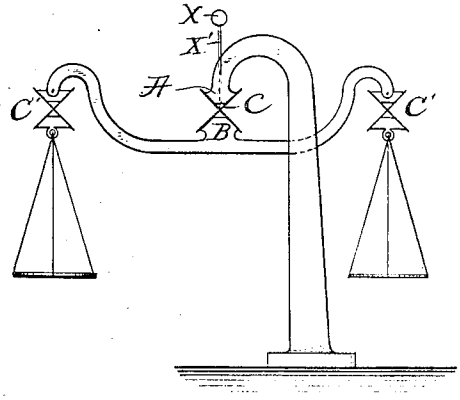


Fig. 3.



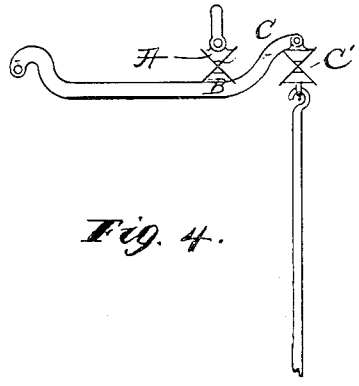


Fig. 4.

Witnesses:
W. E. Bowen
Frederick W. Block.

Inventors.
Charles A. Lieb and
By Edwin Lavens,
Phillips Abbott,
their Attorney.

UNITED STATES PATENT OFFICE.

CHARLES A. LIEB, OF NEW YORK, AND EDWIN LAVENS, OF BROOKLYN NEW YORK; SAID LAVENS ASSIGNOR TO SAID LIEB.

WEIGHING-SCALE.

SPECIFICATION forming part of Letters Patent No. 392,617, dated November 13, 1888.

Application filed March 2, 1888. Serial No. 265,970. (No model.)

To all whom it may concern:

Be it known that we, CHARLES A. LIEB, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, and EDWIN LAVENS, a citizen of the United States, and a resident of Brooklyn, New York, have invented certain new and useful Improvements in Balances and Scales, of which the following is a specification.

Our invention relates to improvements in the means for suspending the scale-beam of balances and weighing devices generally, and also of suspending the weight and platform of such scale-beams from it.

In the drawings the same reference-letters indicate the same parts in all the figures.

Figure 1 illustrates a side plan view of the invention. Fig. 2 illustrates a like view of an alternative construction. Fig. 3 illustrates the invention in plan as applied to an ordinary druggist's balance. Fig. 4 illustrates an alternative construction of the balance shown in Fig. 3. Fig. 5 illustrates a cross-section on the line *x x* of Fig. 1. Fig. 6 illustrates a cross-section on the line *y y* of Fig. 2. Fig. 7 illustrates our preferred means of attaching the suspension-strips to the supports and scale-beam. Fig. 8 illustrates one of the suspension-strips separated from the other parts.

A is a rigid support for the scale-beam.

B is a bar or frame, to which the scale-beam is attached in any desired manner, or it may form part of the scale-beam, as in Figs. 3 and 4.

C C are flexible strips, which we prefer to make of metal, which are attached at their ends, respectively, to the parts A and B and fastened in any desired manner. Their manner of attachment is such that they cross each other, as shown, and they may be made in pairs, as shown in Fig. 1, at either end of the supports A and B, and also in the central parts thereof, if desired; or they may be made as shown in Fig. 2, there being one spring, E, only running in one of the directions which shall be twice the width, or, in other words, shall have the same tension, as the other two springs, F F, which constitute its counterpart, running in the opposite direction.

The springs may be made in single pairs, each being of the same width, if desired; but we do not favor this construction, because the tendency of the scale-beam is then to twist.

The weight and also the platform or receiver of the balance or scales may be suspended from the scale-beam by the spring-strips crossing each other, as shown at C' C' C', Figs. 3 and 4.

As stated, the strips may be attached to the scale-beam and to the fixed support in any desired manner; but the construction preferred by us is that shown in Fig. 7—that is to say, the flexible strip shown separately in Fig. 8 has at each end laterally-extending lugs or projections *a*, which rest upon the upper and under surface of the support A and beam B, respectively, there being a recess, *b*, cut out from the said parts A and B, which accurately fits the flexible strip just below the lugs *a*. Thus the lugs rest upon the upper and under surface of the support A and beam B, respectively, as stated, and the parts A and B, being carefully made and the flexible strips being punched with the same die, great accuracy and uniformity will result, thus securing equal lengths in all the strips, whereby the strain upon the several strips is distributed equally. We hold the strips in place without piercing them with screw-holes by means of a plate or cap, *c*, Fig. 7, which is held firmly against the strips at their ends, clamping them firmly in their seats in the parts A and B by screws or bolts *d d*, which pass through the plate or cap *c* and enter the parts A and B by the side of the strips, but do not pass through them.

Another means by which the flexible strips may be effectively held to the parts A and B is shown in Figs. 5, 6, and 8, in which the flexible strips are made in the same manner as above stated and as shown in Fig. 8, excepting that the lugs have screw or bolt holes I I made through them; and in the sides of the supports A and B the recessed spaces above described are also formed, and on the upper surfaces of the supports A and B there are fastened plates K K, into the edges of which the screws or bolts which pass through the holes I I in the flexible strips enter. There are also other plates, L L, which are substantially the same as the plates or caps *c c*, which rest upon the surface of the springs and hold them down firmly in the recesses prepared for them by means of screws or bolts *d*, in the

manner already described. In Fig. 3 we show at X a weight which is supported on a bar, X', extending upwardly from the scale-beam. As this weight moves with the oscillation of the scale-beam it passes away from the line of gravity, and therefore aids the material being weighed to depress the beam, thus rendering the operation of the apparatus more positive and speedy.

The advantages secured by our invention over all other means of suspending scale-beams, balances, &c., known to us are—

First. The longer the flexible strips are, within certain limits, the better, because it requires less power to bend them and there is less liability to fracture. If, however, a single strip be used, which is of any considerable length, the place where it will bend, or, in other words, form a fulcrum, cannot be determined definitely. It may bend at the top or bottom instead of at its central portion, where it should bend, and if so the location of the fulcrum is changed, and consequently the leverage altered and its accuracy impaired. By using a plurality of strips crossing each other, however, each strip acts as a foil or restraint on the others, compelling flexure at or near the median line of them all.

Second. When a weight is carelessly or suddenly thrown on the platform or receiver in any direction excepting in a truly vertical line, there is a tendency to twist the scale-beam or balance-beam, and when supported upon a single flexible strip this sidewise force frequently snaps the strip; and this objection also presents itself during transportation of the apparatus where they are subjected to jar or shock, so much so that we have been compelled to disorganize certain classes of weighing apparatus made by us and remove the strips during transportation, necessitating the reassembling of the machine at its destination.

We do not limit ourselves to the details of construction shown, because alterations can be made therein and still our invention be employed.

Having described our invention, we claim—

1. The combination of a scale beam or balance and its support and flexible strips which cross each other connecting the scale-beam or balance and its support, substantially as set forth.

2. The combination of a scale beam or balance and its support and strips crossing each other connecting the scale beam or balance and its support, the size and construction of the strips being such that the same power is required to move the scale-beam in either direction when horizontal, substantially as set forth.

3. The combination, in a scale or balance, of a beam, a support for the beam, double T-shaped strips crossing each other connecting the beam and its support, and means to hold the ends of the strips firmly against the beam and its support, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 28th day of February, A. D. 1888.

CHARLES A. LIEB.
EDWIN LAVENS.

Witnesses:
PHILLIPS ABBOTT,
S. B. ROGERS.