

(No Model.)

2 Sheets—Sheet 1.

R. M. SHAFFER.

BALANCE SCALE.

No. 460,036.

Patented Sept. 22, 1891.

Fig. 1.

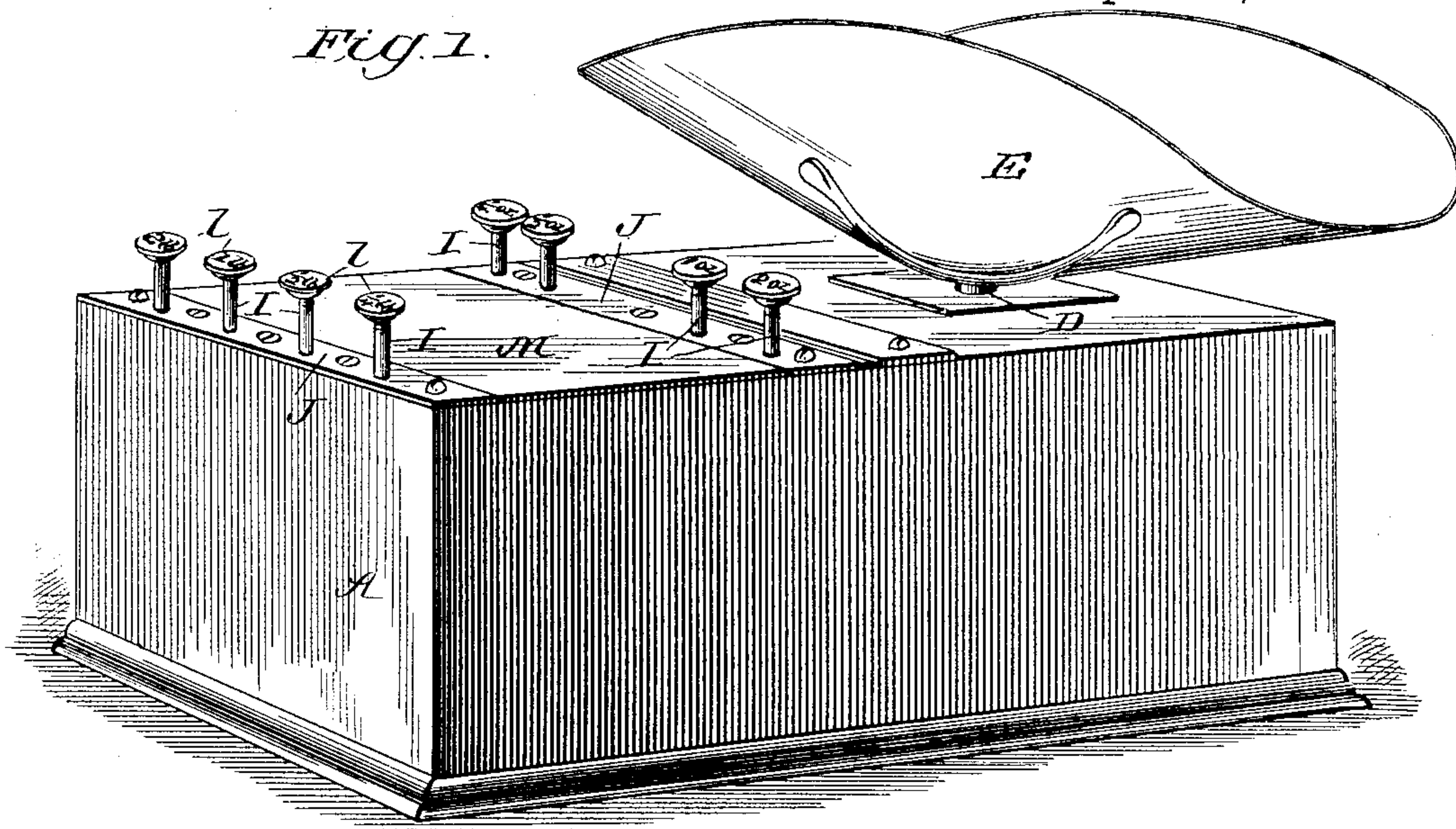
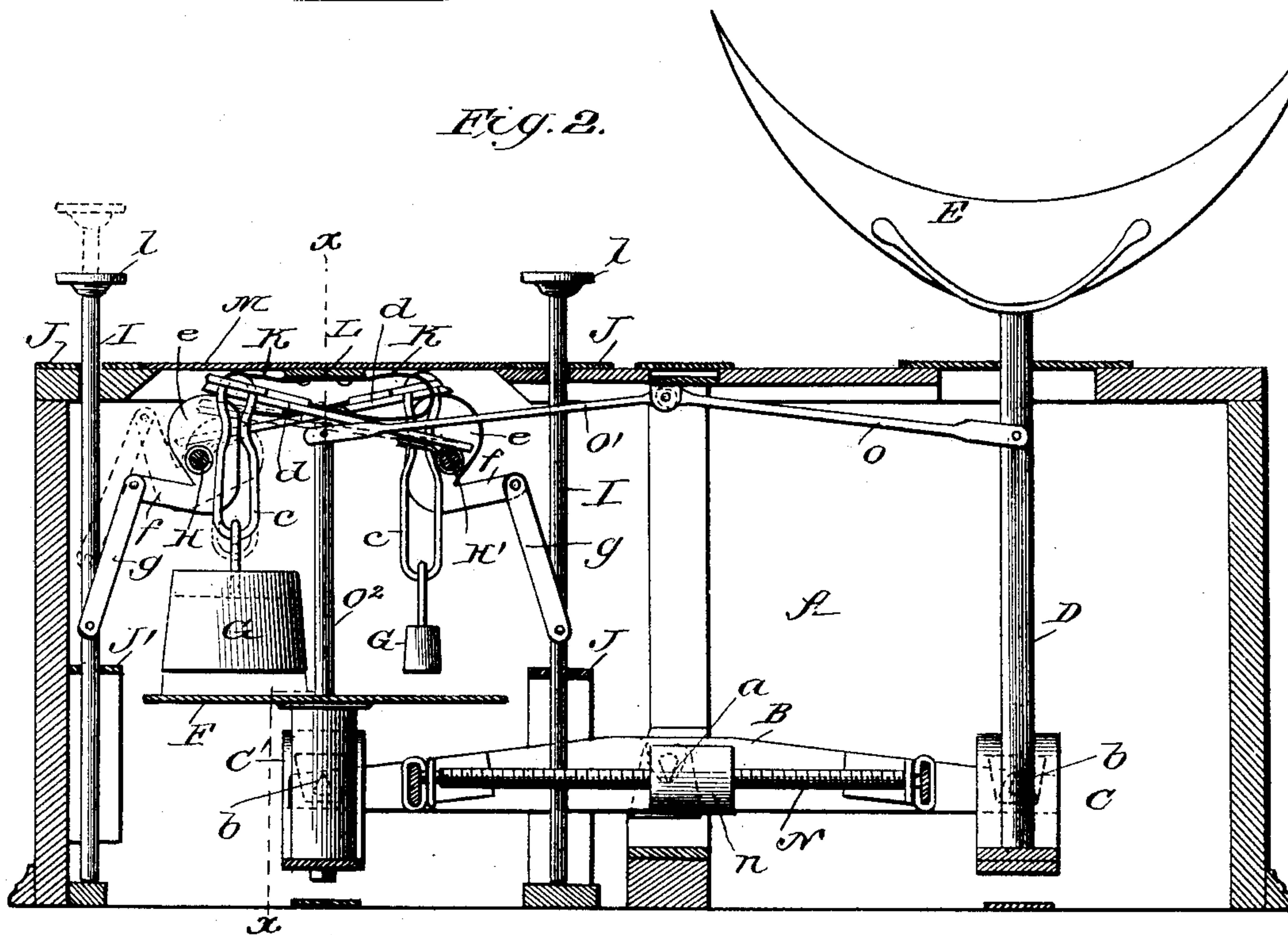


Fig. 2.



