No. 819,325. PATENTED MAY 1, 1906.

J. M. TRINER.

WEIGHING SCALE.

APPLICATION FILED AUG. 11, 1904.

4 SHEETS—SHEET 1.

Fig. 1.

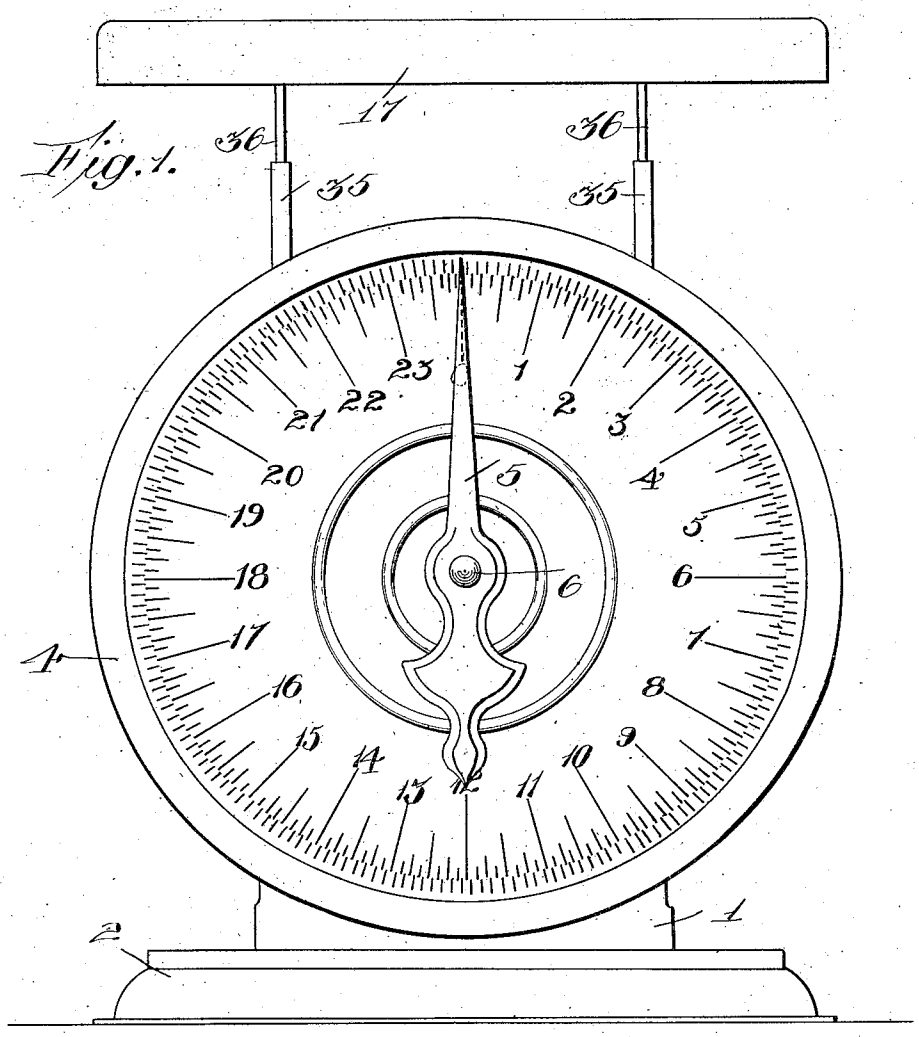
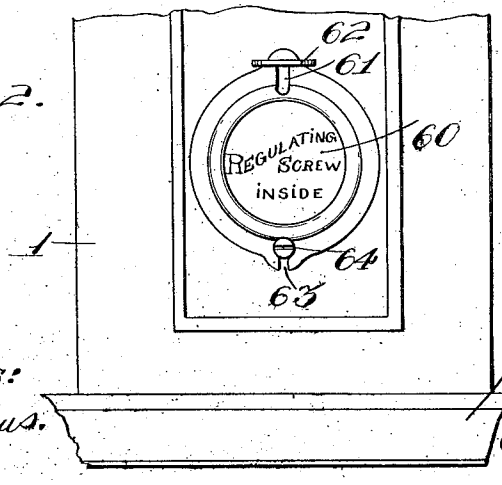


Fig. 2.



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4 SHEETS—SHEET 2.

Fig. 3.

