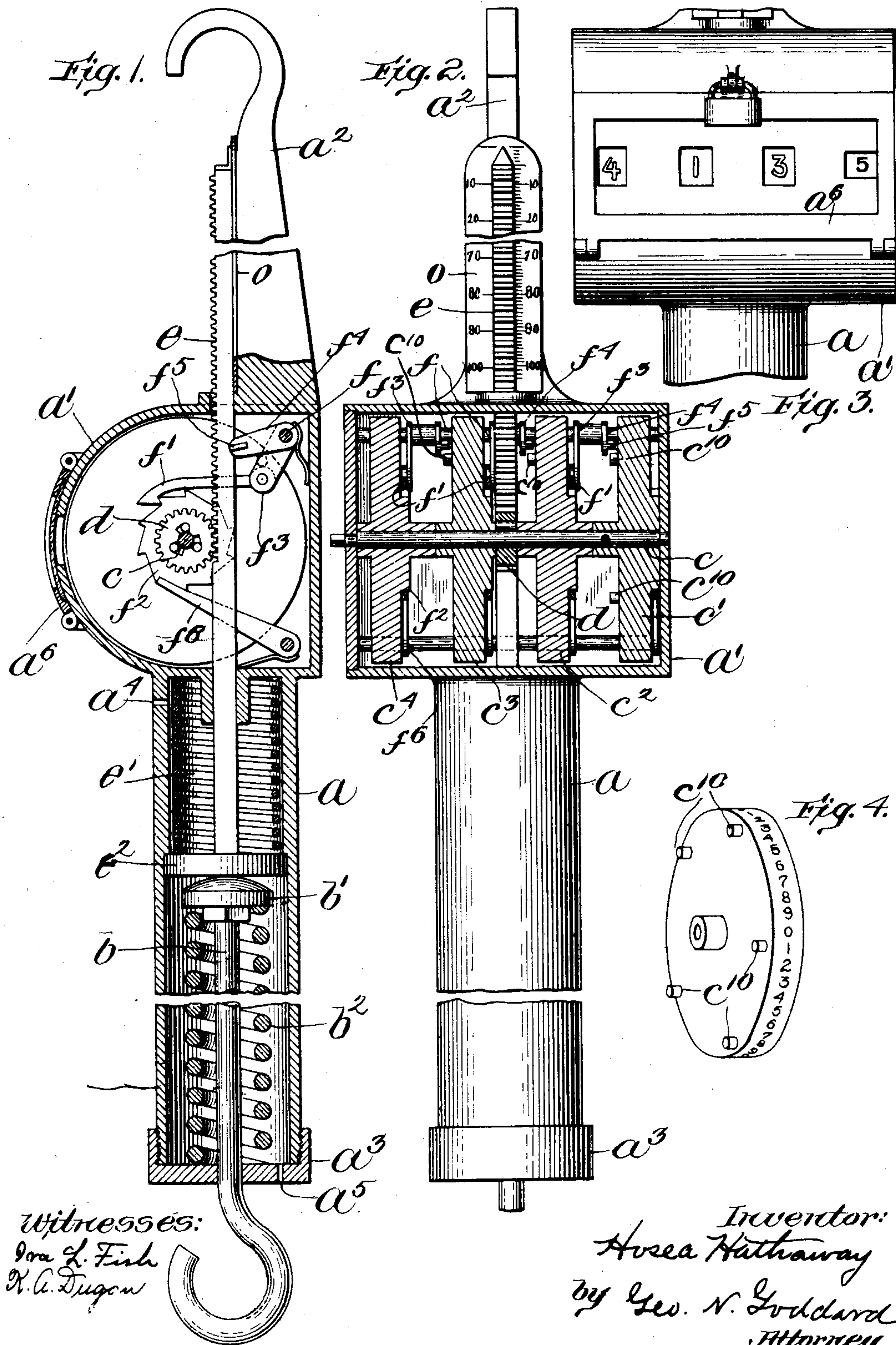


H. HATHAWAY.
RECORDING SCALE.

APPLICATION FILED JUNE 23, 1904.



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RECORDING-SCALE.

SPECIFICATION forming part of Letters Patent No. 791,554, dated June 6, 1905.

Application filed June 23, 1904. Serial No. 213,785.

To all whom it may concern:

Be it known that I, HOSEA HATHAWAY, a citizen of the United States, and a resident of Boston, county of Suffolk, Massachusetts, have invented certain new and useful Improvements in Recording-Scales, of which the following is a specification.

This invention relates to recording-scales, and is intended to provide a simple and highly-efficient device of this class which shall be reliable in its action and durable in service.

In the accompanying drawings I have illustrated one of the forms under which the principles of this invention may be embodied; but it will be understood that variations may be made in the construction and arrangement of parts without departing from the spirit of my invention.