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(No Model.)

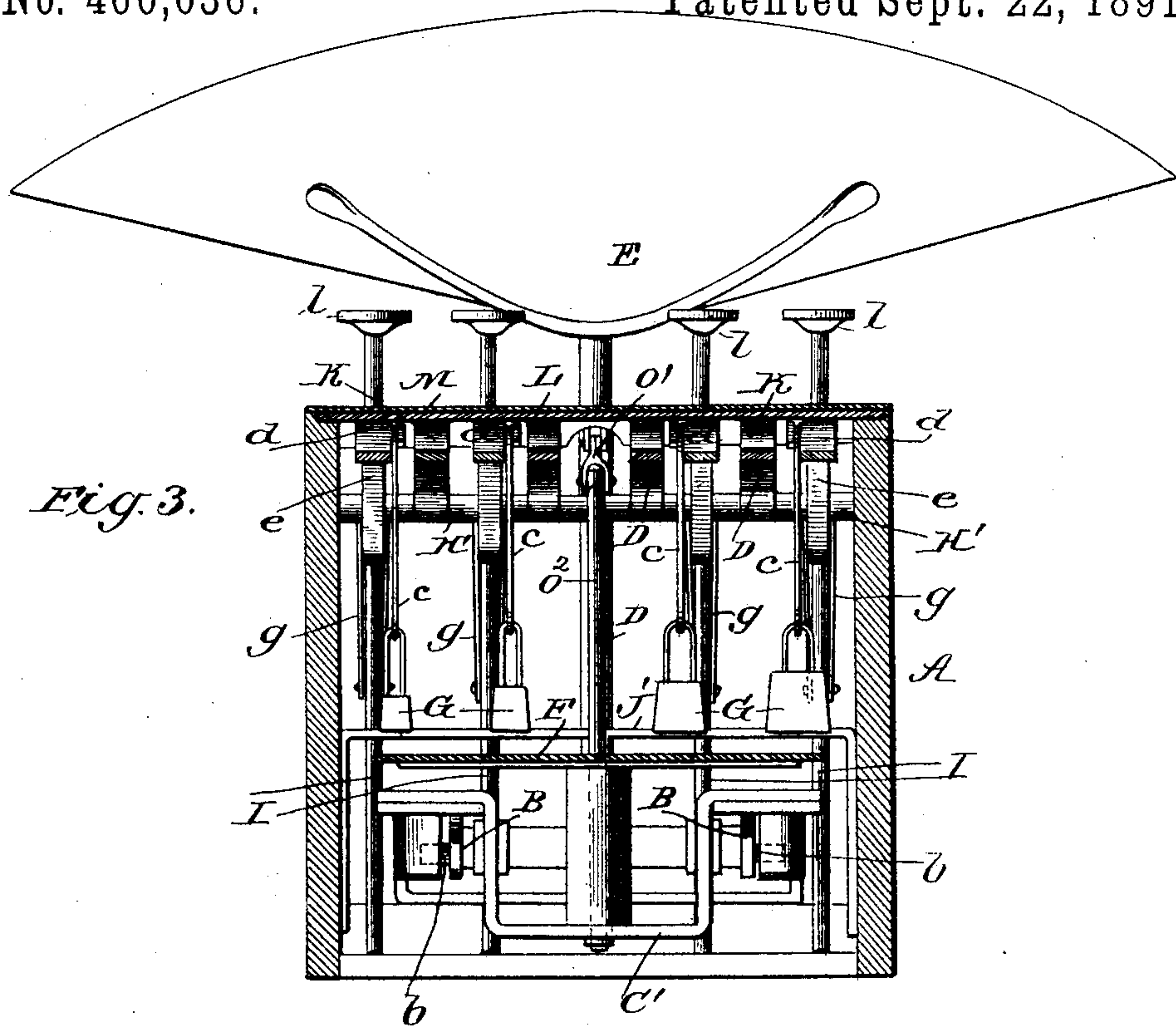
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R. M. SHAFFER.

