No. 806,908. PATENTED DEC. 12, 1905.

F. C. OSBORN.

WEIGHING SCALE.

APPLICATION FILED SEPT. 29, 1900.

2 SHEETS—SHEET 1.

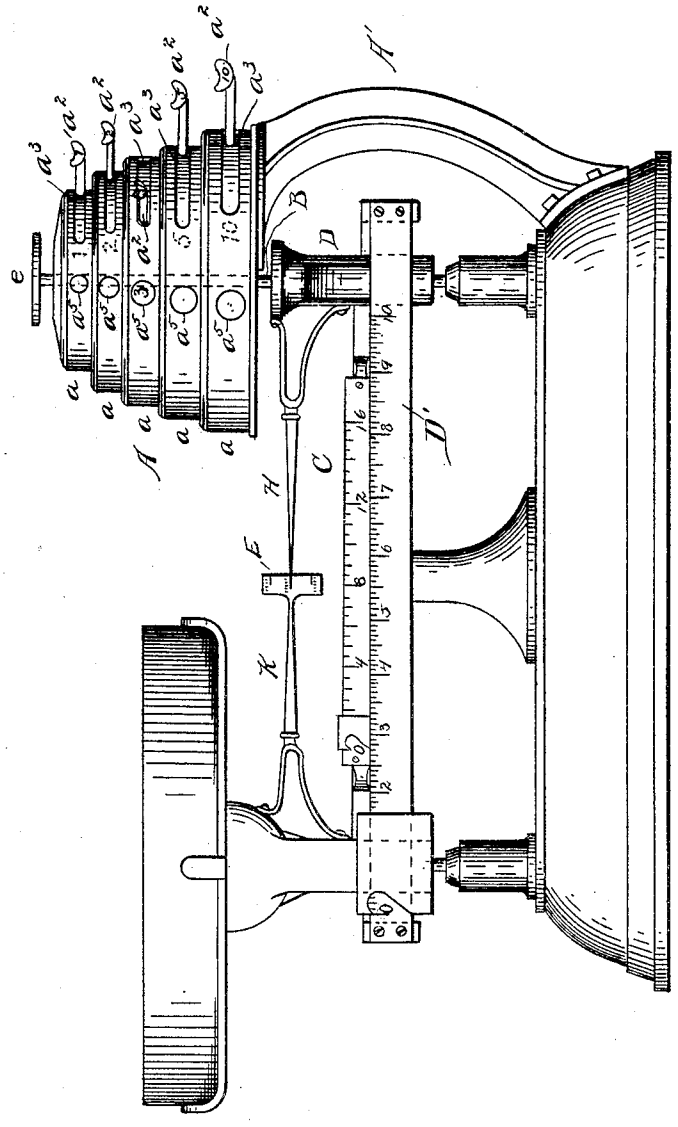

Fig. 1.

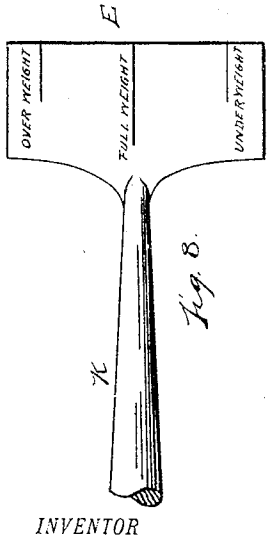

Fig. 8.

WITNESSES

Chas. E. Wiener.

George Whitehead

INVENTOR

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2 SHEETS—SHEET 2.

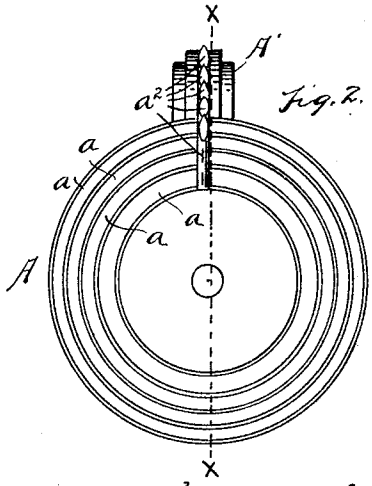

Fig. 2.