In the drawings, Figure 1 is a side elevation in approximately central section, showing one of the forms of my invention. Fig. 2 is a front elevation, the registering mechanism being shown in central section. Fig. 3 is a front elevation of the casing containing the registering device. Fig. 4 is a detail perspective showing the construction of the disk carrying the units figures.

In the practice of my invention as illustrated in the drawings I provide a tubular casing *a*, at whose upper end is arranged a transverse casing of larger diameter *a'* to contain the registering mechanism and which is provided with an upward extension terminating in a hook *a''* for supporting the scale. The lower end of the tubular casing is provided with a close-fitting cap *a'''*, which, as shown, is provided with a small perforation for slowly venting the air during each weighing operation. Near its upper end the casing is also provided with an air hole or passage *a''''* to prevent interference with the action of the piston connected with the recording mechanism.

The casing *a*, with its end cap *a'''*, acts as a supporting-frame for a spring-balance, which comprises a draft or weight-carrying rod *b*, provided with an enlarged head *b'*, which rests upon and is supported by a compression-spring *b''*, said spring being compressed in

proportion to the gravity of the object to be weighed. In this case the draft-rod passes through the central orifice in the cap *a'''*, which it completely fills. It is immaterial whether this hole is made sufficiently large to act as a vent for the compressed air inside the lower end of the casing or whether the separate orifice, as shown at *a''''*, is employed.

The registering device is of the rotary-disk type and comprises a rotary shaft *c*, to which is secured the units-disk *c'* and upon which are loosely mounted the tens-disk *c''*, the hundreds-disk *c'''*, and the thousands-disk *c''''*. To the middle portion of the shaft *c* is pivoted a pinion *d*, which meshes with the rack-bar *e*, the rack-bar serving to actuate the registering mechanism in a manner hereinafter to be described. This pinion *d* has any suitable clutch engagement with the shaft *c*, such as will permit the pinion to turn backward without turning the shaft while causing it to engage the shaft in its forward rotation in order to rotate said shaft. In this case I have shown a simple ball-clutch for effecting such engagement. Since the units-disk *c'* is fast on the shaft *c*, any rotation of the shaft will cause a corresponding rotation of the disk *c'*.

The upward extension of the scale is provided with a graduated scale-plate arranged to register any weight up to one hundred pounds, this plate being arranged so that the zero-mark is opposite the upper or pointed end of the rack-bar *e* when no weight is carried by the spring-balance. In the device shown the proportion of the parts is such that a complete traverse of the scale-bar or rack-bar *e* from "0" to "100" causes two complete revolutions of the pinion *d*. It will therefore be seen that one complete revolution of the pinion *d* corresponds to the movement caused by a weight of fifty pounds. As the second disk *c''* is intended to register ten pounds for each tenth of a revolution, its periphery is numbered consecutively from "0" to "9," inclusive. One forward step or one-tenth of a revolution of the disk *c''* being equal to ten pounds must correspond with one-fifth of a revolution of the disk *c'*. This movement is accomplished by providing the adja-

cent side or face of the disk c' with a series of five projecting pins c^{10} , so that upon each fifth of a revolution of the disk c' the disk c^2 will be advanced one step, or one-tenth of a revolution. Any suitable mechanism may be employed for effecting this movement. I have here shown a shaft f arranged in the casing a' slightly back of and above the respective disks, said shaft being provided with a series of actuating-pawls f' , which engage, respectively, corresponding ratchet-wheels f^2 , formed on or secured to the lateral faces of the disks c^2 , c^3 , and c^4 . These pawls are pivotally secured to pawl-levers f^3 , which are pivoted upon the rod or shaft f , and each of said pawl-levers is provided with a projecting arm f^4 , carrying a lug f^5 , arranged to lie in the path of the pins c^{10} , carried on the lateral face of each disk. As before stated, the units-disk is provided with five such pins, so that during one complete rotation it acts upon the actuating-pawl of the tens-disk c^2 five successive times, thereby moving said tens-disk through five successive steps, thus registering fifty pounds on the dial-register. As the complete traverse of the rack-bar e causes two complete revolutions of the shaft c and disk c' , these five pins during these two complete revolutions will act upon the tens-disk ten times through the medium of its actuating-pawl, thus moving it ten steps, or one complete revolution. As the disk c^2 is provided with a single projecting pin c^{10} , arranged to engage the pawl of the hundreds-disk c^3 , it will be seen that one complete revolution of the disk c^2 will cause the disk c^3 to be moved forward one step, equal to one-tenth of a revolution, thus indicating one hundred pounds on the register. In a similar manner the thousands-disk c^4 is actuated from the disk c^3 .

