(No Model.) 3 Sheets—Sheet 1.

J. W. CULMER.

COMPUTING SCALE.

No. 486,695. Patented Nov. 22, 1892.

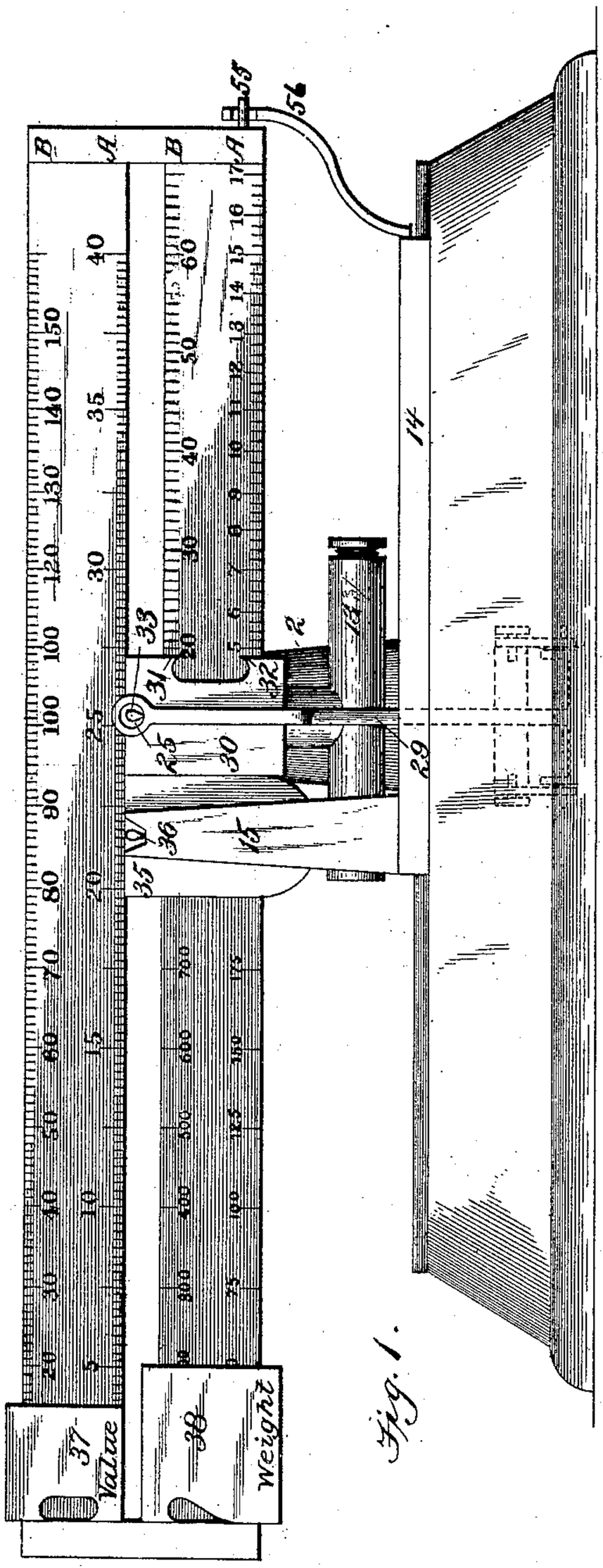

Fig. 1.