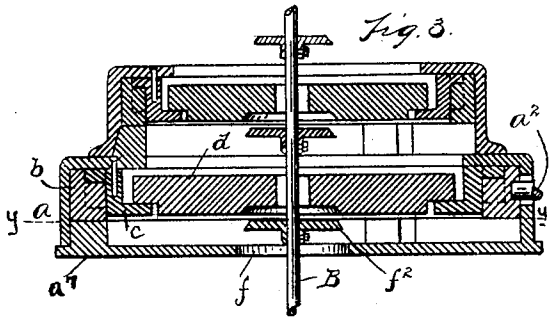

Fig. 3.

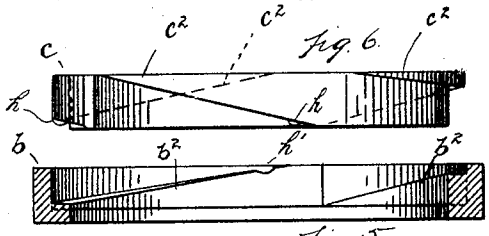

Fig. 5.

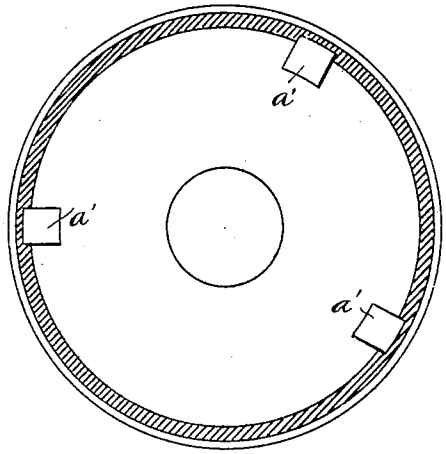

Fig. 7.

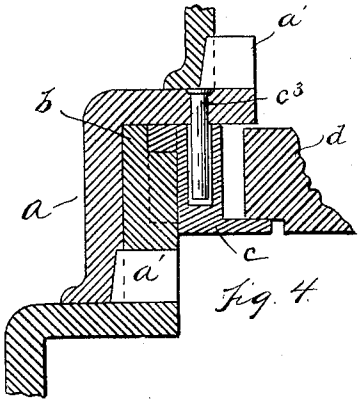

Fig. 4.

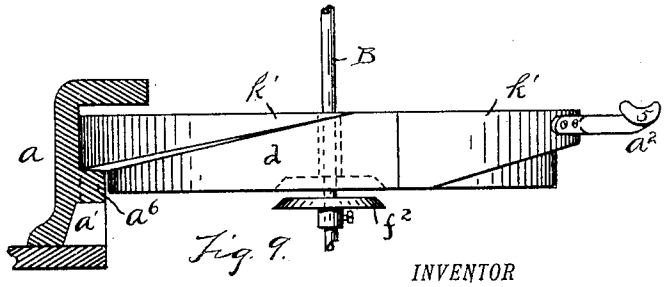

Fig. 9.

WITNESSES

Chas. E. Wisner

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UNITED STATES PATENT OFFICE.

FRANCIS C. OSBORN, OF DETROIT, MICHIGAN, ASSIGNOR TO THE F. C. OSBORN COMPANY, OF DETROIT, MICHIGAN.

WEIGHING-SCALE.

No. 806,908. Specification of Letters Patent. Patented Dec. 12, 1905.

Application filed September 29, 1900. Serial No. 31,532.

To all whom it may concern:

Be it known that I, FRANCIS C. OSBORN, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented a new and useful Weighing-Scale, of which the following is a specification.

My invention relates to improvements in weighing-scales in which a balance-beam is employed; and the objects of my improvements are, first, to provide an improved means for applying counterweights to the counterpoise of such scales; second, to increase the capacity of certain types of scales; third, to provide an improved indicator to show when the scale is in proper balance. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a front elevation of the entire scale. Fig. 2 represents a top view of the weight-holder. Fig. 3 represents a vertical section of a portion of the weight-holder on the line $x\ x$ of Fig. 2. Fig. 4 represents an enlarged view of a portion of Fig. 3. Fig. 5 represents a vertical section of one of the movable weight-holder rings. Fig. 6 represents a view in elevation of one of the stationary weight-holder rings. Fig. 7 represents a horizontal section of a ring-case on the line $y\ y$ of Fig. 3. Fig. 8 represents an enlarged view in elevation of the balance-indicator chart. Fig. 9 represents an alternative construction of the weight-holder mechanism.

Similar letters refer to similar parts throughout the several views.