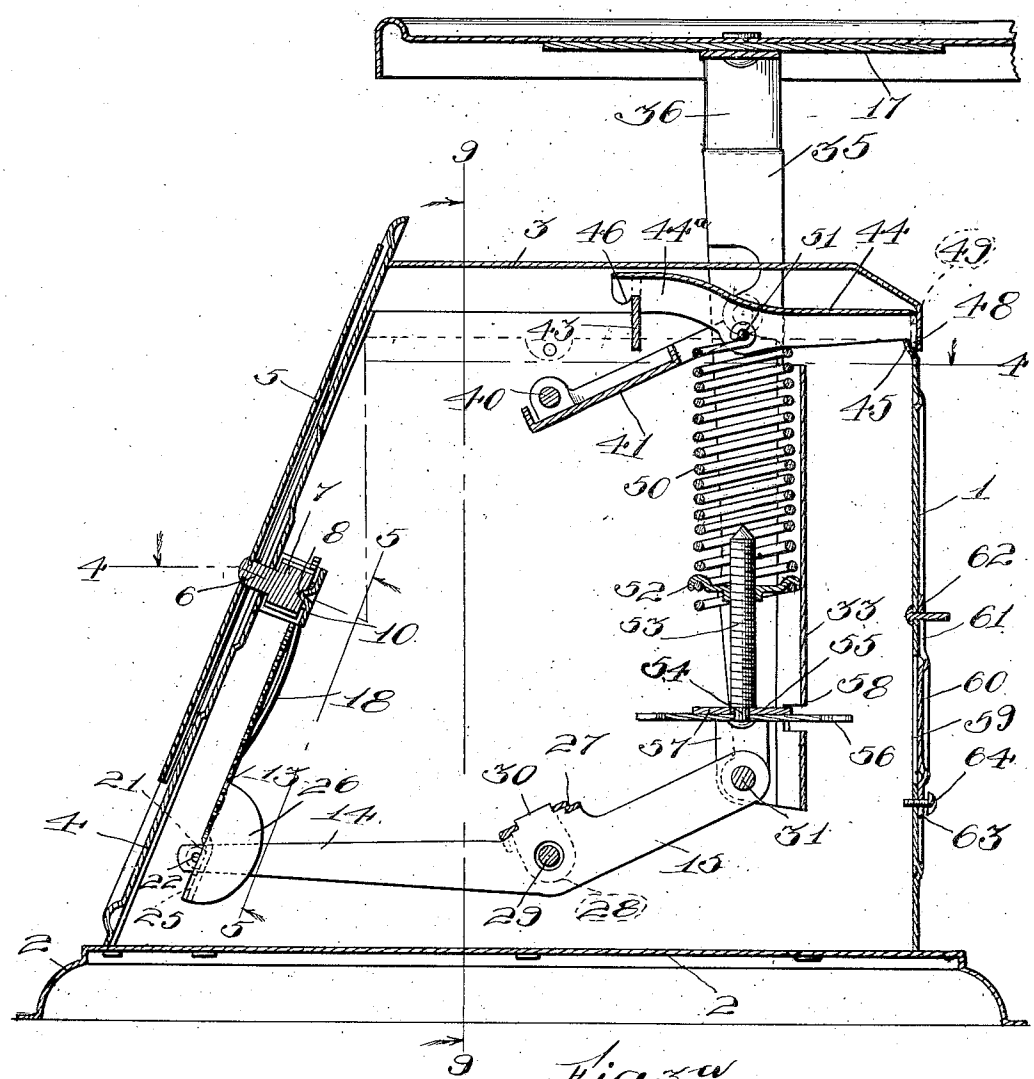
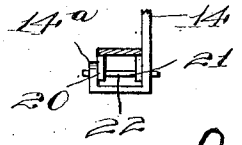


Fig. 3a.



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4 SHEETS—SHEET 3.

Fig. 4.

