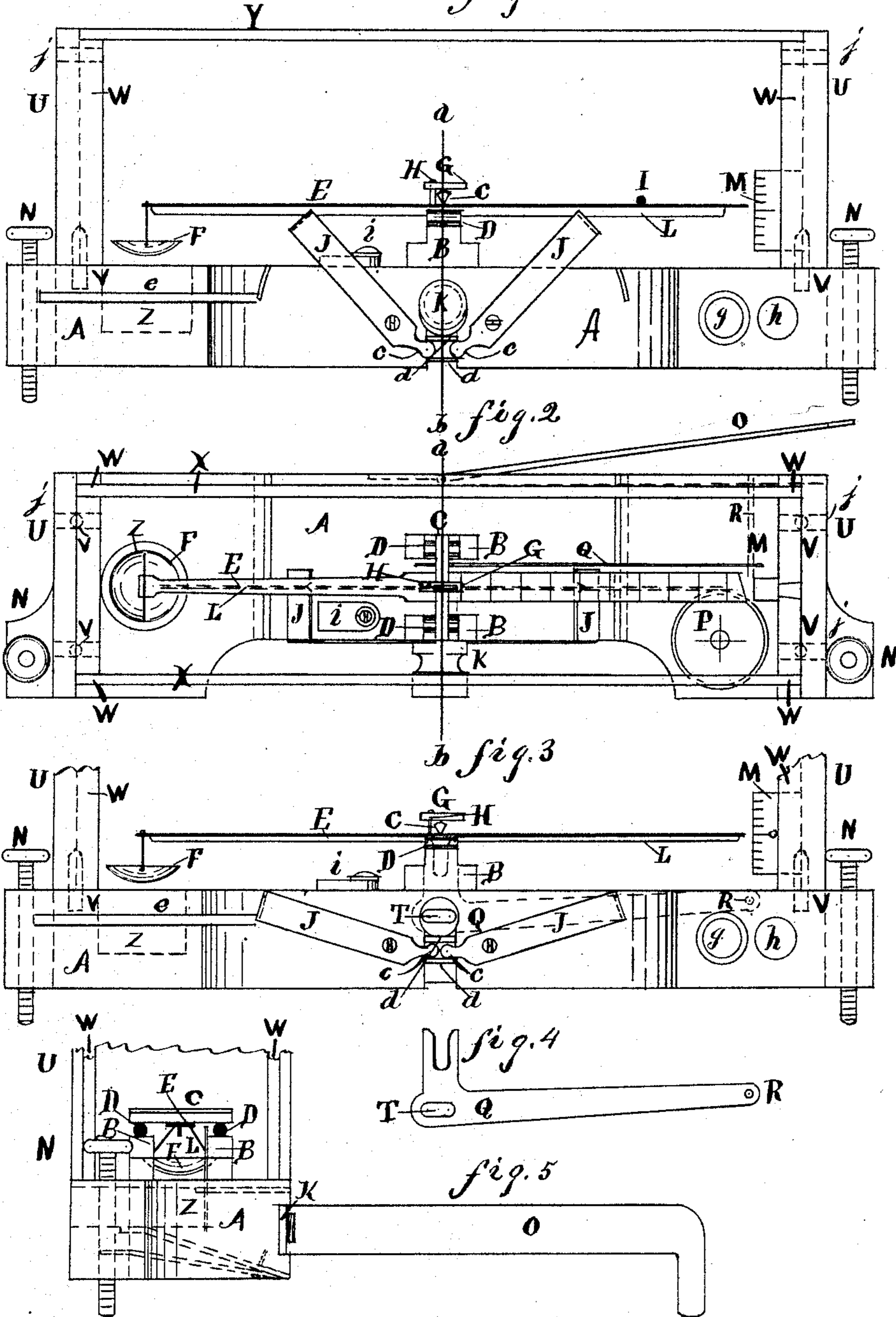


M. ATTWOOD & H. R. TAYLOR.
CHEMIST'S, ASSAYER'S, AND PROSPECTOR'S BALANCE.

No. 357,139.

fig. 1 Patented Feb. 1, 1887.

