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J. W. CULMER & F. C. HOYT.

SPRING BALANCE SCALE.

APPLICATION FILED FEB. 24, 1898.

NO MODEL.

Fig. 5.

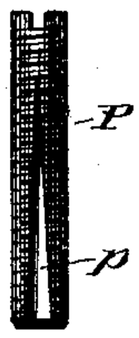

Fig. 1.

Fig. 4.

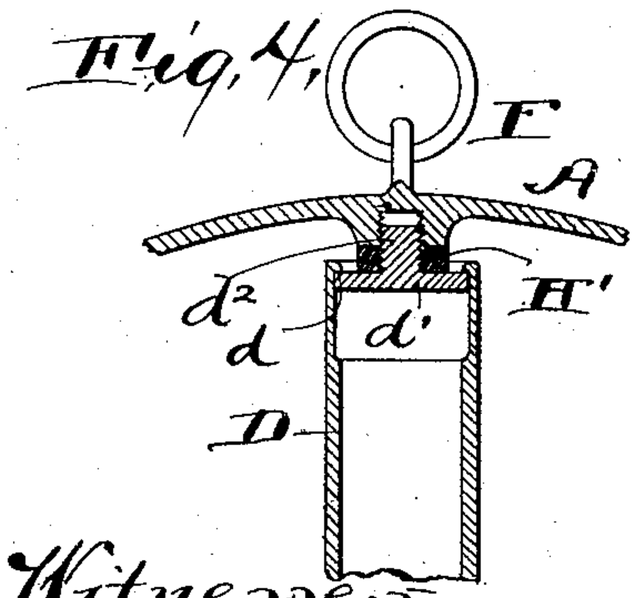

Fig. 3.

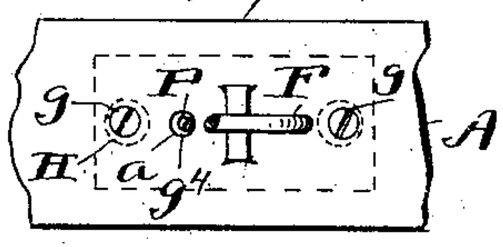

Fig. 2.

Witnesses:
E. B. Gilchrist
Philip E. Knowlton

Inventors
John W. Culmer,
Frank C. Hoyt,
By their attorneys,
Thurston & Bates

No. 743,460. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

JOHN W. CULMER AND FRANK C. HOYT, OF CLEVELAND, OHIO, ASSIGNORS TO THE NATIONAL COMPUTING SCALE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

SPRING-BALANCE SCALE.

SPECIFICATION forming part of Letters Patent No. 743,460, dated November 10, 1903.

Application filed February 24, 1898. Serial No. 671,532. (No model.)

To all whom it may concern:

Be it known that we, JOHN W. CULMER and FRANK C. HOYT, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Spring-Balance Scales, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

Our invention relates to improvements which are particularly useful in scales employing graduated dials for their indicating devices. The invention is directed to preventing the inertia of the dials from causing injurious shocks to the delicate scale mechanism. We employ as a shock-preventing device a pneumatic dash-pot which acts to prevent rapid movement of the scale-runner when the scale is suddenly loaded or unloaded. In scales of this character it is essential that the dash-pot mechanism shall operate without appreciable friction, and to that end it is necessary that the axis of the dash-pot cylinder shall be substantially coincident with the line of draft of the plunger. As scales of this class are generally suspended by a ring at a point opposite the pan or load, the draft will be vertical if the load is placed centrally upon the pan. Ordinarily, however, in the hurry of business the operator places the load carelessly upon the pan at one side or the other of its center, whereby the runner is drawn out of the vertical line.

The principal object of the present invention is to support the dash-pot cylinder within the scale-case in such manner and by such means that it will normally assume a position wherein its axial line is vertical, but will also automatically move more or less out of such position when the line of draft is deflected from the vertical, thereby preventing binding of the plunger in the cylinder and practically eliminating injurious friction.

In the drawings, Figure 1 is a front elevation, partly in central section, of a scale embodying our invention. Fig. 2 is a side view showing the connection between the plunger-rod and runner. Fig. 3 is a top view of the middle part of the scale-case. Fig. 4 is a front elevation, partly in section, of a modified construction. Fig. 5 is a detail elevation of a regulating-screw.

Referring to the parts by letters, A represents a circular scale-case; B, a runner suspended by and balanced upon the two scale-springs C. The pan or other load-supporting device is secured to the lower end of the runner, which passes out through the scale-case through a hole therein of sufficient size to permit more or less motion of the runner to one side or the other or forward or backward. The suspending-ring F is secured to the upper side of the scale-case at a point diametrically opposite to the point at which the pan is secured to the runner when the runner is in a vertical position. A horizontal spindle K is mounted in the scale-case, and a rack J, secured to the runner, engages with a pinion *k* upon the spindle, whereby the rectilineal motion of the runner produces a proportionate rotary movement of the spindle and the indicating device, which is moved thereby. In respect to the features of construction heretofore described the scale resembles scales which have been in use for years.

