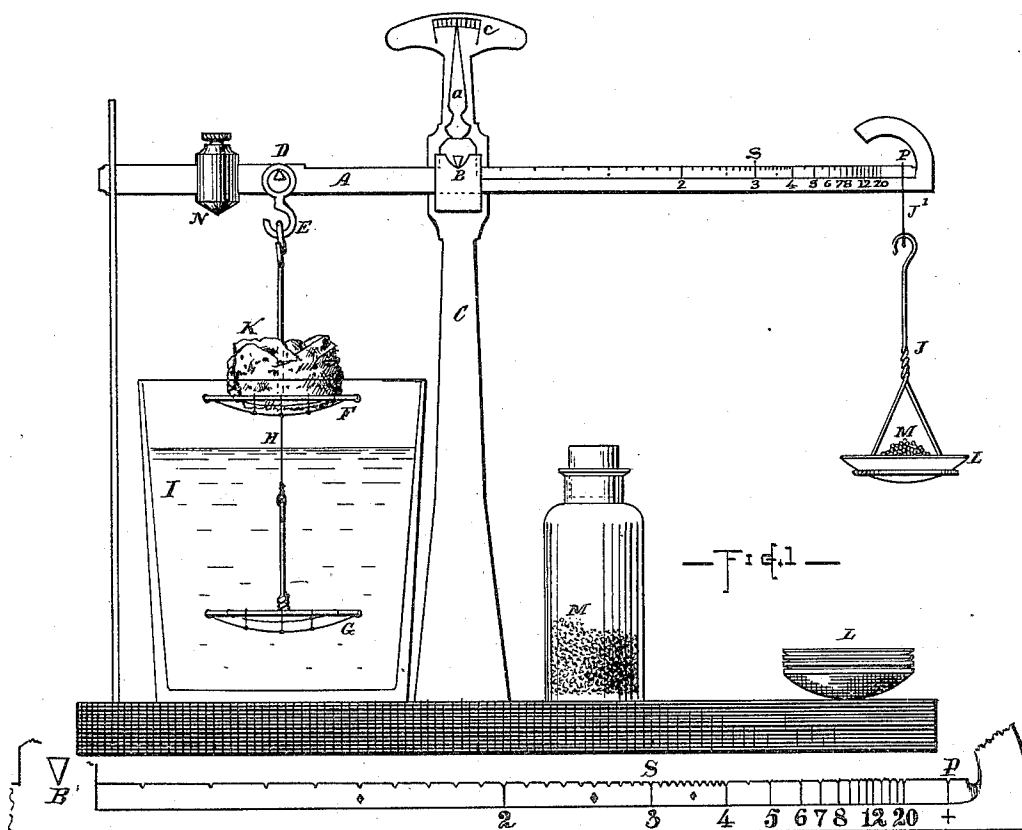


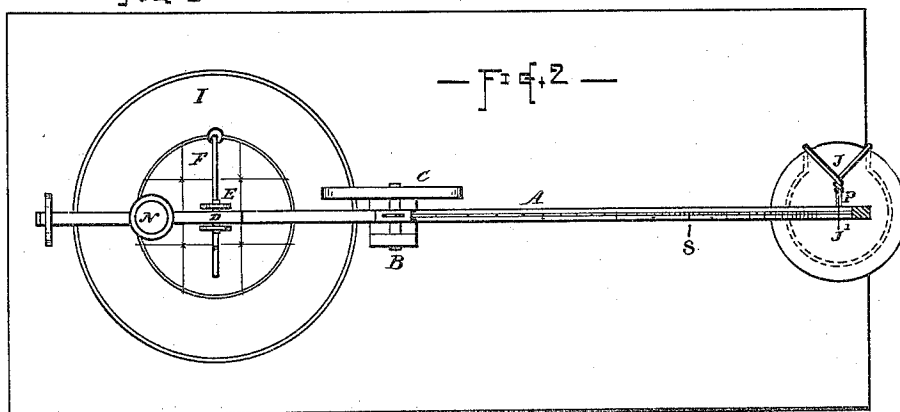
R. PARISH.
SPECIFIC GRAVITY SCALES.

No. 172,581.

Patented Jan. 25, 1876.



— Fig. 1 —



— Fig. 2 —

Witnesses
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IMPROVEMENT IN SPECIFIC-GRAVITY SCALES.

Specification forming part of Letters Patent No. **172,581**, dated January 25, 1876; application filed April 10, 1875.

To all whom it may concern:

Be it known that I, ROSWELL PARISH, of the city and county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Instruments for Determining the Specific Gravity of Minerals and other solids heavier than water; and I do hereby declare that the following is a full, clear, and exact description of the same, sufficient to enable others skilled in the art to which my invention belongs to make and use the same.

The object of my invention is to provide an instrument for use in chemical laboratories or mineralogical field-work, by the aid of which the specific gravities of common minerals and other solid substances heavier than water can be quickly and conveniently determined without resort to mathematical computations, and without regard to exact weight. To this end my invention consists in devices and mechanism organized and operating substantially as herein described, the subject-matter claimed being hereinafter definitely specified.