Witnesses:

L. Deane,
W. Tobin

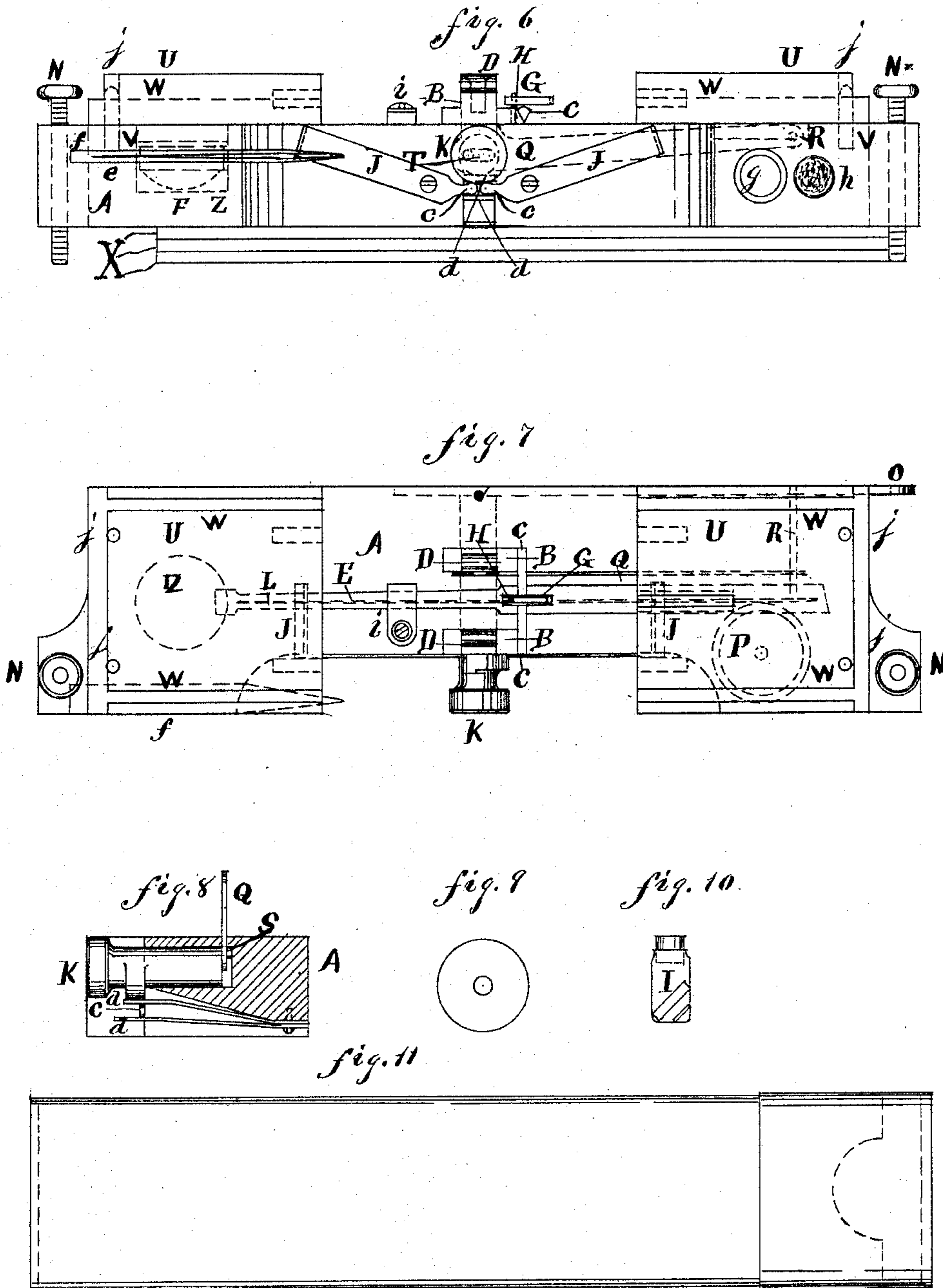
Inventors.

Milville Attwood
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UNITED STATES PATENT OFFICE.