In Fig. 1 is shown an ordinary even-balance scale to which my improvements have been applied. At one end is shown the ordinary scale-pan applied in the ordinary way. At the other end in place of the ordinary weight-plate is shown my improved weight-holder A, held in position and supported by an arm A′, rigidly attached to the base or stationary framework of the scale. The weight-holder A consists of a series of annular cases $a\ a$, &c., equal in number to the number of weights employed. These cases are arranged one above the other in the manner shown and are so attached to the platform supported by the arm A′ and to each other as to be secure against rotary movement. This connection is shown in Figs. 3, 4, and 7. The projecting lugs a', integral with the lower ring, fit into similarly-disposed recesses in the ring above. The lowermost ring is supported by a base-plate a^7, provided also with lugs a'. The annular cases $a\ a$, &c., are all alike, except they may be graduated as to size, as shown, and therefore it will be necessary to describe one only. This statement applies also to the weights d and rings b and c. The projecting lugs a' also serve as bearing-surfaces for the movable ring b. The ring b fits loosely within the casing a and rests directly upon the lugs a'. This ring is provided with a handle a^2, by which it may be rotated within the annular casing. The casing a has a slotted opening a^3 through its side, through which the handle a^2 projects, as shown in Fig. 1. This opening permits a limited oscillatory movement of the ring b, as and for the purpose shown hereinafter. The ring b is provided on its inner side with three inclined surfaces regularly disposed about its circumference, as shown in Fig. 5. This ring may be designated as the "primary" or "rotatable" weight-holder ring. Another ring c, which may be designated as the "secondary" or "longitudinally-movable" weight-holder ring, is made to fit loosely within the ring b and has three oppositely-inclined surfaces on its outer side adapted to engage with the three inclined surfaces on the inner side of the ring b. This ring c is held from rotation by a vertical stud c^3, of which there may be one or more, projecting from the stationary framework. This stud fits loosely in a hole in the ring c, and the ring c is thus held from rotation, but is permitted to move vertically. From this construction it will be seen that when the ring b is rotated a distance corresponding to the length of one of the inclined surfaces the ring c will be moved vertically a distance corresponding to the height of the inclined edge. The solid disk d represents a counterpoise-weight adapted to be applied to the counterpoise of the scale. This weight is of such a form and is applied in such a manner as to occupy as little space vertically as possible. Normally the ring c, with the weight d resting upon its inner flange, is in its uppermost position. (Shown in Fig. 3.) In this position it is free from contact with the movements of the counterpoise. Extending upward from the pivoted counterpoise D is a rigid rod B. This rod carries a disk f^2, one for each weight employed. This disk f^2 remains in fixed position on the rod B and is so formed as to tend to center the weight d

whenever it comes into contact with it. One method of accomplishing this result is shown in Fig. 3, where the outer edge of the disk f^2 is beveled, and a corresponding beveled recess is formed in the weight d. The weight d is thus kept out of contact with the rod B when the weight d is at rest and out of contact with the ring c when the weight is balancing with the rod B. The opening f in the base of the weight-holder A is to facilitate assembling of the parts and to provide for the movement of the disk f^2 vertically. It will be noted that all of these parts are so formed and arranged that the least possible space is required, thus making it possible to use a large number of weights within a small space. In addition to the slotted opening for the handle a^2 an additional opening a^5 is made in the wall of the ring a. This opening is in duplicate, one on each side of the scale—that is, one for the customer and one for the operator. Figures indicating the number of pounds or other unit denoted by the weight are suitably arranged upon the outer surface of the ring b, so that when the ring is moved into position to adjust the weight for weighing these figures will be shown through the opening a^5 and indicate to the operator and the customer that the scale is adjusted for weighing the indicated amount. It will be noted in the construction described that any combination of the weights employed may be used, or one or all of the weights may be employed at the same time.