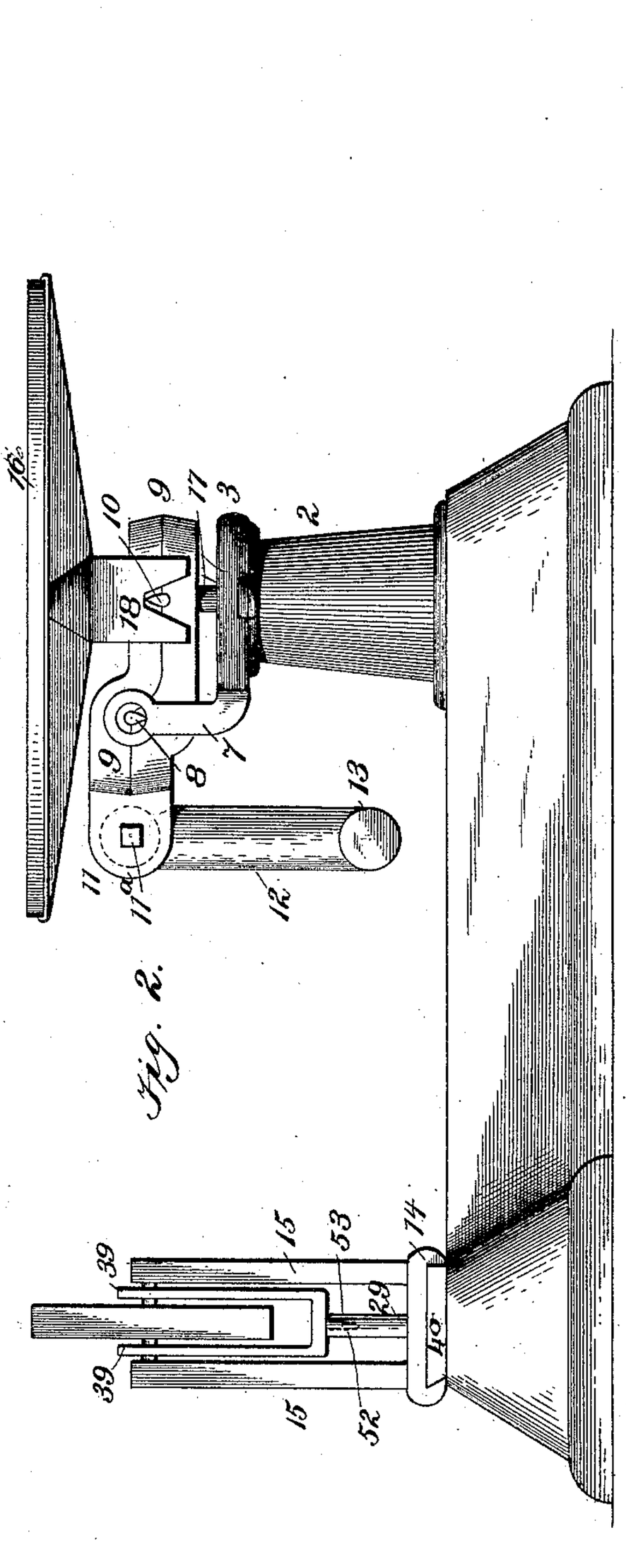

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

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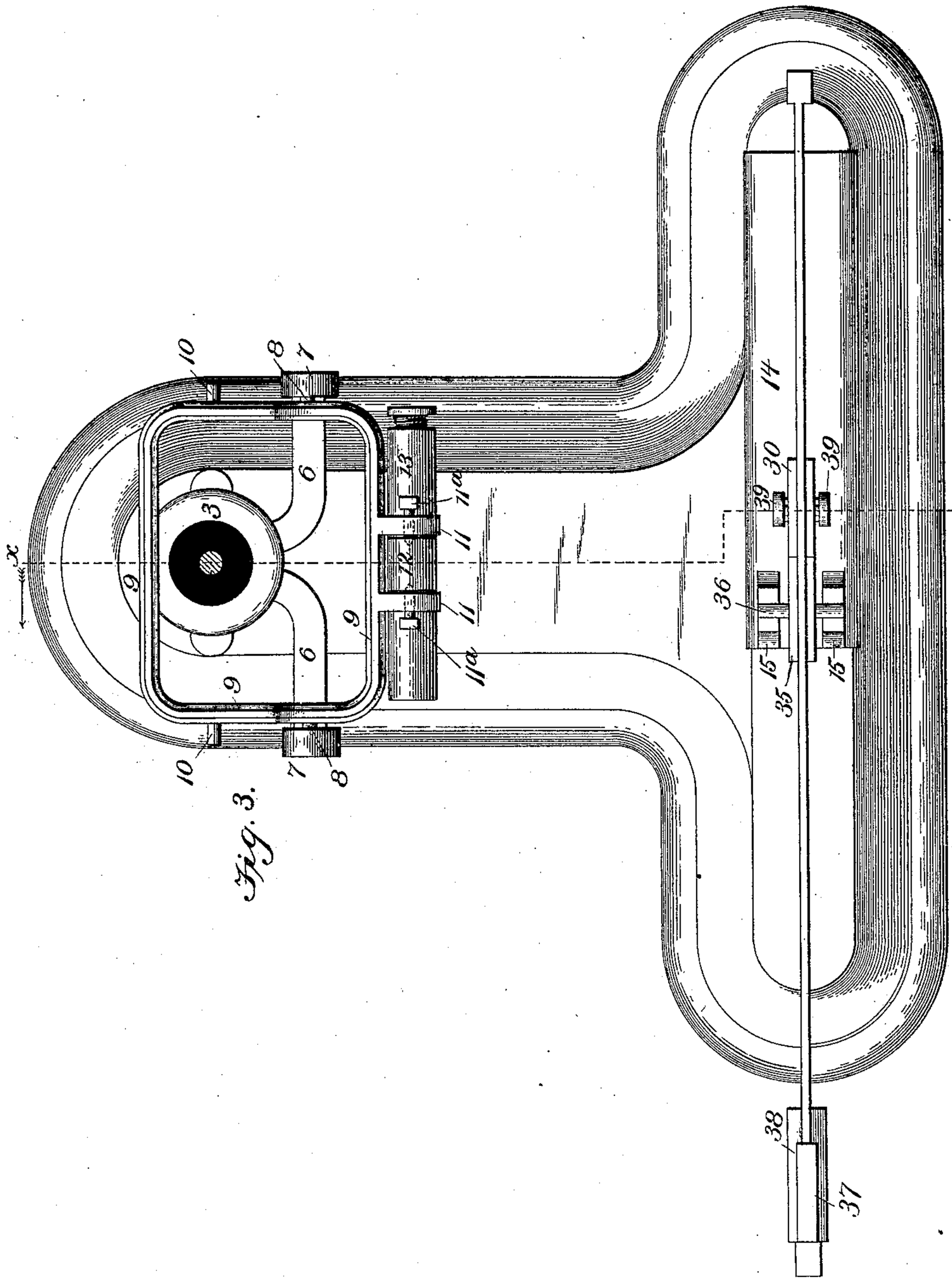