The accompanying drawings represent an instrument constructed to exemplify the essential features of my invention, and the mode of operation whereby specific gravities are determined therewith.

It will be obvious, however, that the size and details of construction of the instrument can be somewhat varied and refined to effect more perfect adjustment of the parts, and to indicate higher or more minute subdivision of the scale, without departing from the nature of my invention.

Figure 1 is a front view of the instrument. Fig. 2 is a plan view of the same; Fig. 3, an enlarged view of the peculiarly-graduated index-scale.

In the drawings, A denotes a balance beam or lever supported or fulcrumed by means of knife-edge trunnions at B upon a suitable hanger or standard, C, and having at D a hook, E, also fitted to work on knife-edge trunnions, which support the double scale-pan or wire baskets F G, one of said baskets being suspended below the other by a fine wire connection, H, as indicated, and immersed in water contained in the vessel I, the surface-level of the water standing about half-way

between the baskets F and G. J denotes a pan-holder, formed of wire or other suitable material, which serves as a counterpoise to the mineral K when the instrument is in use. J¹ is a loop of fine wire forming a part of the counterpoise, and employed, in the present instance, for convenience of adjustment, and to overcome the effect of the swinging and turning of the pan-holder. L L indicate small pans or saucers for use as weights upon the pan-holder J, while M indicates a quantity of granular material (in the present instance small grains of copper) employed with the pans L for increasing the weight of the counterpoise J. Sand or other finely-granulated material may be used in lieu of copper grains, as desired. N denotes an adjusting-weight for establishing perfect equilibrium between the two extremities or arms of the beam or lever A. *a* indicates an index-finger fixed to the beam A, which swings past a segmental scale, *c*, on the standard C to indicate the deflection at either end of beam A in the ordinary manner. 2, 3, 4, 5, &c., denote the graduations or divisions of the scale on beam A to indicate the specific gravities corresponding to the several positions, as will be hereafter more fully explained.

For use the instrument is adjusted to accurate balance with the counterpoise J and its loop J¹ removed from the beam A, but with the double baskets F G in position, and the vessel I supplied with water, as indicated. In determining specific gravities the mineral K or other solid to be tested is placed in the basket F, and the pan-holder or counterpoise J is adjusted to the position P, established at a convenient distance from the fulcrum B, and marking the extreme working length of the lever-arm. One or more of the pans L are placed upon the holder J to counterbalance the weight of the mineral, and a sufficient quantity of the granulated copper or sand is placed in the pan to cause the beam A to assume a horizontal position, or to stand in perfect equilibrium. The mineral K is then removed from the upper basket F, and placed in the lower basket G, where it is submerged in the water contained in vessel I. The counterpoise J, with its load of pans and granular material, is then moved along the beam A toward the

fulcrum B to a position, S, where it just counterbalances the submerged mineral. This position S corresponds with the specific gravity of the mineral, and the amount being indicated by the graduated scale can be read off direct, thus giving at a glance the correct specific gravity without regard to the weight or quantity of the mineral K or other substance under test.

The indicating-scale B P is constructed or graduated in accordance with the following considerations, viz: Let x represent the exact weight of the counterpoise; then,

$$\frac{x.BP}{BD} = \text{weight of K in air, (1).}$$

$$\text{Also, } \frac{x.BS}{BD} = \text{weight of K in water, (2).}$$

$$(1) - (2) \left(i. e., \frac{x.BP}{BD} - \frac{x.BS}{BD} \right) = \frac{x.PS}{BD} =$$

weight of water displaced, (3).

$$(1) \div (3) \left(i. e., \frac{x.BP}{BD} \div \frac{x.PS}{BD} \right) = \frac{BP}{PS} = \text{spe-}$$

cific gravity of K.

Hence the specific gravity is known if the ratio $\frac{BP}{PS}$ is known. This ratio is indicated

upon the arm B P for as many points as may be desired. The peculiar scale thus constructed, and its application as set forth, constitutes one chief essential feature claimed as my invention.

As modifications in the detail of construction, I would mention that in lieu of the loop J¹ a saddle-piece to slide upon the beam A may be employed for supporting the counter-

poise devices. The adjusting-weight N may also be made in the form of a cylindrical nut, or otherwise, to operate along a screw formed upon or attached to the beam A, while the standard C may be curved or bifurcated to permit of the counterpoise being suspended near to the fulcrum without liability of the pans interfering therewith. The length of the beam A, and the proportion between the length of the arms B D and B P, may be varied as desired, provided the indicating-scale from B to P be constructed or graduated in the manner described.

Having described my instrument for determining specific gravities, what I claim therein as new and of my invention, and desire to secure by Letters Patent, is—

1. The scale-beam provided with the graduations, determined as herein described, for indicating without calculation the specific gravity of the mineral, substantially as set forth.

2. A gravity-scale, in which the object to be weighed is suspended from a fixed point, and the counterpoise is moved upon the beam over graduations indicating the specific gravity, substantially as set forth.

3. In combination, the beam A, fulcrumed and graduated as described, a pan-holding counterpoise, J L, double pan or baskets F G, water-vessel I, and adjusting-weight N, arranged for determining specific gravity, substantially as set forth.

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Witnesses:

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