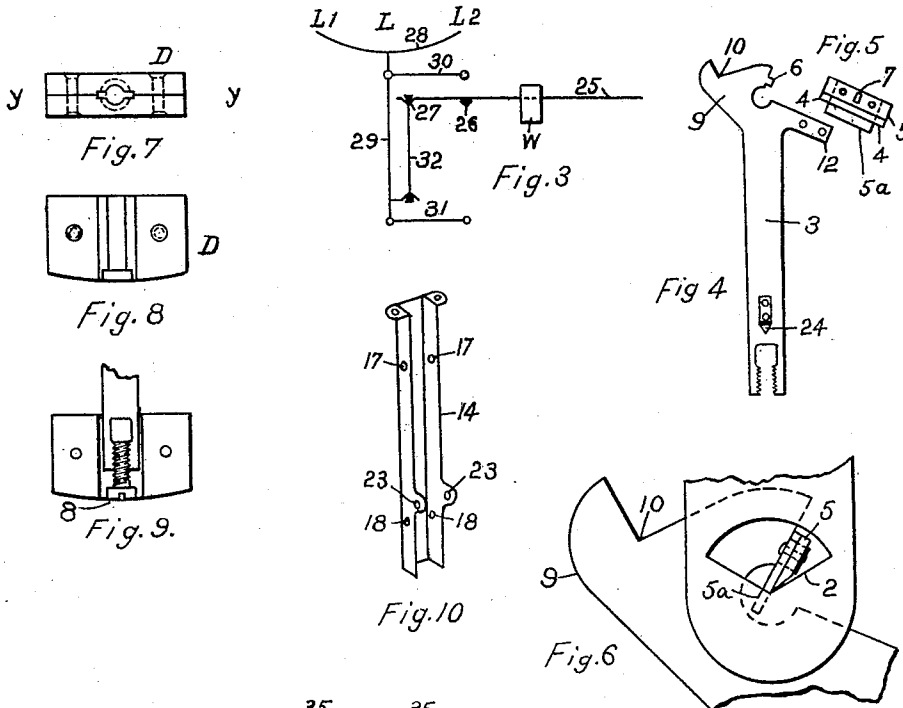
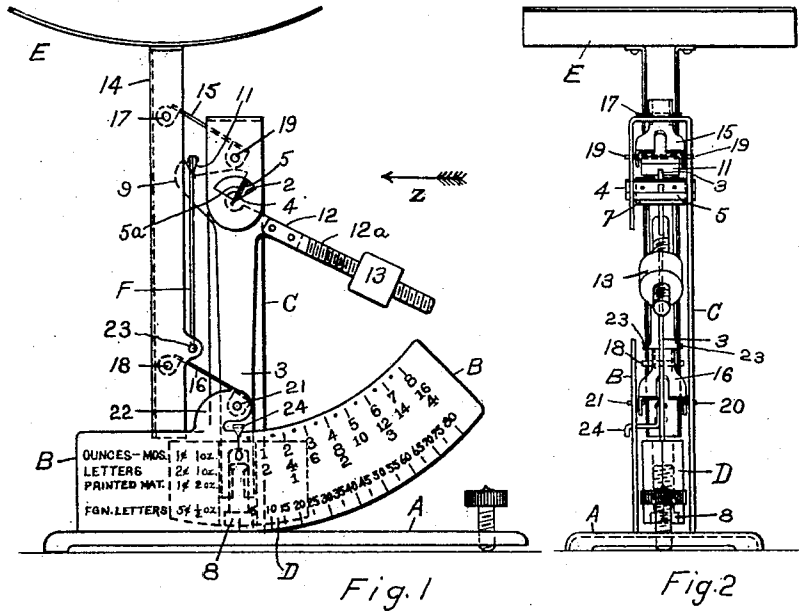


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SCALE.

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SCALE.

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To all whom it may concern:

Be it known that I, EDWIN C. SMITH, a citizen of the United States, residing at Seekonk, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Scales, of which the following is a specification.