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

J. W. CULMER.

COMPUTING SCALE.

No. 486,695. Patented Nov. 22, 1892.

Fig. 4

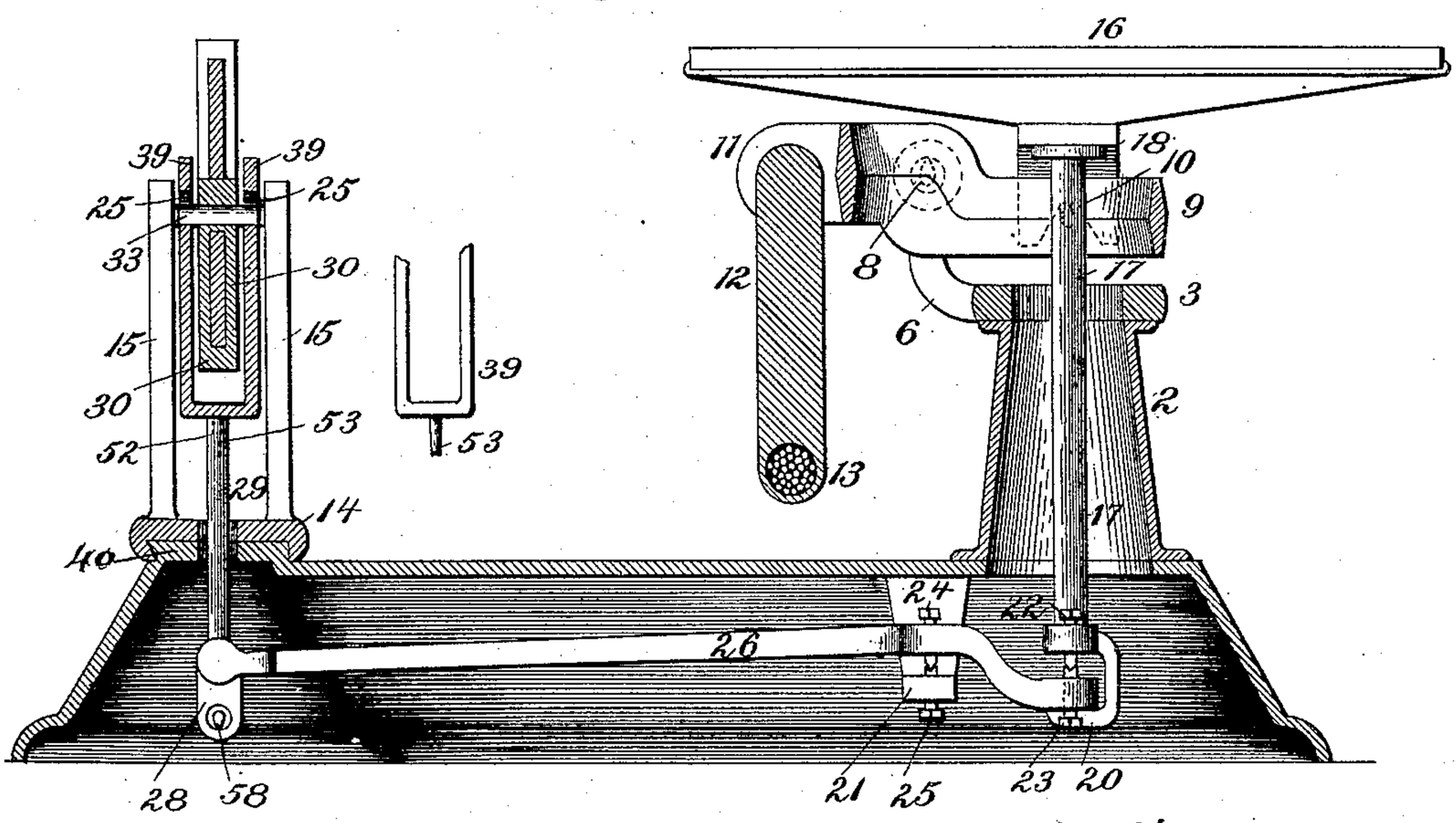


Fig. 8.