Assuming that the recording mechanism is at zero, let a weight of one hundred pounds be thrown upon the scale. This causes the draft or weight rod b to descend against the resistance of its spring b^3 , which it compresses to a certain point. It will be noticed that the rack-bar e has no direct connection with the spring-balance, but that the spring-balance merely acts as a stop to hold said rack-bar against the movement which normally would be caused by the light compression-spring e' , which bears against the upper part of the tubular casing or frame a and thrusts against the piston e^2 , which is secured to the lower end of the rack-bar, so as to completely fill the tubular casing. So long as the spring-balance is not compressed or under tension the rack-bar will be held at the zero-point. Its descent under the action of the spring e' will be limited alternately only by the position of the head b' of the spring-balance. As the spring-balance is likely to jump back and forth before settling into its final position of rest under gravity of the object being weighed, it is important that the registering

mechanism should not come to rest upon the head of the spring-balance until the spring-balance has come to rest in its final position. I therefore provide means for retarding the movement of the piston e^2 by making the lower end of the casing air-tight, except for a small vent-hole a^5 , which allows the air to escape gradually.

The independent movements of the registering device and of the spring-balance constitute an important feature of this invention, since by such a construction and arrangement the likelihood of the device recording more than the proper weight by reason of its passing beyond the proper limit under the influence of the momentum of the weight placed on the spring-balance is completely avoided. Another important feature in the construction and arrangement shown is that the weighing operation is performed by compressing the spring instead of expanding it, thus greatly prolonging the durability or life of the spring. Moreover, by having the cap a^3 arranged to inclose the casing at its lower end and support the spring-balance I find it very easy to get access to the interior of the device for repairs, replacement, &c.

To prevent backlash of the recording-disks, I have provided a friction pawl or brake f^6 . This acts under the tension of a spring with sufficient force to hold the disk against accidental displacement, while not interfering with the step-by-step movement imparted by the actuating-pawls of the respective disks.

By the construction and arrangement shown the weight of each successive object weighed is shown on the scale-plate o so long as the weight hangs on the balance, and at the same time a permanent record is made on the dial or disks which is not affected by the return or upward movement of the scale-beam or rack-bar e to the zero position.

If desired, the casing a' may be provided with a hinged door a^6 , provided with apertures through which the numerals on the disks may be seen, and said door may be provided with a lock to keep it permanently closed, except when it is desired to open the same for resetting the register or for any other purpose.

While I have described in detail the registering mechanism herein shown, it will be understood that various forms of recording-registers may be employed and that modifications may be made in the arrangement and construction of other parts of the device as well.

Without attempting to set forth the various modifications in form, construction, and arrangement which may be made in the practice of my invention or all the modes of its application, what I claim is—

1. A recording-scale embracing in its construction, a tubular casing provided with a sliding piston, a registering device having connection with said piston by which it is actuated, and a spring-balance carried by said cas-

ing and having movement independently of said piston, said spring-balance being arranged to form a stop or support for said piston in its various positions, substantially as described.

2. A recording-scale embracing in its construction, a casing or frame, a compression-spring supported therein, a draft or weight rod supported by said spring in position to compress said spring under the gravity of a suspended weight, and a registering device for recording the successive weighing movements of said draft-rod, substantially as described.

3. A recording-scale embracing in its construction, a tubular casing, a spring-balance mounted therein, a registering device provided with a piston arranged to traverse said tubular casing, said casing being provided with an air-vent at its lower end to retard the movement of said piston relatively to the movement of the spring-balance, and means for normally pressing said piston toward the spring-balance, substantially as described.

4. A recording-scale embracing in its construction, a graduated-scale plate, a rack-bar adapted to move over said plate, a registering device having engagement with said rack-bar to make a permanent record of the successive weights, a spring-balance arranged to form a movable stop for said rack-bar, and means for imparting a gradual movement to said rack-

bar when the spring-balance is depressed, substantially as described.

5. A recording-scale embracing in its construction a multiple-disk register, a rack-bar, a connecting-pinion forming an intermediate connection between said rack-bar and said register arranged to transmit motion to the units-disk of the register, said units-disk being provided with a plurality of pins, a pawl arranged to engage with each one of said pins in succession to move the tens-wheel forward step by step, and a spring-balance arranged to form a variable stop to limit the movement of the rack-bar according to the weight suspended upon the spring-balance, substantially as described.

6. A recording-scale embracing in its construction a draft or weight-carrying rod, a yielding spring arranged to support said rod, a reciprocating follower arranged to press normally toward said draft-rod while capable of independent movement, a recording-register adapted to record the total of successive weighing operations arranged to have engagement with said follower, substantially as described.

In witness whereof I have hereunto set my hand this 21st day of June, 1904.

HOSEA HATHAWAY.

In presence of—

GEO. N. GODDARD,

KATHARINE A. DUGAN.