Within the scale-case and connected to it is a dash-pot cylinder D. The dash-pot is closed at its upper end and open at its lower end, and its axial line when the scale is not loaded should be vertical. Its plunger E is movable in the dash-pot cylinder, and it is connected with the runner by means of a rod M, the upper end of which is pivotally connected to the plunger. The lower end of the rod is connected with the runner by any suitable means, although we show in the drawings certain novel means for making this connection, the construction and purpose of which will be presently explained. The connection between the upper end of the dash-pot and the scale-case is flexible—that is to say, it is such as permits the lower end of the cylinder to swing out of the vertical line for a short distance in any direction. The means shown in Fig. 1 consist of a plate G, secured to the inside of the scale-case below the suspending-ring F by means of two bolts *g*, which pass loosely through holes in the plate; but yielding springs H are placed between the plate and the scale-case, these

springs being preferably elastic rubber washers H, which embrace the bolts. On the upper end of the dash-pot is a screw-threaded stud which screws into this plate G. The nuts g' may be screwed up or down on the bolts g to vary the tension of the springs, so that the dash-pot will normally be held in a position in which its axis is vertical. A slight force, however, applied to the dash-pot will deflect said dash-pot a short distance out of this vertical position. This deflection takes place automatically when the runner is thrown out of its vertical position by placing a load on the scale-pan otherwise than centrally, and because of this deflection the plunger does not bind in the dash-pot cylinder, but moves freely therein with no appreciable friction, whether the runner is drawn downward in a true vertical position or in a line slightly out of the vertical.

In Fig. 4 is shown a modified construction wherein a boss is formed on the inside of the scale-case below the loop and a threaded vertical hole is formed in this boss. The threaded stem of the dash-pot screws into this hole, but fits loosely therein, so that the dash-pot may be drawn at its lower end out of its vertical position. Between the top of the dash-pot and the stud is a rubber spring H′, which serves the same purpose as the springs H—that is to say, it normally holds the dash-pot in a vertical position, but permits its deflection, as described.

It is believed that the best results will be obtained if the lower end of the plunger-rod M and the runner are connected as shown in Figs. 1 and 2, wherein the lower end of this rod is shown passing through a hole in a horizontal arm b, which is swiveled to the runner. Above the arm on the rod M is a shoulder or tappet m and below the arm another shoulder or tappet m', preferably an adjustable nut, and between these tappets and the arm on both sides of the latter are the springs N N, which are balanced against each other. The sudden movement of the runner up or down is transmitted to the plunger-rod through one or the other of these springs, which prevents the sudden movement of the runner from causing the plunger to bind in the cylinder—that is to say, it gives the cylinder time to adjust itself to the line of draft before the plunger moves.

The plunger is provided with one or more annular grooves e between its ends, which grooves cause the deflection out of a straight path of air passing from one end of the cylinder to the other past the plunger, thus preventing the too rapid passage of such air. The air in these grooves also forms what may be called a "pneumatic packing," which greatly diminishes the friction incident to moving the plunger in the cylinder.

The peculiar construction of the dash-pot cylinder which is shown is believed to be new, and it is such that the cylinder may be very cheaply made. It is made of a piece of tubing whose internal diameter near one end is enlarged. A head d', having the integral threaded boss d^2, is fitted into this enlarged end, and the upper end of the tube-wall (thinned by the enlargement) is bent down upon this head, thereby forming the shoulder d and holding the head in place and closing the end of said cylinder.

A screw P, having in its surface a longitudinal groove p, which is deepest at the lower end, but gradually fades to nothing near the other end, screws down through the head of the cylinder. There is a hole a in the scale-case and another hole g^4 in plate G, through which one may pass a screw-driver to turn this screw out or in for the purpose of regulating the speed of the plunger by opening up a greater or smaller hole in the head for the escape of air from the upper end of the cylinder.

Having described our invention, we claim—

1. In a spring-balance scale, the combination of the scale-case, a pneumatic dash-pot cylinder closed at one end and flexibly connected at that end to the scale-case, with the spring-supported runner, a plunger movable in said cylinder, and a plunger-rod connecting the plunger and runner, substantially as specified.

2. In a spring-balance scale, the combination of the scale-case, a pneumatic dash-pot cylinder closed at one end and flexibly connected at said end to the scale-case, and elastic means normally holding said cylinder in a position wherein its axis is substantially vertical, with the spring-supported runner, a plunger movable in said cylinder and connected with said runner, substantially as specified.

3. In a spring-balance scale, the combination of the scale-case, a plate secured to the under side of the upper part of said case, a dash-pot cylinder closed at one end and connected at that end to said plate, and springs between said plate and frame, with the spring-supported runner, and a plunger movable in the cylinder and suitably connected with said runner, substantially as specified.

4. In a spring-balance scale, the combination of the scale-case, its supporting-loop, a plate on the inside of the case below said loop, bolts securing said plate to the case, and springs interposed between the case and plate, with a pneumatic dash-pot cylinder closed at one end and having at that end a threaded stud which screws into said plate, with a spring-supported runner, and a plunger movable in said cylinder and connected with said runner, substantially as specified.

5. In a spring-balance scale, the combination of a scale-case, and a dash-pot cylinder secured thereto, and a piston movable in said cylinder, with a spring-supported runner, and a piston-rod connected with the piston at its upper end and yieldingly connected with the

runner at its lower end, whereby a limited independent movement of said rod and runner is permitted, substantially as specified.

6. In a spring-balance scale, the combination of a scale-case and a dash-pot cylinder secured thereto, a piston movable in said cylinder, and a piston-rod connected with the piston, with the runner, a perforated horizontal arm carried by the runner through which the lower end of the plunger-rod is movable, said rod having shoulders above and below said arm, and springs interposed between said arm and shoulders respectively, substantially as specified.

7. In a spring-balance scale, the combination of a scale-case, a pneumatic dash-pot cylinder closed at one end and secured at that end to the inside of the scale-case, a screw passing through the closed end of said cylinder and having a tapered longitudinal groove, the scale-case having, in line with said screw, a hole through which the screw may be turned, substantially as specified.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

JOHN W. CULMER.
FRANK C. HOYT.

Witnesses:
PHILIP C. KNOWLTON,
OLIVE GILL.