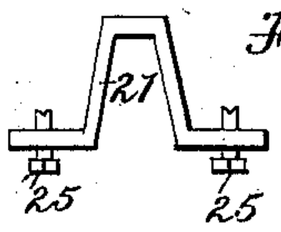


Fig. 5.

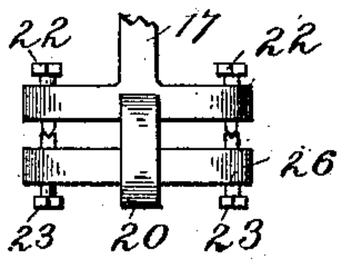


Fig. 6.

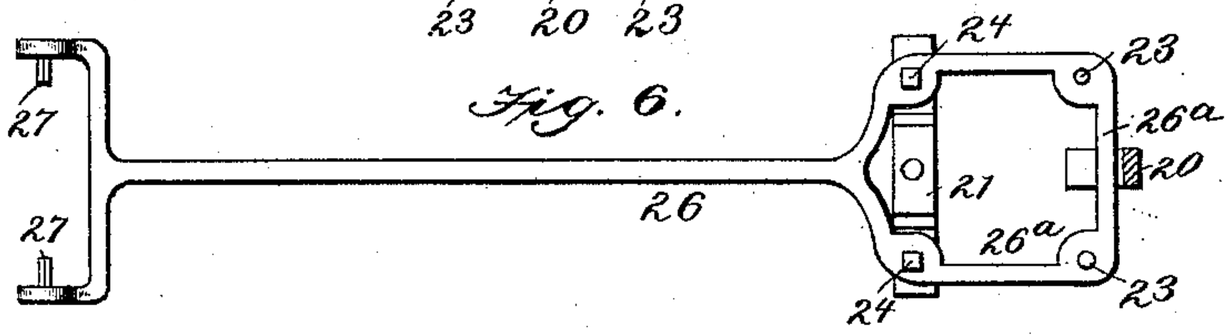
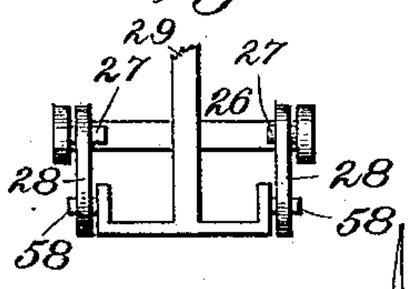


Fig. 7.



Witnesses
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G. H. Copeland.

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By Johnson & Johnson
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UNITED STATES PATENT OFFICE.

JOHN WOODRUFF CULMER, OF NEW BRIGHTON, PENNSYLVANIA, ASSIGNOR TO THE COMPUTING SCALE COMPANY, OF DAYTON, OHIO.

COMPUTING-SCALE.

SPECIFICATION forming part of Letters Patent No. 486,695, dated November 22, 1892.

Application filed February 11, 1892. Serial No. 421,162. (No model.)

To all whom it may concern:

Be it known that I, JOHN WOODRUFF CULMER, a citizen of the United States, residing at New Brighton, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Computing-Scales, of which the following is a specification.

The invention herein is directed to improvements on what is known as the "even-balance" scale for use on the counter; and my said improvements comprise certain novel features of construction and of combinations wherein a computing-beam has co-operative relation to the scoop-holder by means adapted to accommodate itself to all the various motions of said beam and a base-lever or shackle-bar which connects said beam with the scoop-holder without binding or friction of the parts which support and carry said beam, as I will now describe, and specifically point out in the claims concluding this specification.

The accompanying drawings illustrate my said several inventions in a computing-scale organized as an even balance, in which—

Figure 1 is an elevation of such scale, looking at the beam side thereof. Fig. 2 shows an elevation taken at right angles to Fig. 1. Fig. 3 is a top view of the same, the scoop-support being removed to expose the scale-lever. Fig. 4 is a vertical section taken on the line *x* of Fig. 3. Fig. 5 shows in detail view the bearings of the scale-lever rod upon the base-lever. Fig. 6 shows the base-lever, and Fig. 7 shows in detail the bearings of the jointed rod of the computing-beam upon the base-lever. Fig. 8 shows the bearing-bracket for the base-lever.

