(No Model.) 2 Sheets—Sheet 1.

F. W. THOMPSON.

ASSAY AND CHEMICAL BALANCE.

No. 594,364. Patented Nov. 23, 1897.

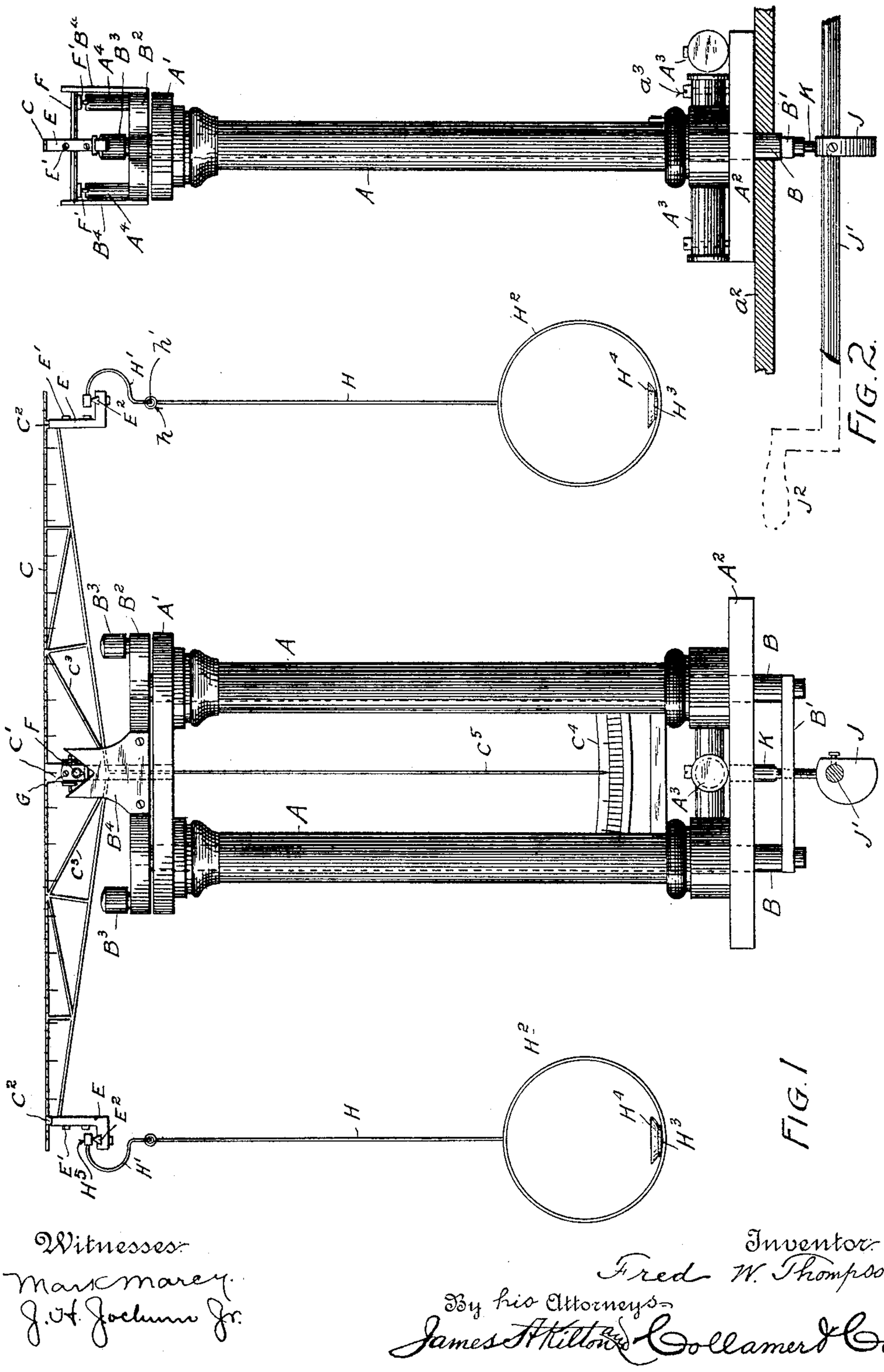

FIG. 2.