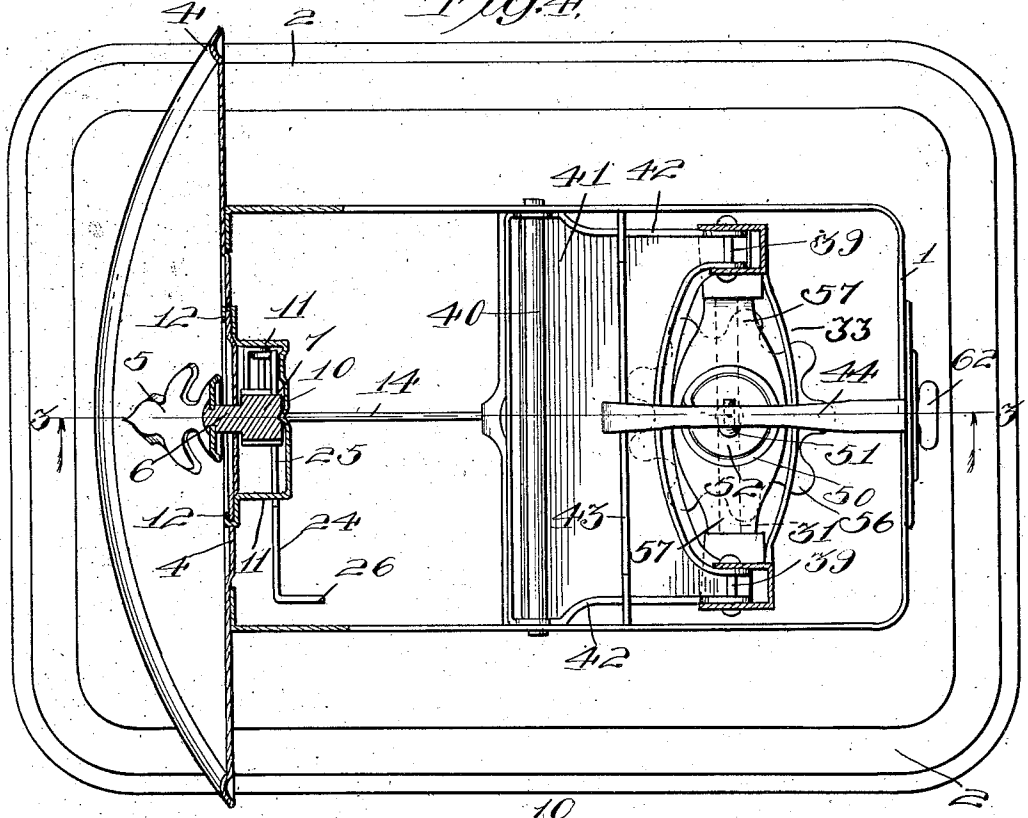


Fig. 5.

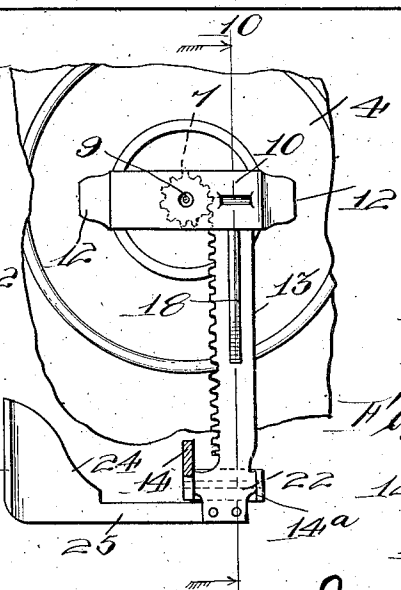


Fig. 6.

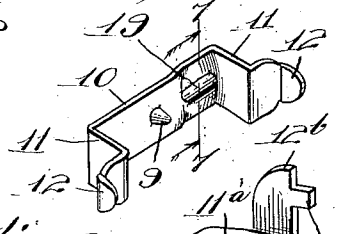


Fig. 7.

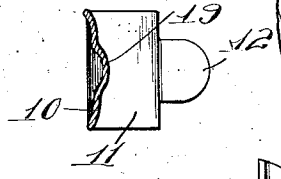
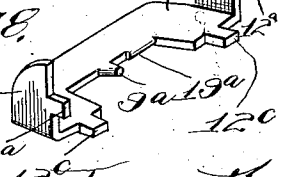


Fig. 8.



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No. 819,325. PATENTED MAY 1, 1906.

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WEIGHING SCALE.

APPLICATION FILED AUG. 11, 1904.

4 SHEETS—SHEET 4.

Fig. 9.