The base-casting is hollow and has the form of the letter T. At one end a fixed hollow column 2 rises for supporting the scale-lever and for inclosing the rod on which the plate or scoop-support 16 is fixed. At the other or front end of the base rises a forked standard 15, made movable on ways and forming a carriage 14, on which the computing-beam is mounted in a position parallel with the arms of the letter T, so that the computing-beam stands at right angles with the scale-lever of the scoop-support, and is thereby adapted to be connected to the base-lever of an even-balanced scale and traversed with its standard-carriage at right angles to said base-lever. At the top of the column 2 there is secured a yoke 3, having arms 6, which extend horizontally outward at each side of the base and terminate in vertical extensions 7, which are formed with bearing-openings for the reception of the fulcrum or central pivots 8 on each side of the scale-lever 9, which supplements the yoke and extends horizontally forward and backward of its fulcrum or central pivots. This lever 9 is of rectangular form and overhangs the yoke-bearing arms, and has at its front side lugs 11, between which is suspended by pivots 11^a a counterpoise 12 13. In the rear of the fulcrum-pivots 8 the scale-lever has similar side pivots 10 10, on which the plate or scoop-support 16 is mounted by a yoke 18, fixed thereto and having its depending ends formed with bearings adapted to rest on said scale lever-pivots 10. A stem or rod 17 is screwed into the plate-yoke 18 centrally between the lever pivot-bearings 10 and extends down through the column and terminates in the base in an inverted T, as seen in Fig. 5, the ends of the arms of which have needle-pointed screws 22 22, which stand axially in line with the scale-lever pivots 10 10, and to this T end of the rod the base-lever or shackle-bar is pivotally connected, as I will presently state. Before doing so it is important to notice that the weight of the counterpoise approximately is equal to the weight carried by the scale-beam pivots 10, and the distance from the edges of the central pivots 8 of said scale-beam to the centers of the rear pivots 10 of the one side and to the front bearings 11^a on the other side are preferably equal, so that a given standard-weight placed upon the counterpoise 13 will balance its equivalent of merchandise upon the plate or scoop-holder. It will be understood, however, that any multiple leverage may be used as desired. As a means for finally adjusting or balancing the scale, I make the counterpoise 13 hollow, so as to receive shot, and fit it with a screw-cap, as seen in Fig. 1, wherein said counterpoise is shown in the form of the letter T inverted.

Referring to Fig. 4, the rod 17 is seen as having a hook 20 extending centrally below its pivot-bearing arms, while in Fig. 6 the base-

lever or shackle-bar 26 is seen as being formed with a rectangular cross-head which rests upon the hook 20 and has its end corners fitted with cup-screws 23 23, arranged to receive and form bearings for the pointed screws 22 22 of the vertical rod cross-head, and thus give a pivotal connection of these parts at the two points corresponding with the pivot-bearings 10. A bracket 21, screwed to the under side of the base, stands crosswise of the latter and its arms afford seats for the two cup-screws 25 25, arranged vertically in axial line with the bearing-pivots 8 8 of the scale-lever and form bearings for the needle-pointed screws 24 24 in the front end or inner corners of the base-lever cross-head. This construction gives the latter two bearing-points on the base and two on the vertical rod 17 for the purpose of supporting and bracing the said lever against the slightest sidewise rocking movement, while being free to have a longitudinal tilting movement upon its pivots 24 as its fulcrum. To allow of this free longitudinal tilting movement, the screws are pointed at sixty degrees and cupped at ninety degrees. That end of this base-lever which connects with the computing-beam is forked, and its ends are fitted with pivots 27, upon which steel hangers 28 are fitted by openings in their upper ends. At their lower ends these hangers have like openings to receive the pivots 58, fitted in the ends of a cross-head on the lower end of the rod 29, which connects with and supports a scale-link 30, as seen in Figs. 4 and 7, and the hangers are preferably placed between the lever-arms and the ends of the cross-head.

The carriage for the computing-beam is formed of a forked standard part 15 and a horizontal plate 14, the edges of which are formed with parallel ways adapted to fit over corresponding ways on the top 40 of the base, one of said baseways being undercut to hold the carriage in place, and these surfaces are milled or planed for easy and smooth movement of the carriage.

The coupling-rod for the computing-beam consists of two parts, a lower rod part 29 and an upper forked part 39, their connection being made by a socket or tubular recess 53 in the upper end of the rod 29 and a stem 52 fitting loosely within the said socket to afford a slight free play of the forked part in any direction. The forks are about equal in height to the carriage-standard and have coincident openings 25 at their upper ends to receive the ends of a pivot 33 of a link 30, through a slot in which the computing-beam passes and which hangs between the forks.

It is important to observe here that the fork-openings 25 are larger than the pivot-bearings 33 to afford a slight play of the fork on said pivots in any direction, so that the fork will be free from binding at both ends, while the link coupling-rod will also be free from binding at both ends.