FIG. 1

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Marc Marcy.
J. H. Jochum Jr.

Inventor:
Fred W. Thompson,
By his Attorneys—
James A. Hilton & Collamer & Co.

(No Model.) 2 Sheets—Sheet 2.

F. W. THOMPSON.

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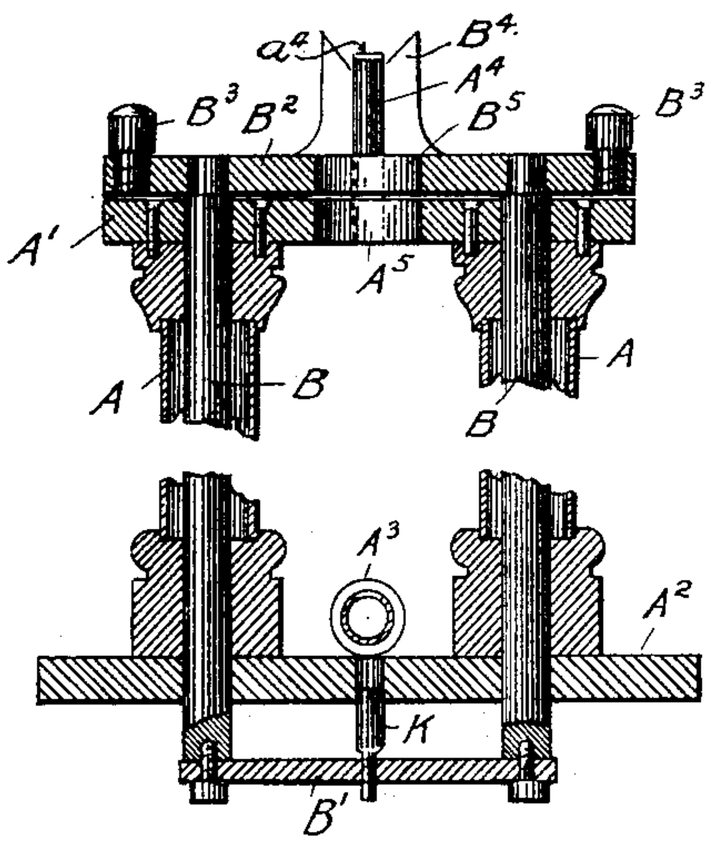
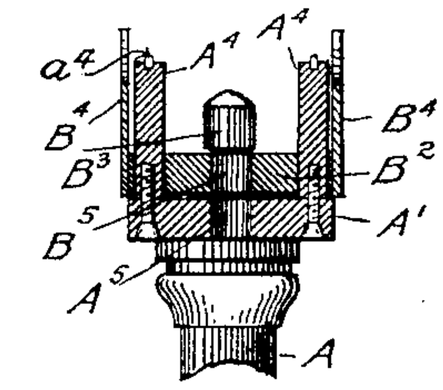


FIG. 3.



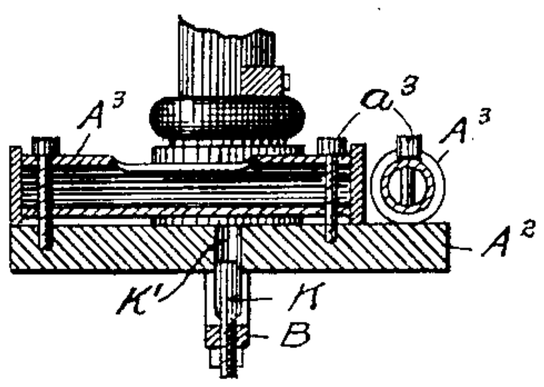


FIG. 4.