MELVILLE ATTWOOD, OF SAUCELITO, AND HENRY R. TAYLOR, OF OAKLAND, CALIFORNIA; SAID ATTWOOD ASSIGNOR TO SAID TAYLOR.

CHEMIST'S, ASSAYER'S, AND PROSPECTOR'S BALANCE.

SPECIFICATION forming part of Letters Patent No. 357,139, dated February 1, 1887.

Application filed September 15, 1885. Serial No. 177,208. (Model.)

To all whom it may concern:

Be it known that we, MELVILLE ATTWOOD, residing at Saucelito, Marin county, California, and a subject of the Queen of Great Britain, and HENRY R. TAYLOR, residing at Oakland, Alameda county, State of California, and a citizen of the United States, have invented new and useful Improvements in Balances, of which this is a specification.

The object of our invention is to produce a small, reliable, convenient, and cheap balance for any light weighing, but more especially for chemists, assayers, and prospectors; and for a more thorough understanding thereof reference is had to the accompanying drawings, in which—

Figure 1 is a side elevation showing the beam resting upon the lifters with the knife-edges raised off the center bearings. Fig. 2 is a plan view. Fig. 3 shows the same with the beam resting upon the knife-edges on the center bearings. Fig. 4 is a detail. Fig. 5 is a transverse elevation of the balance, showing an end view of the same mounted for use, also showing the glass case and swinging foot. Figs. 6 and 7 are an elevation and a plan of the same packed ready to go into its case, as shown in Fig. 11. Fig. 8 is a detail, to be hereinafter explained. Fig. 9 is a rubber wad, and Fig. 10 shows a small vial of weights. Fig. 11 shows a tin or leather case of sufficient size to hold the scale with all its appurtenances when not in use or for transportation.

Similar letters indicate corresponding parts throughout the several views.

A is a block of wood, upon which are mounted and permanently fastened the two bearings B B, the tops of which are provided with any sufficiently hard material to resist the cutting action of the knife-edges C C. In the present case we employ glass rods D D. To and at right angle, with the knife-edge bearing C C is secured a light and delicately-balanced beam, E, on one end of which is suspended by a thread a small scale-pan, F, and by its weight the beam is brought into equilibrium. For finer adjustments the adjusting-counterpoise or feather-adjustment G, which turns upon the stud H, is used. This is an old device and used by nearly all scale-makers.

The beam is made of any very thin metal

in the form of a letter T, having a rib, L, on the under side to strengthen it. The scale-pan is suspended from one end at E, while the other end serves as a pointer to pass over the graduated scale M, the wide end of which may be graduated into ten or more equal parts or divisions; and for the purpose of illustration we will assume that there are ten. Consequently, if the weight I equals one grain and is placed upon the seventh graduation from the center it will require seven-tenths of a grain in the pan to balance it. Two or more weights may be used at a time of different sizes when extreme accuracy is desired. These weights may be round or flat; if round, the graduations should be as wide and deep as possible, to prevent their rolling.

The two lifters J J, operated by the eccentric knob K, are raised to receive the beam, they being provided with arms reaching under the beam, having in each a V-shaped notch to receive the rib L on the under side of the beam. In this position the pan may be put on or removed, the weights changed, and the article to be weighed manipulated at the pleasure of the operator, who, when he desires, turns the eccentric knob, gently drops the beam until it rests upon the knife-edges on the glass bearings, when the pointer end will at once indicate upon the scale M the weight of the article, as shown in Fig. 3.

In order to secure a level position (which is important) the block A is provided with two thumb-screws, N N, and the swinging foot O, and circular level P, which levels in all directions at once, and also to prevent motion endwise to the beam the knife-edge passes through the forked guide Q. (Shown in broken lines in Figs. 3 and 6; also, in plan, Figs. 2 and 7; also, in detail in Figs. 4 and 8.) This guide has its center of motion in the pin R, and is raised and lowered by a pin, S, in the end of the eccentric-knob shaft. Said pin passes through the slotted hole T, and it will be observed that as the beam is lowered the guide is also brought down, but faster than the beam, so that when the knife-edges touch the glass bearings the bottom of the V-shaped notches on the guide is some ways below them, thus preventing any friction that would result by the knife-edges touching and resting upon

the bottom of said notches. This slot T is seen in Fig. 3, the eccentric knob being omitted for that purpose.