The employment of this weight-holding mechanism obviates the objection to the use of a number of heavy weights, especially in an even-balance scale, and it is therefore possible with the employment of this mechanism to arrange an even-balance scale to weigh larger amounts than has heretofore been practicable. I show in Fig. 1, therefore, a combination of beams and counterweights which enables me to weigh larger amounts than has heretofore been practicable on this style of scale. To this end I employ a long beam D′, graduated to weigh, say, ten pounds. This beam is mounted upon the scale-lever through extensions at the end of the lever at one side in the ordinary manner. Back of this beam is mounted a smaller beam C and is graduated to weigh one pound. The counterweights in the weight-holder are adapted to weigh one, two, three, five, ten, and ten pounds, respectively. (One more ten-pound weight than is shown in the drawing.) The small beam C is adapted to weigh small amounts up to one pound and of course may be used in connection with the counterweights to weigh one, two, or more pounds and a fraction thereof. With the arrangement of weights indicated this beam may be used in connection with the counterweights to weigh up to thirty-two pounds. The beam D′ in connection with the counterweights weighs up to forty-one pounds. The two ten-pound weights in combination with the beam D′ may be used to weigh up to thirty pounds, and the beam C and the remaining counterweights may be used at the same time to weigh tare to the extent of twelve pounds. Inasmuch as the handling of the heavy weights through the weight-holder mechanism described is so facilitated and the objection to their size overcome, additional heavy weights, as twenty-pound or thirty-pound weights, may be added to the mechanism, thus increasing the capacity of an even-balance scale much beyond a capacity which is practicable with the ordinary method of applying such weights. The combination of the large beam D′ and the small beam C with a series of weights which combine with either beam and the combination of the large beam D′ with a series of counterweights which range in capacity below the capacity of the large beam D′, as well as above, make possible a wider range of weighings combining tare than has heretofore been practicable in even-balance scales.

Counterpoise-rod B may extend above the weight mechanism and carry the usual weight-plate e, as shown in Fig. 1, so that additional loose weights may be used in connection with the weight-holder weights. This arrangement also provides facility for testing the balance of any two articles, as in the ordinary even-balance arrangement.

On each of the handles a^2 I place figures designating the denomination of the weight connected therewith. These figures need not necessarily be placed upon the handles, but may be placed upon the casing near the respective handles. These figures indicate to the operator which handle to select in order to set the scale at the required weight.

In order to enable me to reduce the size of the weight-holder mechanism, I reduce the distance of the vibratory motion of the scale-lever. This limited movement also causes the beam to come to a rest sooner, and is therefore a desirable improvement. In order to enable the customer and operator to readily determine the balance of the scale with this short movement, and especially to enable the customer to determine when the scale is balancing in his favor or otherwise, I employ movable indicator-pointers K and H, as shown in Fig. 1; but instead of the usual two points I place upon one end of one of the movable arms K a graduated chart, upon which the point of the other arm indicates whether the scale is at an exact balance—full weight—or whether it is over weight or under weight. Fig. 8 shows the arrangement and method of designating whether the weight is balancing in favor of or against the customer.

In Fig. 9 I show a modification of the weight-holder mechanism in which the rings b and c are dispensed with and the inclined cam-sur-

faces c^2 and b^2 are applied directly to the casing a (shown at a^6) and the weight d, (shown at K'.) In this construction the weight has both a rotary movement and a vertical movement. The operating-handle a^2 is applied directly to the weight d. On account of the vertical movement of the weight, and therefore of the handle, the opening in the casing a is accordingly widened to permit the vertical movement of the handle. It will be obvious that this construction has some objectionable features, such as the abrading of the weight in frictional contact with the casing in the rotary movement and the torsional movement of the weight when it comes in contact with the weight-plates of the counterpoise. Again, the weight is not so well protected from dust as in the other construction.

It is obvious that this weight-holder mechanism may be applied to any lever-scale having a limited vibratory movement, and I do not, therefore, wish to confine myself in the claims to the style of scale shown.

By the use of the term "type of scale described" I wish to be understood to mean any scale of the steelyard type—that is, any lever-scale in which the vibratory movement is the same irrespective of the weight applied.

What I claim as my invention is—

1. In a weight-holder mechanism for weighing-scales, a series of weights, a mechanism for moving the weights into and out of weighing position said mechanism bearing three series of denominational indications for the weights two of said series of indications being arranged to be concealed when the weights are in non-weighing position and to be displayed when the weights are in weighing position, the third series of indications being so arranged as to be displayed continuously.

2. In a weighing-scale provided with a weight-holder mechanism of the type described, a series of flat weights arranged one above the other, a mechanism for raising out of or lowering into weighing position any one of the weights at will, said mechanism arranged within the vertical limits measured by the thickness of the weights and the space required for their movement in weighing, substantially as set forth.