From the construction above set out it will be seen that the connections for the computing-beam, consisting of the link 30, the hangers 28, and their coupling-rod and fork parts 29 and 39, provide a coupling device whereby the motion of the computing-beam in making changes of leverage and price is in the line of the pivots upon which such device rests and affords a durable and perfectly-free connection of the weighing portion of the scale with the computing-beam; that the pivotal bearings of the base-lever connections form so broad a base that its movement will at all times be free and easy and not liable to derangement in making changes of leverage and price; that the arc through which the base-lever 26 moves is compensated for by the duplex link-bearings 27 and 58, and that the arc through which the computing-beam moves is compensated for by the free play provided by the coupling-rod joint 52.

It is desirable to construct a scale of this kind with a multiplication, as between the weighing-scale part having the scoop and the computing-beam, of, say five, in order that the poises upon the computing-beam may be light and the range of computation ample—that is to say, the base-lever 26 is designed to have a multiplication of five to one, and the slide-link 30 is supported on the long end of this base-lever, the balancing of the weighing-scale part is in equilibrium, so that the weight of the slide-link in no wise affects the delicacy of the action of the computing-beam when the said slide-link causes the said beam to vibrate. The multiplication referred to as between the weighing-scale part proper and the computing-beam is meant that the said base-lever 26 is divided as to its leverage in proportion of five to one and that one pound upon the extremity of this base-lever will counterbalance five pounds upon the scoop, and that the said slide-link 30 is supported upon the extremity of this base-lever, and the computing-beam sliding through said link will also have a multiplication of five. In the beam shown in Fig. 1 there are two equal divisions of the beam connected at both ends and fitted in the middle of its length with a block 35, through which a pivot 36 is fitted, said pivot resting within bearings in the standards 15 of the carriage. The upper portion of the beam is provided with a sliding poise 37, and the lower portion is divided into two parts by the block 35 and is provided at one end with a sliding poise 38 just below the poise 37. At the other side of the block 35 this lower beam part is embraced by the link 30, the weight of which is balanced with the weighing-scale parts, as I have stated, while the computing-beam, with its poises 37 38 in place at zero, is caused to balance within itself. That portion of the computing-beam embraced by the link 30 is divided into an upper and lower series of subdivisions, the lower division A representing cents, each of which is divided into quarters, while in the upper series B

each division represents four times the value of the division immediately below it. Upon the upper half of the beam division A represents the value of any article weighed at a price indicated by a pointer 32 of link 30 upon series of prices, while series B above represent the price of any article weighed at a price indicated by the pointer 31 of the link 30 upon series B of the prices. That portion of the lower half of the beam embraced by the poise 38 is divided into weight divisions and subdivisions, as pounds, ounces, and quarter-ounces, and is to be used with the link 30 set upon some determined division of the price series, as, say, 10 of the series A. As shown, each smallest division in each lower series A represents a quarter of a cent, and each corresponding division in each upper line B four times that amount, or one cent. The left end of the lower beam is used to weigh in even increments of value too large to be weighed on the upper beam—as, for instance, a thing worth six dollars and thirty-two cents, in which case the poise 38 would be placed at six hundred on C and the thirty-two cents weighed by poise 37 on the upper line B of the upper beam.

From the foregoing it will be seen that I have produced an even-balanced scale wherein the scoop-supporting crotch or plate stands above the scale-lever bearings 10, and the base-lever or shackle-bar is of uniform leverage as regards the weighing side of the scale and is extended beyond its central or fulcrum pivots to a distance which affords any desirable multiplication at its outer bearings for the purpose of its attachment to a computing-beam. It will also be seen that this construction of the weighing parts of the scale is adapted for the convenient arrangement of a traversing carriage bearing a computing-beam at right angles to the base-lever and divided upon a multiplication determined by the multiplication of the base-lever. It will also be seen that the device coupling the base-lever with the computing-beam is so constructed and connected to said parts as to accommodate itself to all the various motions of said connected parts and adjust themselves to slight changes in level or alignment without binding or friction, and therefore enhancing the durability and accuracy of the scales.

In Fig. 1 the coupling-beam is seen as having two independent pivot-bearings, one of which 36 has a sliding relation to the base and a fixed relation to the beam, and the other 33 has a fixed relation to the base and permits the beam to slide; but the weight of the beam is supported by its central pivot-bearings 36. As the jointed coupling-rod has a free vertical limited play over the beam-pivots 33, the beam is thereby permitted to have a free slightly-longitudinal tilting movement on its pivots 36, so that the beam may have a free sliding movement over and upon the link of the said pivot-bearings 33. For limiting this tilting movement of the beam I provide that end of the beam next the pivot-bearings 33 with a pin 55, which stands in the eyed or slotted end of an arm 56, fixed to the beam-carriage. These independent pivot-bearings are shown as arranged in the same horizontal plane and mediately of the width of the beam, so that the latter slides in the line of the said pivots in fixed relation to the one set thereof and over a pointer-link 30, having the other set of pivots.