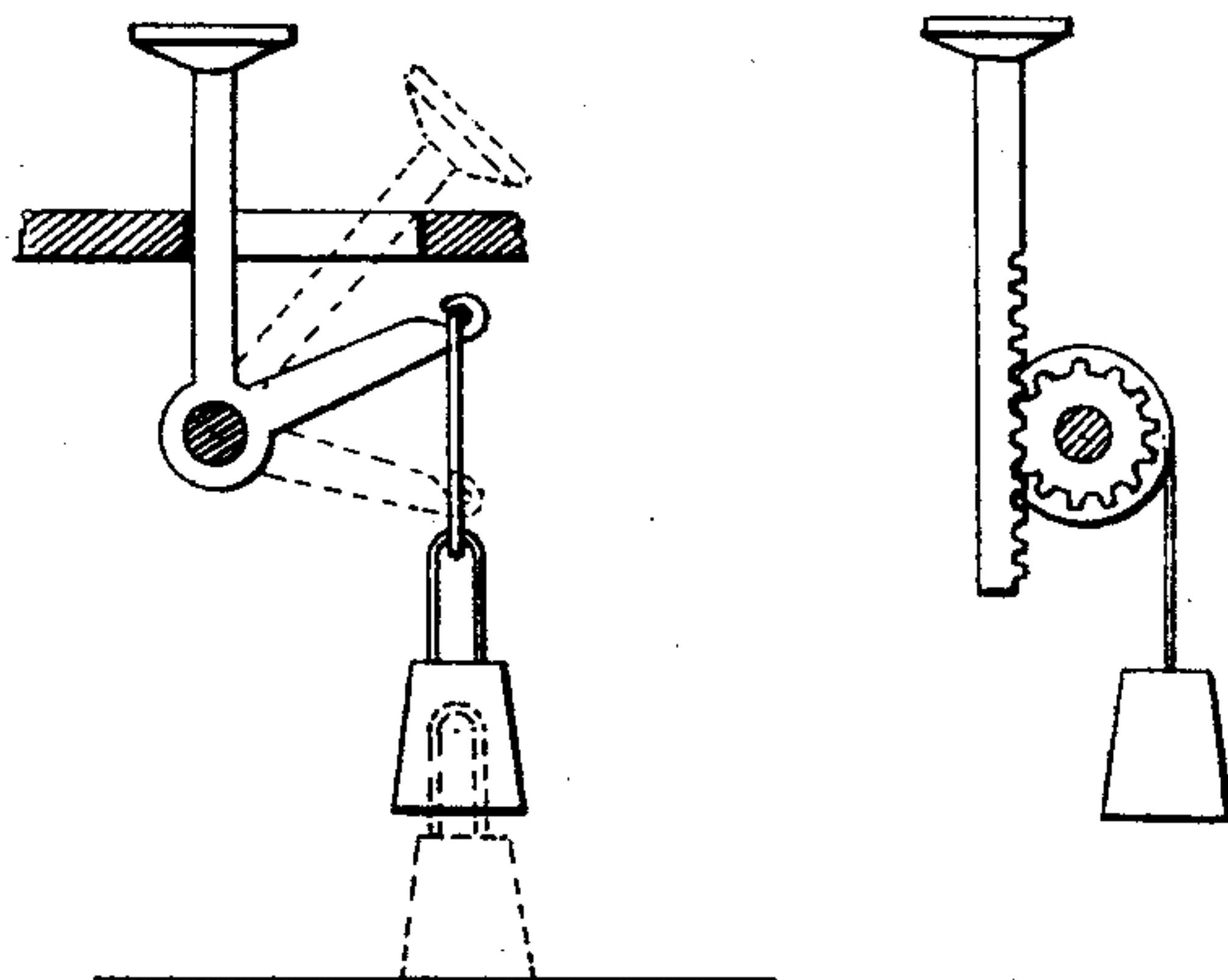
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*Fig. 4.*



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# UNITED STATES PATENT OFFICE.

RICHARD M. SHAFFER, OF BALTIMORE, MARYLAND.

## BALANCE-SCALE.

SPECIFICATION forming part of Letters Patent No. 460,036, dated September 22, 1891.