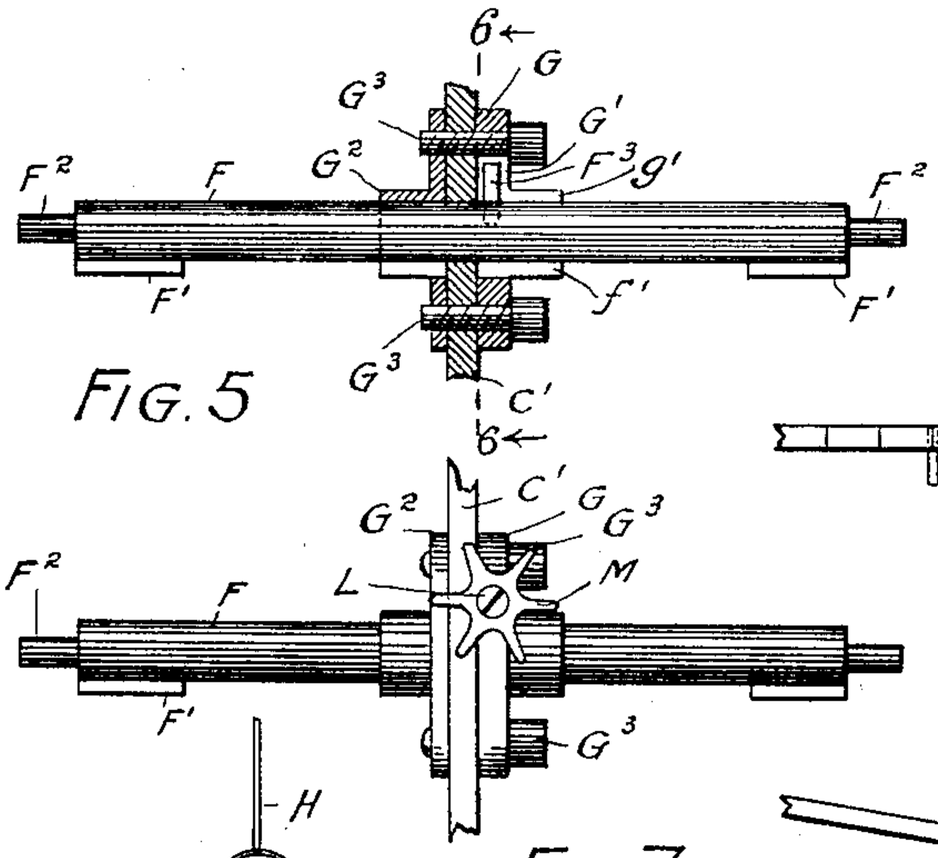


FIG. 5.

FIG. 7.

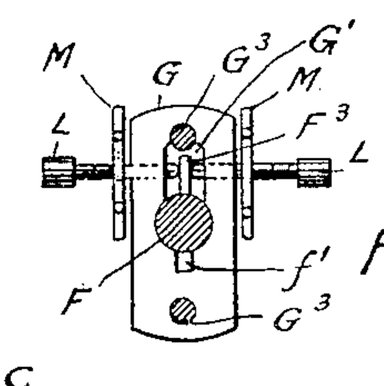


FIG. 6.

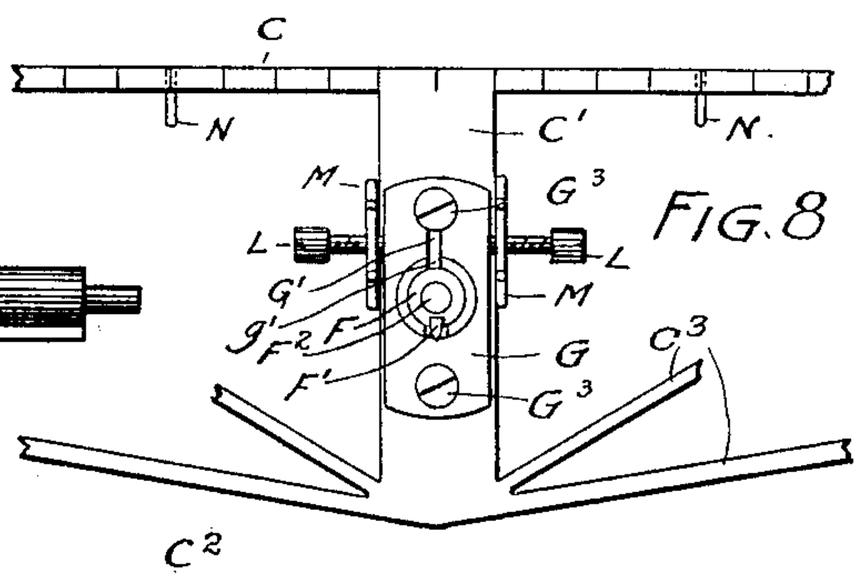


FIG. 8.