My invention relates to scales, or devices for weighing.

The purpose of my invention is to provide for greater accuracy in weighing, and by a construction which attains this end at a relatively low cost.

Figure 1 is a side view of a scale embodying my invention. Fig. 2 is an edge view looking in the direction of the arrow *z*, Fig. 1. Fig. 3 shows my invention applied to the ordinary beam scale. Figs. 4 to 13 inclusive show details of construction.

I have illustrated the preferred embodiment of my invention, viz: a "postal scale" so called, usually made as a spring balance scale, but by my invention may be made a gravity or pendulum scale with knife edge fulcrums.

The scale, as indicated in Fig. 1, comprises a base A with graduated beam or index B, and a standard C secured thereto. These and other parts of my scale are preferably made of sheet metal suitably joined. The standard C is formed at the top with opposed V's or fulcrum bearings 2, preferably by forming the top of the standard as an inverted L and cutting in the opposed portions apertures of the desired form. Suspended from the V bearings is a pendulum D, hung on an arm 3 which has a knife edge fulcrum 4. This fulcrum is preferably formed as a knife edge on the plate 5 which is secured to the arm 3 and transversely thereto. The plate is riveted to the arm 3, preferably by forming on the latter a projection 6—see Fig. 4—and in the plate 5 a corresponding hole 7—see Fig. 5—which projection and hole are intermeshed and the projection then headed over.

It is to be essentially noted that the fulcrum plate 5 is so attached to the arm 3 that, when the pendulum hangs normally with the arm 3 vertical, the said plate 5 stands at an angle from the vertical. The extent of this angle is such that the plate has ample range of movement to accommodate the range of the pendulum D in weighing, without interfering with the inclined sides of the fulcrum bearings 2. A plate 5^a, extending below the

knife edge 4, and riveted with the plate 5 to the arm 3, provides abutments or shoulders to prevent undue longitudinal movement of the fulcrum plate in its bearings. Likewise, the fulcrum bearings are over-arched by the surrounding metal and with a radius of curvature which permits the fulcrum to swing freely without contact, but so close as to prevent displacement of the fulcrum plate 5 from its bearings, as shown more clearly in the enlarged view, Fig. 6.

The pendulum D is preferably formed of two symmetrical pieces, each having a groove of combined rectangular and semicircular form, as indicated by Figs. 7 and 8. These are so riveted or otherwise joined together that the aforesaid grooves match, forming a guide-way to receive the arm 3 and also a screw 8. The end of the arm 3 is recessed and formed with teeth of internal screw thread section—Fig. 4—to take the screw 8, whose head bears against the pendulum D, preferably on a counterbored seat, see Fig. 9, which is a sectional view of the pendulum on line *y-y* of Fig. 7. By adjusting the screw 8, the radius of oscillation of the pendulum D can be varied and thus compensation can be had for any variation in the weights of parts, or deviations from exact dimensions. Such compensating means is essential because usual manufacturing processes do not insure exactitude of dimension, and there is liable, in all materials, to be variation in density.

At the top of the arm 3 is an arm 9 which extends laterally therefrom and in which is formed a V-bearing 10. This has an included angle of about 105° but is so positioned that when the scale registers 0, one edge of the bearing stands about 30° from the vertical, which of course results in the other side being about 15° from the horizontal, and this insures that the knife edge 11 will, under action of gravity, find its way to the bottom of the bearing 10. Opposite the arm 9 is an arm 12 preferably depressed from the horizontal, to which is secured a rod or bar which is screw threaded to receive the nut 13. This nut serves to counterbalance the weight of the pan E and its parts. The scale pan E is mounted on a stem 14, preferably of channel form, as indicated in Fig. 10. Vertical movement of the pan is insured by a parallel motion device comprising two links 15 and 16 which have bearings in the stem 14 at 17 and 18 respectively. The top link has

bearings in the standard C at 19, and the lower link 16 in the standard C at 20, and also in the bar B at 21, an upward projection 22 being formed on the bar B for the purpose. At the lower portion of the stem 14 are bearings 23 for the vertical link E which, at its upper end carries the vertical knife edge 11 above referred to. On the arm 3 is secured a pointer 24 which indicates on the bar B, by graduation of the latter, the weight, or preferably the amount of postage to be used or paid. For this purpose, the bar is marked with, or has otherwise applied, an index of the amount of postage corresponding to the different classes of mail matter.