The end pieces, U U, of wood, are secured to the block A by the dowels V, fixed firmly into it, but fit snugly in the uprights. These pieces have grooves W, into which the glass plates X are slid, as shown in Fig. 2, and also one plate X is laid on top, as shown in Fig. 1, thus forming a glass case, which will completely shelter the balance from the slightest breath of air. The scale M is dovetailed into one of these end pieces, and can be removed and placed in the hole Z, shown under the pan when the apparatus is packed, as shown in Figs. 6 and 7.

The transverse section, Fig. 8, is through *a* and *b*, Figs. 1 and 2. It shows the eccentric knob and mode of operating the two lifters J J and the forked guide Q. The short end *c c* of lifters J J are confined between the two springs *d d*, with the eccentric part of the knob resting upon the top one; and it will be seen that by depressing it the lower one must also be forced downward and the forked guide Q is carried upward.

The slot *e* in Figs. 1, 3, and 6 is for the purpose of holding the tweezers *f*. (Shown in Figs. 6 and 7.) The holes *g* and *h* in Figs. 1, 3, and 6 are for the purpose of holding the eccentric knob and the small vial of weights, the latter being shown in Fig. 10.

In order to pack the apparatus in the least possible space for transportation, the three pieces of glass X, which are of equal length, breadth, and thickness, are withdrawn from their respective slots and placed below the block A, as shown in Fig. 6. The pan and scale are removed and placed in the hole Z and covered by the rubber wad, Fig. 9. The lifters J J, with the forked guide Q, are lowered, and the beam E removed and placed on top of the block A, which contains a groove deep enough to accommodate the rib on the under side of the beam, and is secured by the button *i*. The two end pieces, U, are then laid with their slotted sides up, the dowels V entering the holes *j*, and the swinging foot O is swung back into the recess *k* in the side of the block A, Fig. 5. The tweezers are put in the slot *f*, the vial of weights, Fig. 10, and the eccentric knob in their respective holes *g h* in the block A, as shown in Figs. 6 and 7, when the whole is slid into the case, (represented in Fig. 11,) which can be easily carried in the pocket.

From the foregoing it will be seen that we have invented a new and useful balance that

will for its completeness and low cost be desirable to many, and the only attempt made, to our knowledge, to supply the demand was by Dr. Black, whose balance was composed of a simple strip of wood suspended by a needle, without pan, lifters, guide, or glass case. Such an instrument is illustrated in Makin's Metallurgy, page 288.

Having illustrated and described our invention, what we claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a metallic beam having a T-shaped section equipoised by the scale-pan suspended from one end, and the feather-adjustment, said beam resting upon central bearings fixed to a block, in combination with the two lifters operated by the eccentric knob and springs, substantially as set forth.

2. The combination of a metallic beam having a T-shaped section equipoised by the scale-pan suspended from one end, and the feather-adjustment, said beam resting upon central bearings fixed to a block having two lifters operated by the eccentric knob and springs, in combination with the two thumb-screws, a swinging foot serving as feet, and a circular level, substantially as described.

3. The combination of a metallic beam having a T-shaped section balanced by a scale-pan suspended from one end and the feather-adjustment, said beam resting upon central bearings fixed to a block having two lifters operated by an eccentric knob and springs, also two thumb-screws, a swinging foot serving as feet, and circular level, in combination with a forked guide to counteract end motion, said guide being operated by a pin in the end of the eccentric-knob shaft, substantially as herein set forth.

4. The combination of a metallic beam having a T-shaped section balanced by a scale-pan suspended from one end, and a feather-adjustment, said beam resting upon central bearings fixed to a block having two lifters operated by an eccentric knob and springs, also two thumb-screws, a swinging foot serving as feet, and circular level, also a forked guide operated by a pin in the end of an eccentric-knob shaft, in combination with a glass and wooden case or housing having a graduated scale, substantially as described.

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