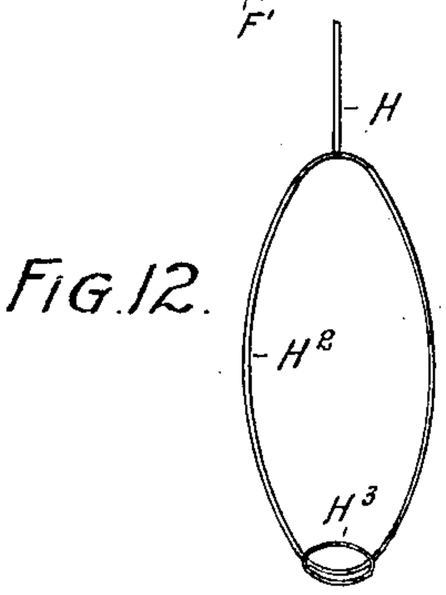


FIG. 12.

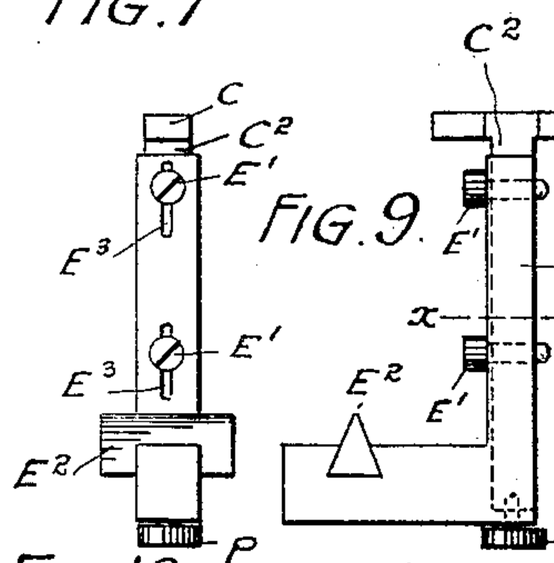


FIG. 10.

FIG. 9.

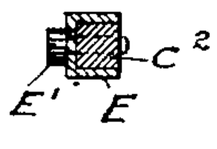


FIG. 11.

Witnesses:
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UNITED STATES PATENT OFFICE

FRED W. THOMPSON, OF DENVER, COLORADO.

ASSAY AND CHEMICAL BALANCE.

SPECIFICATION forming part of Letters Patent No. 594,364, dated November 23, 1897.

Application filed March 22, 1897. Serial No. 628,668. (No model.)

To all whom it may concern:

Be it known that I, FRED W. THOMPSON, a citizen of the United States, and a resident of Denver, Arapahoe county, State of Colorado, have invented certain new and useful Improvements in Assay and Chemical Balances; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, terminating with claims particularly specifying the novelty.

This invention relates to measuring instruments, and more especially to that class thereof known as "scales;" and the object of the same is to effect certain improvements in the various adjustments usually employed in delicate instruments of this character. There are further objects, as will appear below.

To this end the invention consists in the details of construction set forth in the following specification and as illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of this scale complete Fig. 2 is an end view with the nearer pan removed. Fig. 3 is a central vertical section through the supporting-pillars and on a line at right angles to the section of Fig. 2. Fig. 4 is a similar vertical section taken just between the pillars. Fig. 5 is a longitudinal section through the center of the beam, showing the rock-shaft in elevation. Fig. 6 is a transverse section on line 6 6 of Fig. 5. Fig. 7 is a side elevation of the rock-shaft and its adjusting mechanism. Fig. 8 is an enlarged side elevation of the center of the beam. Figs. 9 and 10 are respectively side and end views of the adjustable brackets for the pans, while Fig. 11 is a section on line $x\,x$ of Fig. 9. Fig. 12 is a perspective detail of one of the pan-sustaining rings.