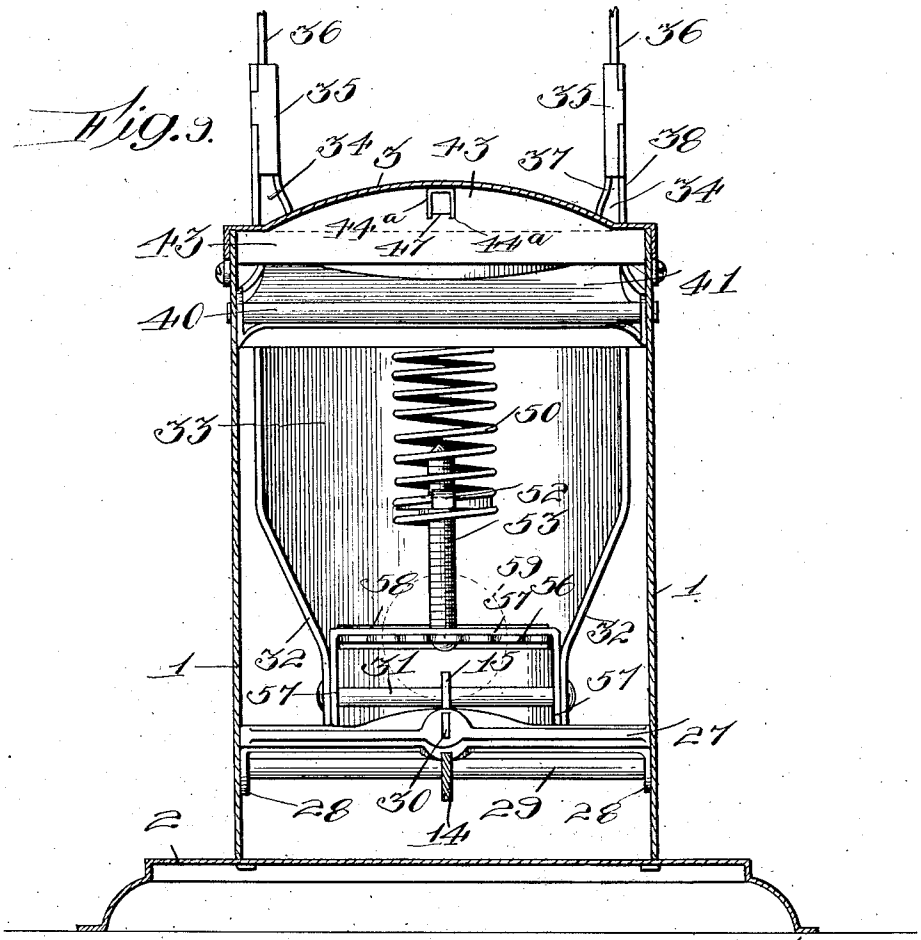


Fig. 10.

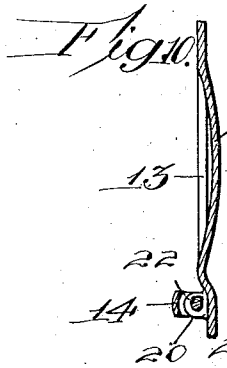


Fig. 12.

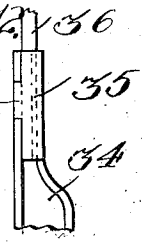


Fig. 15.

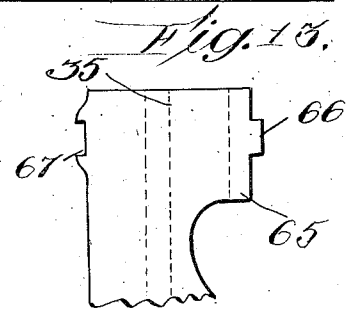
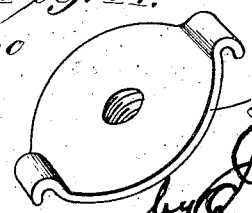


Fig. 11.

Fig. 14.



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UNITED STATES PATENT OFFICE.

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WEIGHING-SCALE.

No. 819,325. Specification of Letters Patent. Patented May 1, 1906.

Application filed August 11, 1904. Serial No. 220,321.

To all whom it may concern:

Be it known that I, JAMES M. TRINER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Weighing-Scales, of which the following is a full, clear, and exact specification.