3. In a weighing-scale provided with a weight-holder mechanism, a weight, and a combination of elements having a plurality of active cam-surfaces arranged to move said weight into and out of weighing position, substantially as set forth.

4. In a weight-holder mechanism for weighing-scales, two coöperating parts, having a plurality of active cam-surfaces, and means for moving one of the parts, substantially as set forth.

5. In an apparatus for moving the weights of a weighing-scale into and out of weighing position, a mechanism comprising two coöperating elements having a plurality of active cam-surfaces, one of said elements arranged to be moved by the other through said cam-surfaces, substantially as set forth.

6. In a weight-holder mechanism for weighing-scales, two coöperating elements having a plurality of active cam-surfaces at two or more separated points, and means for moving one of the elements with respect to the other whereby the position of one of the elements is changed vertically, substantially as set forth.

7. In a weighing-scale provided with a weight-holder mechanism, two coöperating elements having a plurality of active cam-surfaces, a weight combined therewith and arranged to be moved into and out of weighing position thereby, and means for moving one of the elements with respect to the other whereby the weight may be moved into or out of weighing position at will, substantially as set forth.

8. In a weighing-scale provided with a weight-holder mechanism, two coöperating elements having a plurality of active cam-surfaces, a weight combined therewith, and arranged to be raised or lowered thereby, and means for moving one of the elements with respect to the other whereby the weight may be moved into or out of weighing position, substantially as set forth.

9. In a weighing-scale provided with a weight-holder mechanism, two coöperating elements having a plurality of active cam-surfaces, a weight carried by one of the elements, means for moving one of the elements with respect to the other whereby the element carrying the weight is moved vertically, substantially as set forth.

10. In an apparatus for moving the weights of a weighing-scale into and out of weighing position, a mechanism comprising a series of elements arranged in pairs, the elements of each pair coöperating through a plurality of active cam-surfaces and operating independently of the others, and separate independent means for moving one of the elements of each pair, substantially as set forth.

11. In an apparatus for moving the weights of weighing-scales into and out of weighing position, a mechanism comprising a series of rings arranged in pairs, the rings comprising each pair arranged to coöperate, by means of cam connection between the rings, and means for moving one of the rings of each pair, substantially as set forth.

12. In an apparatus for moving the weights of a weighing-scale into and out of weighing position, a mechanism comprising a series of rings arranged in pairs, the rings comprising each pair arranged to coöperate and to operate independently of the others, by means of cam connection between the rings, and separate independent means for moving one of the rings of each pair, substantially as set forth.

13. In a weighing-scale provided with a

weight-holder mechanism, a series of weights, a corresponding series of pairs of elements having a plurality of active cam-surfaces arranged to move said weights, a weight connected with one of the elements of each pair, and means for moving selectively at will one of the elements of each pair, substantially as set forth.

14. In a weighing-scale provided with a weight-holder mechanism, a series of weights, a corresponding series of pairs of elements having a plurality of active cam-surfaces arranged to move said weights, one of said weights being connected with one of the elements of each pair, and means for moving one of the elements of each pair whereby the weights may be moved into weighing position in any order or combination at will, substantially as set forth.

15. In a weighing-scale provided with a weight-holder mechanism, a series of weights, a housing for said weights arranged in separable parts, one part for each weight and its operating mechanism, each weight and its operative mechanism and housing therefor forming a separable member of said weight-holder mechanism, substantially as set forth.

16. In a weighing-scale provided with a weight-holder mechanism, a series of separable members, each comprising a weight, operating mechanism therefor and a housing for said weight and operating mechanism, and a weight-receiving element common to all the weights, substantially as set forth.

17. In a weight-holder mechanism for weighing-scales, two coöperating circular elements, inclined cam connections between these elements whereby one of them may be moved vertically, and means for rotating one of the elements, substantially as set forth.

18. In a weighing-scale provided with a weight-holder mechanism, a weight, two weight-holder rings, means for giving one of the rings a rotary movement, means for holding the other ring from rotary movement, but permitting vertical movement thereof, the said rings being so arranged and of such form as to cause one ring to move vertically when the other ring is moved in a rotary direction and connection between the vertically-movable ring and weight whereby the weight is moved therewith, substantially as set forth.

19. In a weighing-scale provided with a weight-holder mechanism, a weight, a longitudinally-movable weight-holder ring, a rotatable weight-holder ring, and means for moving the rotatable weight-holder ring, substantially as set forth.