In the said drawings, A^2 is a suitable base resting on a table, stand, or box a^2, Fig. 2, by which it is firmly supported, and a strict level of the base is maintained by means of two spirit-levels A^3, secured to the base by screws a^3 and standing at right angles to each other. Carried by the base are two parallel upright pillars A A, connected by a single capital A′, having a hole A^5 between the pillars, through which extends the index C^5, whose tip moves over a scale C^4, attached to the pillars, as will be clear.

Beneath the table a^2, in suitable bearings, (not shown,) is mounted a shaft J′, having a button, wheel, or crank-handle J^2 at its front end, and fast on this shaft is a cam J, standing under the tip of a vertical screw K, whose head is accessible through a hole K′ in the base A^2 when one of the levels A^3 is removed for this purpose. The screw is threaded through a cross-bar B′, connecting the lower ends of two parallel upright rods B, extending through the hollow pillars A and connected at their upper ends by a cross-head B^2, resting normally upon the capital A′ and having a hole B^5 registering with the hole A^5 and for a similar purpose.

At the extremities of the cross-head B^2 are studs B^3, standing beneath the scale-beam C, and at opposite sides of this head are plates B^4, having V-shaped notches in their upper edges standing under projections F^2 at the extremities of the rock-shaft F. By properly manipulating the crank, button, or wheel J^2 the cam J causes the screw K and cross-bar B′ to rise, and this motion raises the rods B and cross-head B^2 slightly and lifts the entire tilting parts of the scale off their supports.

Rising from the capital A′, just inside the plates B^4, are two posts A^4, having hardened upright strips a^4 set into their upper ends parallel with the length of the beam. F is the rock-shaft supporting said beam and having projections F^2 at its extremities to engage in the notches in plates B^4, as mentioned above, and set into the lower face of this shaft, just inside said projections, are the knife-edges F′, which rest on the strips a^4 when weighing is taking place, thus giving the greatest nicety of support.

On the center of the rock-shaft F is mounted an upright plate C′, to whose upper end is fixed the scale-beam C, preferably marked with graduations, as seen in Figs. 1 and 8, and having indicating-pins N at every fifth or tenth mark for the sake of easier reading. This beam I preferably make perfectly straight and quite light, supporting its ends against sagging by suitable trusses C^3, as shown.

G and G^2 designate short upright plates set against opposite faces of the plate C′ and having outwardly-projecting collars or hubs surrounding the shaft F and slotted or notched, as at f', on their under sides to permit their

passage over the knives F′, and these plates and hubs are held to the plate C′ by screws G^3, near their tops and bottoms, Fig. 8. It is well known that balances of this light and delicate character are extremely likely to become disarranged or sprung, so that the knife-edges no longer stand exactly vertical or at right angles to the length of the beam, and vanes or flies are employed for effecting the proper adjustment. For this purpose I provide two screws L, threaded edgewise through the plate of hub G with their tips entering an opening G′ within it and abutting against opposite sides of an upright pin F^3, fast in the shaft F and having a limited rocking movement within said opening, and on these screws are weights M, whose peripheries are pointed in the shape of spur-wheels and which may be tightened up against the plate G or moved on the screws after the latter are set, or can be turned slightly with the point of a pencil or other equally delicate tool. The opening G′ continues through the side of the plate G, and a slot g' in its hub communicates therewith in order to permit this plate to be put on and taken off over the pin of the shaft F, although it will be clear that the opening G′ might open at the inner face of the plate and the hub have no slot g', in which case the plate G would have to be detached and removed laterally with the shaft F and afterward taken off of it.

The letter H designates a rod having at its lower end a large ring-shaped bail H^2, at the lower side of which is supported an open ring H^3, wherein rests the pan H^4. I have found this form of support for the pan preferable, because it permits no particles of dust, &c., to lodge under the pan and upset an accurate balance. The upper end of the rod H preferably has an eye h engaging a hook h' at the lower end of an elbow or bend H′, curving outward and then again inward and terminating in a block H^5, resting on a suitable knife-edge E^2, supported by the end of the beam C.