My invention relates more particularly to that class of weighing-scales in which the pointer is mounted on a pivoted arbor and operated from the platform-standard by means of a rack and pinion; and one of the objects of my invention is to provide an angularly-disposed dial-scale with improved means for thus operating the pointer by the aforesaid rack-and-pinion movement. If the construction of scales of this class is to be inexpensive it is necessary that substantially all parts be produced by dies, formers, punches, &c., and while the parts thus produced may be accurately fitted without material lost motion for ordinary purposes, yet the small amount of play which inevitably occurs in the joints either through wear or original looseness of fit is sufficient to permit appreciable tilting or careening motion of the platform-standard, especially when the weight is placed to one side of the center of the platform, and it is obvious that if the rack be secured directly to the standard this careening motion will be imparted to the rack also, and that in turn imparts partial rotation to the pinion, thereby producing false movement of the pointer and indicating a false weight, too light if the standard tips in one direction and too heavy if it tips in the other direction.

My invention is designed to overcome this defect, and therefore has for its further object to so combine and arrange the rack and standard that the said tipping movement thereof will not be communicated to the pinion.

A still further object of my invention is to arrange the adjusting-screw which alters the length of the connection between the pointer and the supporting-spring entirely within the casing of the scale or to have at least the operating portion of said screw thus arranged, so that it may not be tampered with or accidentally moved.

With these ends in view my invention consists in certain features of novelty in the construction, combination, and arrangement of parts whereby the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings, Figure 1 is a face view or front elevation of my improved scale. Fig. 2 is a fragmentary view of a part of the back of the casing. Fig. 3 is a vertical section on the line 3 3, Fig. 4. Fig. 3ª is a detail view of the rack-bar pivot. Fig. 4 is a plan section on the line 4 4, Fig. 3. Fig. 5 is a detail front elevation of the rack-and-pinion mechanism. Fig. 6 is a perspective view of the yoke or support for the rack and pinion. Fig. 7 is an enlarged transverse section thereof on the line 7 7, Fig. 6. Fig. 8 is a view similar to Fig. 6, illustrating the same element slightly modified. Fig. 9 is a vertical section of the scale on the line 9 9, Fig. 3. Fig. 10 is a detail longitudinal sectional view on the line 10 10, Fig. 5. Fig. 11 is a detail side elevation of the support for the lower end of the rack-bar. Fig. 12 is an enlarged front elevation of one of the standard-sockets. Fig. 13 is the blank from which the same is produced, and Fig. 14 is a perspective view of the nut for the adjusting-screw.

1 is a casing of suitable form and construction, preferably made of sheet metal and supported upon an appropriate base 2, the top being closed by a removable cover 3. As shown in Fig. 3, the front of the casing is formed on an incline, and the dial 4 closes the front and is also arranged on the same incline, so as to be in a convenient position for reading. The dial is provided with a pointer 5, mounted upon a central arbor 6, which is preferably formed integrally with a pinion 7. The arbor 6 is journaled in the dial 4, and the inner end of the pinion is provided with a conical depression 8, in which engages a pin 9, preferably of conical form and, as shown in Figs. 3 and 6, produced by striking up a cone-shaped boss on a yoke or cross-bar 10, extending across the back of the pinion and having arms 11, provided with lugs 12, inserted through the dial 4 and clenched against the face thereof. By this means the pinion is provided at both ends with sufficient but inexpensive support.

Engaging with the pinion 7 is a flat rack-bar 13, which is considerably less in width