While I have described in the foregoing specification what I term an "even-balance" scale, I desire it to be understood that such statement is not intended to limit all my said inventions to their employment in such type of scale, and I wish, also, to state that many of the combinations and details above described are not essential to some of the features of my invention broadly considered. All this will be indicated in the concluding claims, as the omission in any claim of an element or the omission of reference to the particular construction of the elements mentioned is intended to be a formal declaration of the fact that the omitted elements or features are not essential to the invention therein covered.

Having described my even-balance scale, embodying in preferred form the several features of my invention in combination, what I separately claim, and desire to secure by Letters Patent, is—

1. In an even-balance scale, an approximately-T-shaped base, a computing-beam supported parallel with and adapted to slide on the T-head of the said base, a scoop-holder at the opposite end of the said base, and a base-lever or shackle-bar adapted to connect the computing-beam with the scoop-holder, the parts being combined and arranged in co-operative relation, substantially in the manner hereinbefore set forth.

2. An even-balance scale comprising an approximately-T-shaped base having ways on the T-head and having a hollow standard on the end opposite the said T-head, a weighing-scale part for the scoop, mounted on said standard and having a depending rod projected through it, a carriage mounted and adapted to slide upon the T-headways of the base, a computing-beam supported by said carriage, graduated and equipped with poises, a jointed coupling-rod depending from and having connection with the computing-beam, and a base-lever or shackle-bar fulcrumed between its ends in the said base and having its ends loosely and pivotally connected, respectively, with the said jointed coupling-rod and the said depending rod of the weighing-scale part, the parts being arranged, combined, and operating substantially in the manner specified.

3. The combination, with a weighing-scale lever having a depending rod 17, provided with a cross-head on its lower end, and a computing-beam, of a base-lever or shackle-bar fulcrumed between its ends, having a cross-head at one end and mutually-coacting pivots

between the ends of the juxtaposed cross-heads of the rod 17 and the shackle-bar, and a coupling-rod having a loose pivotal connection with the other end of the shackle-bar and adapted to connect the latter with the computing-beam, substantially as and for the purpose described.

4. The combination, with scale-lever 9, a computing-beam, and a base-lever or shackle-bar having connection at one end with the scale-lever, of a coupling-rod made in section and adapted to connect the other end of the shackle-bar with the computing-beam, substantially in the manner set forth.

5. The combination, with a computing-beam adapted to slide in the direction of its length, a scale-lever, and a shackle-bar connecting at one end with the scale-lever, of a link mounted on and having positive engagement with the computing-beam and a coupling-rod having loose pivotal connection with the said link and with the shackle-bar, substantially as and for the purpose described.

6. The combination, with the scale-lever and a computing-beam, of a shackle-bar having jointed connection at one end with the computing-beam and having a cross-head 26^a at the opposite end and the rod 17, depending from the scale-lever and having a cross-head, and a hook 20, depending therefrom and extending beneath the cross-head 26^a, the said cross-head having mutually-coacting pivots between them, substantially as described.

7. The combination, with the scale-lever, a computing-beam, a shackle-bar having connection with the scale-lever at one end and having a cross-head and pivots 27 at the opposite end, of a coupling-rod having connection at its upper end with the computing-beam and having a cross-head and pivots 58 at its lower end, and the swinging links 28, connecting the pivots 27 and 58, substantially in the manner and for the purpose hereinbefore set forth.

8. The combination, with the scale-lever, of a computing-beam arranged at right angles to the scale-lever and adapted to slide in the direction of its length and a shackle-bar adapted to connect the scale-lever with the computing-beam, substantially as set forth.

9. The combination, with the scale-lever, a computing-beam, and a shackle-bar having connection at one end with the scale-lever, of a coupler connecting the other end of the shackle-bar with the computing-beam, consisting of a rod 29, having loose pivotal connection with the shackle-bar and having a socket or depression in its upper end, and a fork having independent loose pivotal connection with the computing-beam and having a tongue or pin projected from its lower end to enter the socket or recess in the rod 29, substantially as and for the purpose set forth.

10. The combination, with the rectangular-shaped scale-lever having lugs 11 on its front end, of a poise pendently supported between the lugs 11 and a scoop-holder pivotally supported near the opposite end of the scale-lever, the fulcrum of the said scale-lever being centrally between the pivot-supports of the said scoop-holder and poise, substantially as set forth.