The link F is the most essential part of my invention, for, by it, the scale is caused to weigh accurately, independent of the location on the pan of the article weighed. Errors in balance, due to eccentricity in position of the article weighed as regards the pan fulcrum, are recognized but ignored in current scale practice. By my invention this error cannot occur, because the vertical movement of the pan in weighing is controlled by the means entirely independent of the weighing devices, viz: by the parallel motion links 15 and 16. Movement of the pan is transmitted through the long link F by its knife edge 11 and the V 10 of the arm 9 to the fulcrum D. The relation of the link F to the other elements is such that its movement of oscillation is slight, it remaining substantially vertical with all positions of the pendulum, and this, in conjunction with the link's length, insures that there can be no disturbing influence on the action of the pendulum, due to eccentric loading of the scale pan.

While a certain specific preferred construction has been described, modifications are obvious which are purely matters of treatment falling within the scope of my invention.

Fig. 3 shows, diagrammatically, my error eliminating device applied to a balance scale of usual form. W is the weight and 25 is the graduated beam, whose fulcrum is at 26. At 27 the beam 25 has a V-fulcrum bearing. The pan 28 is mounted independently of the beam 26, carried by a stem 29 and two suitably constructed and mounted parallel motion links 30 and 31, which insure a vertical movement of the pan 28. Connecting the stem 29 and the beam 25 is the link 32 corresponding with the link F of the previously described construction.

Obviously, a load may be applied at L, L' or L² without in any way affecting the weighing. By suitable introduction of knife edges

or equivalent devices, as in the manner indicated, the element of friction can be practically eliminated.

Obviously, a variety of modifications may be made in the structure and arrangement of the components of the scale. For example, the fulcrum plate 5 might be made as indicated by 35 in Figs. 11 and 12, where one piece is formed with both knife edges and abutment to prevent end play, instead of being made composite, with one plate of lamination providing the knife edges, and another lamination the abutments. Again, as in Fig. 13, it is within the scope of my invention to use a very thin plate for the knife edge, as indicated by 40 in Fig. 13. Such thin, flat wire is made with its edge practically as sharp as the edge of pivot wire usually employed for scales. In such case, the plate 40 is reversed in position from what is shown in Figs. 1-4 and 6, so as to constitute a reinforcement for the thin plate or lamination 40, especially when the scale is used to its full capacity and the plate 40 must sustain its heaviest load.

What I claim is:

1. In a scale adjustment, the combination with a weight having an opening, an arm to engage the threads of said opening and having an end recess adapted to engage a screw and a screw engaging the recess aforesaid and also the weight, for the purpose specified.
 2. In a scale adjustment, the combination with a two-piece weight having registering channels, means to join the two pieces, an arm entering the opening formed by the registering channels, and a screw also entering the opening and engaging said arm and also engaging said weight by its threaded portion.
 3. The combination with a weight having an opening of combined circular and rectangular section, an arm adapted to enter said weight by the rectangular portion of the opening and adapted to receive a screw, and a screw adapted to enter the weight by the cylindrical portion of the opening and engage said arm.
 4. In a scale adjustment, the combination with an arm having in its end a recess formed with teeth of internal screw thread section, a headed screw engaging said teeth, and a weight slidable on the arm, engaged by the screw head for purposes of adjustment.
- In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWIN C. SMITH.

Witnesses:

CARL V. J. CHRISTENSEN,
CHAS. A. EDDY.