than the face of the pinion, so that while it travels longitudinally over the pinion it may also move lengthwise of the axis of the pinion without getting out of mesh therewith. The upper end of this rack-bar is confined between the pinion and one of the arms 11, whereby it is held in mesh during its reciprocating motion, and the lower end of this rack-bar is pivotally connected to one arm 14 of a lever whose other arm 15 is operatively connected with the standard of the platform 17, as will be presently described, so that as the platform is depressed or rises and falls the rack-bar 13 will be correspondingly moved or reciprocated and the pointer 5 thereby revolved through the intermediary of the pinion 7 a corresponding degree. As the arm 14 oscillates it of course carries the lower end of the rack-bar toward and from the dial 5 and would ordinarily destroy the proper angular relation between the rack-bar and the pinion; but in order that the upper end of the rack-bar may move longitudinally of the axis of the pinion in unison with its lower end, and thus maintain this proper angular relation, the rack-bar is provided with a curved slide 18, which may be produced in any suitable way, as by striking up a loop from the metal thereof, and which slide 18 rests against a bearing 19, formed on or secured to the inner face of the yoke 10 by upsetting a part of the metal, if desired, as shown in Figs. 4 and 6, so that as the rack-bar 13 moves upwardly and its lower end consequently moves toward the dial the slide 18 will also ride upwardly on the bearing 19 and being curved or inclined from end to end toward the center or mid-length will push the upper end of the rack-bar toward the dial 4 as rapidly as the lower end is thus moved by the lever-arm 14, and when the lever-arm 14 rises beyond that point where it moves the rack-bar 13 toward the dial and begins to move it away from the dial, as will be understood, the curved slide 18 will correspondingly move the upper end of the rack-bar away from the dial by virtue of the inclined character of its lower end, sliding over the bearing 19 from the mid-length toward the lower end until all of the curved slide is above the bearing 19 or until the upward motion of the arm 14 ceases. In thus constructing the rack-bar 13 with its curved slide 18 for producing the described result the curved slide may be given a length which is substantially equal with the reciprocating movement of the rack-bar and should be so positioned on the rack-bar that its upper end will be contiguous to the bearing 19 when the arm 14 is at the limit of its lower movement and its lower end in substantially the same position with relation to the bearing 19 when the arm 14 is at the limit of its upward movement, the radius of the arc of the slide 18 being substantially equal to that of the arc described by the arm 14.

In order that the rack-bar 13 may move freely without resisting the rising-and-falling motion of the platform 17 in any appreciable degree, it is important that the rack-bar be pivoted on two axes at substantially right angles to each other, so that it may move both toward and from the dial, as well as transversely in a plane at right angles to the axis of the pinion. With that end in view the lower end of the rack-bar is formed with a pair of ears 20 21, through which passes a pin 22, which pivots said ears between the arm 14 and an angular projection 14^a turned backwardly at the end of the arm 14. The pivot 22 is secured firmly in the arm 14 and projection 14^a; but at least one of the holes in the ears 20 21 is enlarged or slotted, as shown at 23, Fig. 11, so as to permit the rack-bar 13 to undergo a transverse movement transversely of the axis of the pinion to allow for any lateral or side play of the arm 14 without causing the pinion and rack-bar to bind. In order, however, that the rack-bar may not be objectionably loose in its connection with the pinion, it is provided with a counterweight 24, having an arm 25 secured to the lower end of the rack-bar in any suitable way, and inasmuch as this weight stands in an inclined position, its upper end tilting backwardly or away from the dial, it also holds the slide 18 of the rack-bar against the bearing 19, turning the rack-bar on the pivot 22, and to the end that this action of the weight may be augmented it is formed with an inwardly or extended portion 26, which exerts a tendency to throw the upper end of the rack-bar toward the yoke 10.

The lever 14 15 is secured to a cross-bar 27, which extends across the casing and is provided at its ends with downwardly-turned bearings 28, which are pivotally supported on a cross-rod 29, the cross-rod 29 also passing through the lever 14 15, whereby the pivotal support of the lever 14 15 is constituted by bearings located a wide distance apart, and as a result the lateral or side motion of the lever-arm 14 is reduced to the minimum. The upper side of the lever 14 15 is formed with a lug 30, which passes through the cross-bar 27 and is upset or riveted, thus connecting the two parts together.

The arm 15 is pivoted on a cross-rod 31, which is passed through and preferably riveted in side flanges 32 of the platform-standard and which standard is of the peculiar construction best shown in Figs. 3 and 9. It is formed of a plate which is bowed outwardly at the back, as shown at 33, to stiffen it and which is provided at its upper end with upward extensions 34, carrying sockets 35, which receive two stems 36 on the bottom of the platform 17. The projections 34 are formed with side flanges 37 38, through which pass short pivots 39, which connect the upper end of the standard to an arm pivoted on a

cross-rod 40 and which arm is parallel with the arm 15, so as to maintain the equilibrium of the standard as it rises and falls, and this arm just referred to is constituted by a plate 41, having surrounding flanges 42, which stiffen it and serve as connections with the pivots 39 and also with the rod 40. Arranged above the arm 41 and rigidly secured to the casing 1 is a cross-bar 43, and upon this bar rests one end of a second cross-bar 44, whose other end rests upon a flange 45, struck inwardly from the rear wall of the casing 1. The cross-bar 44 is preferably formed up out of a strip of sheet metal with side flanges 44^a and has its forward or inner end provided with a notch 46, which is saddled upon the cross-bar 43, and this end of the cross-bar 44 is also mortised into a notch 47 (see Fig. 9) in the cross-bar 43, whereby the end of the cross-bar 44 is held against both lateral and longitudinal movement. The rear or outer end of cross-bar 44 is formed with a hook 48 on each of its side flanges 44^a and which hooks engage over the flange 45, the outer or rear end of cross-bar 44 being also mortised or countersunk in the upper edge of the back portion of the casing 1, which is provided with a notch 49 for that purpose.