Application filed April 6, 1891. Serial No. 387,890. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD M. SHAFFER, of Baltimore city, in the State of Maryland, have invented a new and useful Improvement in Balance-Scales, of which the following is a specification.

The object of my invention is to dispense with the use of the detached weights which ordinarily accompany the usual forms of balance or counter scales. These graduated weights, being more or less numerous, are continually being misplaced or lost and are liable to roll off the counter or be scattered promiscuously thereon or be stolen on account of their detached character.

My invention seeks to preserve all the positive advantages of this class of scales by weighing with weights instead of springs and yet present such a construction of scales as shall be free from the objection of detached weights and at the same time be simple, compact, accurate, and efficient.

It consists, mainly, in placing one of the pans of the balance at a lower level than the other and providing a series of weights connected with a series of pulls or adjusting-handles, by moving one or any number of which one or any number of the weights may be placed in the pan to weigh any body placed in the other pan, the pulls or handles being each plainly marked with the weights which they represent, as hereinafter fully described.

Figure 1 is a perspective view of the exterior of the scales. Fig. 2 is a vertical longitudinal section. Fig. 3 is a vertical transverse section through line  $xx$ , and Fig. 4 shows details of modified constructions.

In the drawings, A represents the outer case of the scales, which case is preferably in the form of a rectangular box, but may be made of any other shape. It is formed of cast-iron, wood, marble, or any other desirable material.

B is the lever-frame, which is fulcrumed at  $a$  upon knife-edges sustained upon suitable supports fixed to the inner sides of the case. At opposite ends of this lever-frame are the stirrup-shaped supports C and C', which are supported upon the ends of the lever-frame by means of knife-edges  $b$ . From one of these supports C there rises a rod D, extend-

ing through the top of the case and supporting the pan E, or in the place of it the slab, disk, or scoop upon or in which the articles to be weighed are placed. At the other end of the lever-frame the supporting-frame C' is connected within the case to a pan or table F, upon which the weights are to be placed. These weights are shown at G, and they vary in their gravity to correspond with the subdivisions ordinarily used or any that may be desired—as, for instance, one-fourth ounce, one-half ounce, one ounce, two ounces, one-fourth pound, one-half pound, one pound, two pounds. They are arranged in one, two, or more rows immediately above the weight-support F and out of contact with the same. As shown, there are two rows of them, and as their connections for depositing them upon the weight-support F and lifting them off again are all the same it will be sufficient to describe one of them. Each weight has a loose link  $c$ , that connects it to an arm  $d$ . This arm is pivoted or hung at one end upon a shaft H and rests at its other end upon a cam  $e$ , loosely hung on a shaft H', parallel to H. This cam has an extension  $f$ , that is connected by links  $g$  to a vertical slide-rod I, that extends through the top of the case and terminates in a knob or disk  $l$ , marked with a figure or figures to correspond with the weight connected thereto. There is one of these slide-rods and its connections for each weight, and these rods are guided in their vertical movement by cross-bars J J'.

K are springs, which may be of any shape and cross-section, and which, as shown, are of flat spring-steel curved and resting upon the tops of the lift-arms  $d$  and connected to the cross-bar L above. The action of these devices is as follows: When it is desired to weigh any specified amount of material, the knob or pull  $l$  indicating that amount is pulled up, or several of them aggregating that amount are pulled up, and the material placed in the pan or scoop E will be, when a balance is obtained, exactly the desired amount. The effect of raising one of the pulls is to throw the cam  $e$  down and drop the arm  $d$  to a position in which the weight of that arm is deposited upon and supported by the lower pan or table, accomplishing in effect the same result that is reached when



the tradesman places a weight of definite size upon the table of the counter scales or balance. After the article has been weighed the pull-rod is forced down and the cam *e* is rotated partly, so as to lift the arm *d* and raise, through the link *c*, the weight until it is off of the table or pan which supported it. The cam enables this movement to be easily and smoothly effected, with but little effort on the part of the operator. The function of the spring *K* is to hold each arm steadily to place and prevent rattling and looseness.