In balances of this character it is important that the three knife-edges or rocking supports be in an exact horizontal line, and with the object of rendering the knives E^2 vertically adjustable to effect this I have mounted each in the lower arm of an L-shaped bracket E, Figs. 9, 10, and 11. The upper arm of each bracket has a groove which is U-shaped in cross-section, so as to closely embrace a pendent arm C^2 at the extremity of the beam C, and through this upright arm of the bracket are slots E^4, receiving screws E′, that take into the pendent arm to permit vertical adjustment. It will be clear, however, that the slots could be in the other member if preferred. In addition I preferably provide a screw P, passing loosely upward through the lower end of the U-shaped groove and screwing into the pendent arm, whose function is to permit a greater nicety of adjustment even when the screws E′ are set rather tightly.

I do not wish to be confined to all the precise details of construction above set forth, as considerable change may be made therein without departing from the spirit of my invention; but I consider the mechanism described especially advantageous for use in a scale of this character and whose uses and operation will be clear to those skilled in this art.

What is claimed as new is—

1. In a scale, the combination with the base having a hole, hollow pillars rising from the base, supports carried thereby, and a scale-beam resting on said supports; of a cam beneath the hole, a screw resting thereon, a cross-bar through which the screw is threaded, rods connected with the cross-bar, and plates carried by the rods beneath the pivotal supports of said scale-beam, as and for the purpose set forth.

2. In a scale, the combination with two posts having parallel strips in their upper ends, the scale-beam, and the rock-shaft therethrough having knife-edges resting on said strips; of projections in the ends of the shaft laterally beyond said knife-edges, a cross-head, means for raising it, and upright plates carried by said head and having notched upper ends standing beneath said projections, as and for the purpose set forth.

3. In a scale, the combination with the scale-beam having supporting-trusses and a central upright plate, a rock-shaft through the latter having knife-edges in its under side and projections at its extremities, and supports for said knife-edges; of a vertically-movable cross-head standing under the beam, studs at its ends adapted to strike under said trusses, and plates at its sides with notched upper edges adapted to strike under the projections of the shaft, as and for the purpose set forth.

4. In a scale, the combination with a rock-shaft having a pin rising from its center, supports for the ends of said shaft, a scale-beam, and a plate connected therewith and surrounding the shaft above which it has an opening; of screws threaded edgewise through said plate into its opening on opposite sides of said pin, and spur-wheel-shaped weights on the screws, as and for the purpose set forth.

5. In a scale, the combination with a rock-shaft having a pin rising from its center and knife-edges set in its under side near its ends, supports for said knife-edges, and a scale-beam having an upright plate surrounding the shaft adjacent said pin; of plates screwed to opposite sides of said upright plate and having hubs embracing the shaft, both hubs being notched on their under sides for the passage of said knife-edges, and screws threaded edgewise through this hub inwardly against opposite sides of the pin, as and for the purpose set forth.

6. In a scale, the combination with the scale-beam having pendent arms at its extremities, and a central pivotal support there-

for; of L-shaped brackets having slotted upright arms, screws taking through the slots into said pendent arms, rods supported by the feet of the brackets, and pans carried by the rods, as and for the purpose set forth.

7. In a scale, the combination with the scale-beam having a pendent arm near its extremity; of an L-shaped bracket whose upright arm is U-shaped in cross-section and snugly embraces the pendent arm, one of said arms being slotted, a pan supported by the foot of the bracket, and screws taking through said slots and into the other arm, as and for the purpose set forth.

8. In a scale, the combination with the scale-beam having a pendent arm, and an L-shaped bracket whose upright arm has a U-shaped groove snugly embracing the pendent arm; of means for adjustably connecting the two arms where they lap each other, a screw extending through the elbow of the bracket into the lower end of the pendent arm, and a pan supported by the foot of the bracket, as and for the purpose set forth.

9. In a scale, the combination with the scale-beam having a pendent arm, an L-shaped bracket having a knife-edge in its lower member, and means for adjustably connecting its upright member with said arm; of a block resting on said knife-edge, a bent rod connected therewith and curving around the lower member, and a pan supported by this rod, as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my signature on this the 10th day of March, A. D. 1897.

FRED W. THOMPSON.

Witnesses:
MARY HAMPTON LLOYD,
JOHN S. GIBONS,
JAMES A. KILTON.