The side flanges 44^a of the cross-bar 44 serve as a means of attachment for the spring 50, which has its upper end secured to a cross-pin 51, passing through the flanges 44^a, and its lower end provided with an adjustable nut 52, in which engages the adjusting-screw 53. The lower end of this screw has a reduced portion 54, which is firmly swiveled in a yoke 55, and below the yoke 55 it is rigidly secured to a turning-wheel or thumb-piece 56, whereby the screw may be rotated for adjusting it relatively to the spring. The yoke 55 has depending arms 57 arranged a considerable distance apart and pivoted between the flanges 32 of the standard on the rod 31 contiguous to said flanges, so as to prevent lateral movement of the rod 31. By this means the lever-arm 15 is connected to and supported from this spring, and the center of the support of said lever-arm and its connection with both the spring and the standard are one and the same, and consequently when the standard tips in either direction it will merely oscillate about this center 31 without altering the position of the rack-bar 13, and consequently the lost motion which ordinarily occurs at the centers 39 40 and which permits the platform to tip or careen when the weight is arranged to one side of the center will not result in a false movement of the pointer 5 nor in the false indication of the weight. It will also be observed that as the arm 15 rises and falls, carrying the center 31 back and forth on the arc described by said arm, and consequently deflecting the spring from the perpendicular, the spring will nevertheless be maintained in a straight line by reason of the swivel connection at its lower end with the center 31, constituted by the yoke 55 57 and the pivot-rod 31.

The back of the standard 33 has an aperture 58, through which the operating-wheel or thumb-piece 56 projects, so that it will be accessible to the finger of the operator for rotating the screw. In order that this wheel may not be tampered with or accidentally moved, it is arranged entirely within the casing 1, and in order that it may be reached for operation when necessary the casing is provided in the back with an opening 59, which, if desired, may be closed by a suitable door or shutter 60, which has a slot 61 at its upper end, whereby it is supported on a suitable hanger 62, and a notch 63 in its lower edge, whereby it may be dropped over a button 64 and held in place.

The projections 34 of the standard are each formed with a flange 65, as shown in Fig. 13, and on this is produced a lug 66, which when the flange 65 is folded around the stem 36 to produce a socket for receiving said stem engages in a notch 67 in the opposite edge of the blank, Fig. 13, and the edges of this notch 67 are then upset over the edges of the lug 66, so as to lock the two sides of the blank together and produce the socket.

In the modification shown in Fig. 8 the yoke for supporting the pinion and retaining the rack-bar has the cone 9^a formed on the edge of the plate instead of on the face, and the bearing 19^a is similarly formed, the arms 11^a being arranged flat and provided with angular projections 12^b, on which are formed the lugs 12^a, which correspond with the lugs 12 and pass through the dial, as described with reference to the lugs 12, the projections 12^b being arranged against the back of the dial for bracing the plate 11^a and preventing it from tipping. The edge of the plate 11^a is also formed with additional lugs 12^c, which pass through the dial, like the lugs 12^a.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. In a scale, the combination of a pointer, an arbor therefor having a pinion, a platform-standard, means connected with said standard for yieldingly sustaining the same, a pivoted lever pivoted at one end to said standard at a point contiguous to the point of connection between it and said sustaining means, and a rack-bar connected to the other end of the said lever and engaging said pinion.

2. In a scale, the combination of a pointer, an arbor therefor having a pinion, a platform-standard, means connected with said standard for yieldingly sustaining the same, a pivoted lever pivoted at one end to said standard at a point contiguous to the point of connection between it and said sustaining means and a rack-bar engaging said pinion and pivoted to the other end of the said lever on

crossed axes whereby the rack-bar may oscillate both lengthwise and transversely of the lever.