20. In a weighing-scale provided with a weight-holder mechanism, the series of weights, a series of longitudinally-movable weight-holder rings, a series of rotatable weight-holder rings, the weights and rings arranged in telescopic relation to one another and means for moving the rotatable weight-holder rings, substantially as set forth.

21. In a weighing-scale provided with a weight-holder mechanism, a circular weight, a vertically-movable weight-holder ring arranged to carry said weight, a rotatable weight-holder ring arranged to carry said vertically-movable weight-holder ring, guide for said rotatable ring, and a handle fixed to said rotatable ring, substantially as set forth.

22. In a weighing-scale provided with a weight-holder mechanism, the weight *d*, the ring *c*, the ring *b*, suitable guides and support for the ring *b*, means for holding the ring *c* against rotary movement, and means for moving the ring *b* in a rotary direction, substantially as set forth.

23. In a weight-holder mechanism, a series of circular weight-casings so arranged and formed as to fit one upon the other in definite, relative, circular relation and to be held against rotation by the interlocking of said casings, substantially as set forth.

24. In a weighing-scale of the type described, the combination of a weighing beam or lever, a suitable weight-receiver, a weight-holder mechanism comprising a series of independent weight-moving elements, a series of weights carried by the weight-holder mechanism and inclosed thereby, and suitable means of connection between the weights and the weight-receiving mechanism, substantially as set forth.

25. In a weighing-scale of the type described, a counterpoise-rod, a series of weights arranged one above the other and embracing said rod, suitable means for holding and selectively moving said weights so arranged, and suitable connecting means between said rod and each of said weights, substantially as set forth.

26. In a weighing-scale of the type described, a counterpoise-weight rod, a series of weights arranged one above the other and embracing said rod, a weight-holder mechanism embracing said weights and arranged to selectively move said weights independently of one another, and connecting means between said rod and each of said weights, substantially as set forth.

27. In a weighing-scale of the type described, a counterpoise-weight-receiving rod, a series of weights arranged one above the other embracing said rod, a weight-holder mechanism embracing said weights, means for moving into and out of weighing position any one of said weights selectively at will, and connecting means between said rod and each of said weights, substantially as set forth.

28. In a weighing-scale of the type described, a weight-receiving element comprising a series of weight-receiving flanges or projections, a series of weights, a series of separable housings or casings for said weights

each inclosing a weight and an independent mechanism for moving into and out of weighing position said weight, substantially as set forth.

29. In a weighing-scale of the type described, a weight-receiving element, a series of flat weights with central openings therethrough, operative connective means between said element and said weights at said openings, a mechanism engaging the weights at their outer edge for moving the weights independently and selectively into and out of connection with said weight-receiving element, substantially as set forth.

30. In a weighing-scale of the type described, a counterpoise-rod with a series of weight-plates fixed thereon, corresponding series of weights arranged to be used in connection with said weight-plates, means for holding said weights in juxtaposition to said plates, but out of operative connection therewith, and means for moving said weights independently and selectively at will into operative connection with said plates, substantially as set forth.

31. In a weighing-scale of the type described, a series of weights, a weight-holder mechanism comprising a series of practically independent and separable elements, each of said elements combining weight, a weight-moving mechanism, and a housing or casing for said weight and mechanism, substantially as set forth.

32. In a weighing-scale of the type described, a weight, a weight-holder mechanism comprising a handle arranged to be moved in a substantially horizontally circular plane, and suitable connections between the weight and the handle whereby the weight may be moved into and out of weighing position, substantially as set forth.

33. A weighing-scale of the type described, a weight-holder mechanism provided with a weight or weights arranged to be operated thereby, counterpoise-receiving means for said weights when in weighing position, and additional counterpoise-receiving means adapted to receive additional weights independent of said weight-holder mechanism, substantially as set forth.

34. In a weighing-scale of the type described, the combination of the inclosed weight-holder mechanism and the uninclosed weight-receiver *e*, substantially as set forth.

35. In a weight-holder mechanism, a series of weights, a like number of operating-handles, connecting mechanism comprising elements having a plurality of active cam-surfaces between said weights and handles whereby said weights are moved vertically when said handles are moved horizontally, substantially as set forth.

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

FRANCIS C. OSBORN.

Witnesses:
BURT E. KNAPP,
GEORGE MAITLAND.