*M* is a sliding cover, which has dovetailed edges that slide beneath the two cross-bars *J J'*.

*N* is a longitudinal screw-rod arranged in the lever-frame and provided with a weight *n*, turning on it like a nut. This is an adjusting-weight, by which the equilibrium of the balances is preserved or readjusted when necessary.

*O O'* are stays or radially-swinging arms for preserving the parallel movement of the pans and the vertical positions of their rods. These stays are jointed inside the case to a stationary part of the same, immediately above the fulcrum of the main frame, and one of said stays is jointed to the rod which supports the upper pan and the other stay is jointed to the top of a rod *O<sup>2</sup>*, which rises from the lower pan.

In carrying out my invention I do not confine myself to the special construction and arrangement of parts shown, as these may be changed without departing from my invention. Thus, for instance, the vertical slide-rods *I*, with links, arms, and cams *e*, may be replaced by any other operating mechanism for raising and lowering the weights, such as tilting crank handles or levers or cord and pulleys, as shown in Fig. 4. The springs *K* may also be entirely dispensed with, if desired.

I am aware that it is not new to provide a scale-beam with a series of weights of the same gravity, spaced along the beam for different leverages on the same, and arranged to be placed upon or removed from the beam by adjusting devices, and I make no claim to such arrangement.

My invention is distinctive in the different gravities of the weights and the fact that they are all placed upon a support having a single point of connection with the fulcrumed frame and a constant leverage.

Having thus described my invention, what I claim as new is—

1. A pair of balance-scales consisting of a fulcrumed frame bearing at one end a pan or its described equivalent and at the other end a support for adjustable weights having a single point of connection with the fulcrumed frame, a series of weights of different gravities, and adjusting devices for each for placing them singly or collectively upon said support to balance the articles in the weighing-pan, substantially as shown and described.

2. A pair of balance-scales consisting of a

fulcrumed frame bearing at one end a pan or its described equivalent and at the other end a weight-support placed at a lower level and having a single point of connection with the fulcrumed frame, a series of weights of different gravities sustained just above the weight-support, adjusting devices for depositing said weights upon the support, an outer case inclosing the weights and weight-support, and operating knobs or handles arranged outside the case marked to correspond with the weights which they represent and connected to their adjusting mechanism, substantially as shown and described.

3. The combination, with an inclosing case, of a fulcrumed main frame having at one end a rod extending up through the case and bearing a pan or its described equivalent and having at the other end a weight-support within the case for adjustable weights, with vertical standard *O<sup>2</sup>*, rising above the weight-support, and the swinging or oscillating stay-arms *O O'*, pivoted or hung centrally above the fulcrum of the main frame and pivoted the one to the rod of the pan below the same and the other to the standard of the weight-support above the latter, substantially as shown and described.

4. The combination, with the weight-support in a balance-scales, of a series of weights loosely hung above it, the links *c*, loosely connected thereto, the lifting-arms *d*, connected to the links, the lifting-cams *e*, arranged beneath the arms and provided with extension *f*, the vertical pull-rods *I*, and the links *g*, connecting the same to the cam-extensions, substantially as shown and described.

5. The combination, with the weight-support, the weights, and the weight-adjusting devices, of a series of springs for tightly holding the adjusting devices to place against looseness, substantially as described.

6. The combination, with the outer case having balance-frame, weight-support, weights, and adjusting devices within, of the cross-bar *L*, springs *K*, attached to the cross-bar and pressing upon the weight-adjusting arms, the undercut guide-bars *J'*, and the dovetailed sliding cover *M*, substantially as shown and described.

7. A balance-scales consisting of an inclosing case, an external weighing-pan or its described equivalent, a series of external pulls or handles marked with the specific weights which they represent, and a series of weights of different gravities, a pan or support having a single point of connection with the fulcrum-frame, and adjusting devices within the case and connected to said pulls or handles, substantially as described, to cause the weights to be brought at will into or out of weighing action, as set forth.

RICHARD M. SHAEFFER.

Witnesses:

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WILLIAM H. BERRY.