3. In a scale, the combination of a pointer, a pinion for rotating the same, a platform, a rack-bar engaging said pinion, a curved slide and a bearing therefor, one secured to and carried by the rack-bar and the other fixed with relation to the rack-bar and contiguous to the pinion and over which the rack-bar slides, a pivoted lever having one end pivoted to said rack-bar for reciprocating it, an operative connection between said platform and pivoted lever, and means for yieldingly sustaining the platform.

4. In a scale, the combination of a pointer, a pinion for operating the same, a reciprocatory rack-bar, a curved slide thereon, a bearing for said slide fixed with relation thereto, a pivoted lever operatively connected with said rack-bar for reciprocating it, a platform operatively connected with said lever and means for yieldingly sustaining said platform.

5. In a scale, the combination of a pointer, a pinion for operating the same, a pivoted lever, a rack-bar engaging the pinion and pivoted on an axis extending transversely of the lever, a bearing for said rack-bar, a counterweight for holding the rack-bar against said bearing, a platform operatively connected with said lever, and means for yieldingly sustaining said platform.

6. In a scale, the combination of a pointer, a pinion for operating the same, a pivoted lever, a rack-bar pivoted to said lever on crossed axes so as to oscillate transversely and longitudinally of said lever, a bearing against which said rack-bar rests and slides, a counterweight having its center of gravity out of center with both of said axes whereby it will hold the rack-bar against the pinion and also against its said bearing, a platform operatively connected with said lever and means for yieldingly sustaining said platform.

7. In a scale, the combination of a pointer, a pinion for operating the same, a rack-bar engaging said pinion, a yoke in which said pinion is journaled and which embraces the pinion and rack-bar, said pinion having a countersink in one end and the yoke a projecting pin engaging in said countersink, a pivoted lever pivoted to said rack-bar, a platform connected with said lever and means for yieldingly sustaining said platform.

8. In a scale, the combination of a dial normally inclined to the vertical, a pivoted pointer therefor, a pinion for operating said pointer, a rack-bar engaging said pinion, means for holding said rack-bar parallel with the dial and at right angles to the pinion, a pivoted lever pivoted at one end to one end of said rack-bar for reciprocating it, the other end of the rack-bar being free, a platform-standard pivoted to the other end of said lever and means for yieldingly sustaining said standard.

9. In a scale, the combination of a dial normally inclined to the vertical, a pointer therefor, a pinion for operating said pointer, a rack-bar engaging said pinion, a platform, a pivoted lever having pivotal connection with one end of said rack-bar and platform whereby the rack-bar will be reciprocated, the other end of the rack-bar being free, means for holding said rack-bar parallel with the dial and at right angles to said pinion, and means for yieldingly sustaining the platform.

10. In a scale, the combination of a pointer, a casing provided with an aperture, a platform having a connection extending through said casing, mechanism within said casing operatively connected with the platform and pointer for operating the latter by the movement of the platform, said mechanism comprising means for yieldingly sustaining the platform, and an adjusting means located entirely within the casing and comprising an operating member located opposite said aperture whereby the operating member will be accessible therethrough from the outside.

11. In a scale, the combination of a casing having a notched cross-bar and a notched wall, a second cross-bar let into said notches, a bifurcated platform-standard straddling said second cross-bar, a spring connected to said standard and to said second cross-bar, means for maintaining the equilibrium of said standard and a pointer operatively connected with the standard.

12. In a scale, the combination of a casing having a removable cover, a removable cross-bar supported within the casing below and held in place by said cover, a platform-standard, a spring secured to said standard and cross-bar, means for maintaining the equilibrium of said standard, a pointer and means operatively connecting the same with the standard.

13. In a scale, the combination of a platform-standard comprising a plate having side flanges and upwardly-extending projections at both sides thereof, a platform having depending stems around which said projections are folded to form sockets therefor, a spring supported independently of said standard at one end, a swivel connecting the other end of said standard thereto on a transverse axis extending through the said flanges at the lower end of the standard, means for maintaining the equilibrium of the standard, a pointer and means operatively connecting the pointer with the standard.

14. In a scale the combination of a pointer, a pinion for operating the same, a dial normally inclined to the vertical, behind which said pinion is arranged, a pivoted lever ar-

ranged behind said inclined dial and movable in a plane at an angle thereto, a rack-bar engaging the pinion and pivoted at one end on an axis extending transversely of one end of the lever, means for holding the rack-bar at right angles to the axis of the pinion during the oscillation of the lever, a platform operatively connected with said lever, and means for yieldingly sustaining said platform.

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