11. The combination, with a scale-lever of an even-balanced scale, of an inverted-T-shaped poise pendently supported by its vertical member and having its horizontal portion hollow to receive compensating weights, substantially as and for the purpose set forth.

12. The combination, with the hollow T-base having cap 40 at one end and tubular standard 2 at the opposite end, the yoke 3, having lateral and vertical arms 6 and 7, mounted on said standard, a rectangular scale-lever 9, pivotally supported between the yoke-arms 7 and the poise 12, and the scoop-holder 16, pivotally supported on the scale-lever at points equidistant from its axial line of support, of a computing-beam, a carriage adapted to slide on the cap 40 and having vertical members between which the computing-beam is pivotally supported, a link 30, and a shackle-bar supported within the hollow base and having positive connection at its ends with respectively the said link 30 and the scoop-holder 16, a limited movement being provided between the said shackle-bar and the said connections, substantially as and for the purpose specified.

13. In a weighing-scale, a scoop-support and a weighing-lever mounted at one end of a base and a computing-beam standing at right angles on the other end of said base and adapted to have a sliding movement thereon, in combination with a base-lever fulcrumed at two opposite points on vertical screw-bearings 24 and 25, arranged in vertical line with the bearings 8 of said weighing-lever, a rod having a free joint at or near the middle of its length, that part above the joint being forked and having a limited vertical play on bearings 33 of a link 30, on which said beam is adapted to slide, the lower part of said rod terminating in a cross-head having two opposite longitudinal bearings 58, standing at right angles to said beam-link bearings, the links 28, vertically connecting the said rod with two opposite horizontal bearings 27 27 on the long end of the base-lever, and an inflexible rod having a rigid connection with said scoop-support, free bearing connections with said weighing-lever, a free seat connection with the lower side of the short end of said base-lever, and two opposite vertical screw-bearings 22 22 on the upper side of the short end of said base-lever in vertical line with the bearings 10 10 of said base-rod and weighing-lever, for operation as described.

14. The combination of the base, the weighing-lever, a scoop-support, and a base-lever with a computing-beam standing at right angles on one end of the base, a bearing-support for said beam, adapted to slide on said base, a slide-link for said beam, having a fixed relation to said base, a jointed rod having a free

connection with said slide-link and a free connection with one end of said base-lever and an inflexible rod having a rigid connection with the scoop-support and a free bearing connection with said weighing-lever, and a free bearing connection with the other end of the base-lever, substantially as described.

15. In a weighing-scale, a scoop-support and a weighing-lever mounted at one end of a base and a computing-beam standing at right angles on the other end of said base and adapted to have a sliding movement thereon, in combination with a base-lever formed at one end with a rectangular cross-head fitted at its four corners with bearing-screws 23 and 24, the inner ones whereof are fulcrumed on screw-bearings 25 in a base-bracket, the long end of said base-lever terminating in a cross-head fitted with bearings 27, in combination with an inflexible rod having a rigid connection with said scoop-support, free bearing connections with said weighing-lever, a free-bearing connection on the under side at the outer end of said cross-head and free upper bearings on the outer cross-head screws 23, and a rod having a free bearing connection with said computing-beam and a free bearing connection with the long end of said base-lever and having a freely-flexing joint between the base-lever and the beam, for operation substantially as described.

16. In a weighing-scale, a scoop-support and a weighing-lever mounted at one end of a base and a computing-beam standing at right angles on the other end of said base and adapted to have a sliding movement thereon, in combination with a base-lever fulcrumed near one end in a base-bracket, the other end terminating in a cross-head fitted with end bearings 27 27, a rod having a free joint at or near the middle of its length, the part above the joint being forked and having a free bearing connection with the computing-beam, the lower part of said rod terminating in a cross-head having bearings 58, the links 28, vertically connecting the said rod and lever bearings, and an inflexible rod having a rigid connection with said scoop-support, free bearing connection with said weighing-lever, and a free bearing connection with the upper and the lower sides of the short end of said base-lever, for operation substantially as described.

17. The combination, in a weighing-scale, of a base, a scale-lever having a poise at one end, a scoop-support mounted on said scale-lever, and a base-lever fulcrumed near one end in said base and in vertical line with the fulcrum-bearings of said scale-lever, and a rigid support suitably connected to the scoop, to the scale-lever, and to the short end of the base-lever, with a computing-beam mounted to slide on said base at right angles to said base-lever, a link loosely connecting said beam, and a flexibly-jointed rod having a free bearing connection with said link and with the long end of said base-lever, substantially as described.

In testimony whereof I have signed this specification in the presence of witnesses.

JOHN WOODRUFF CULMER.

Witnesses:

O. O. OZIAR,

L. F. KEPLER.