M. H. HANSEN.

SPRING SCALE.

APPLICATION FILED FEB. 3, 1909.

967,188.

Patented Aug. 16, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

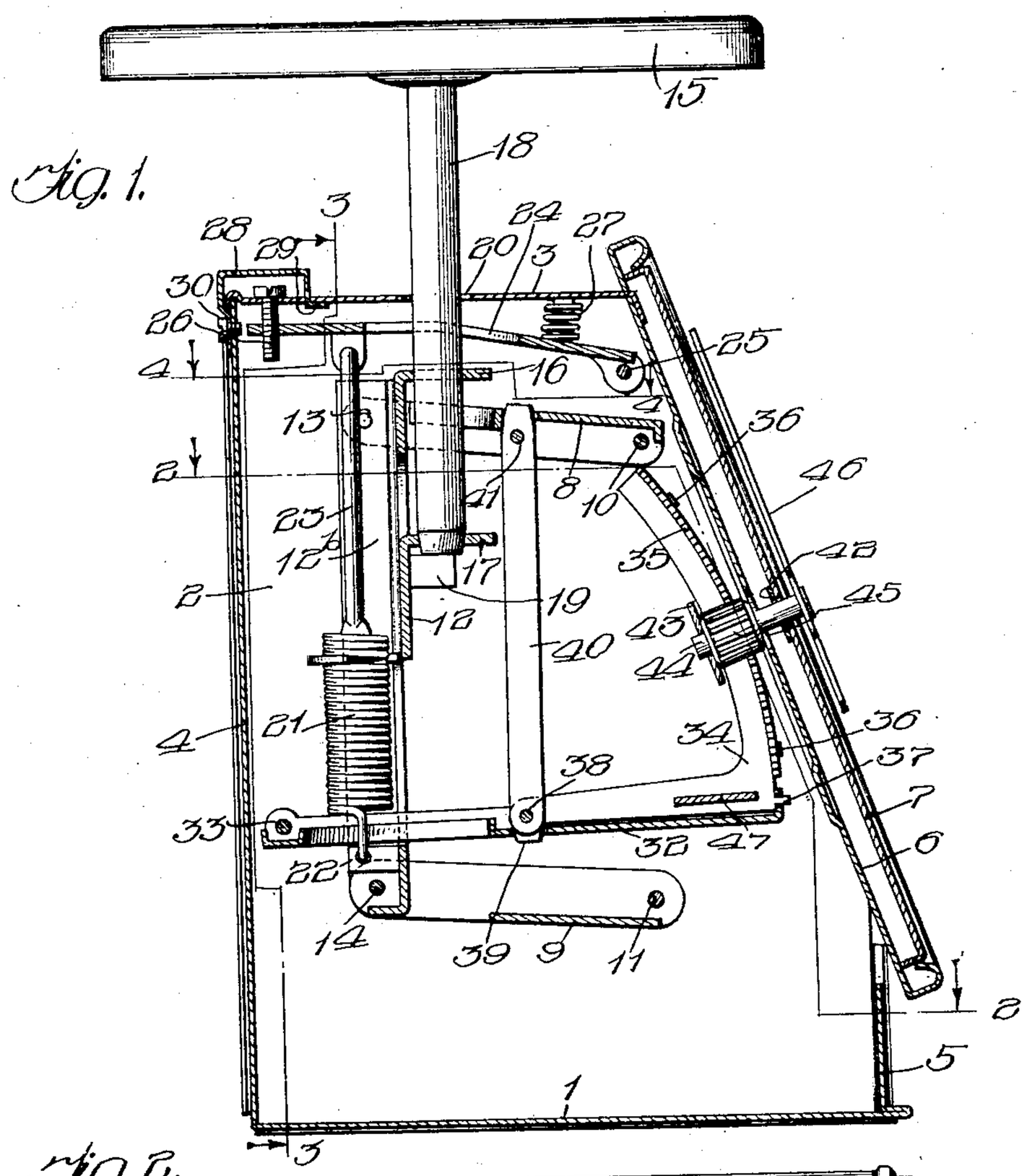
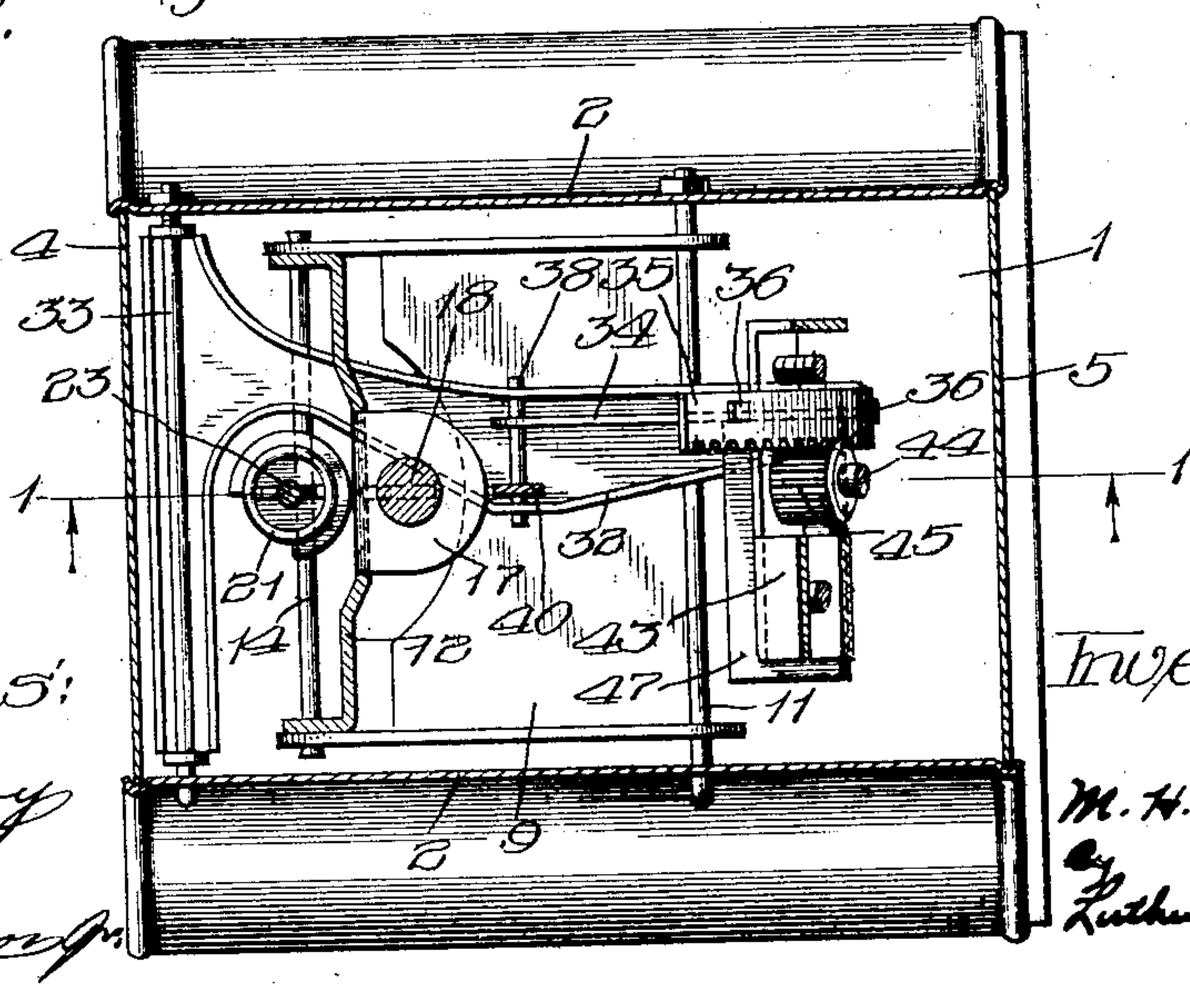


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

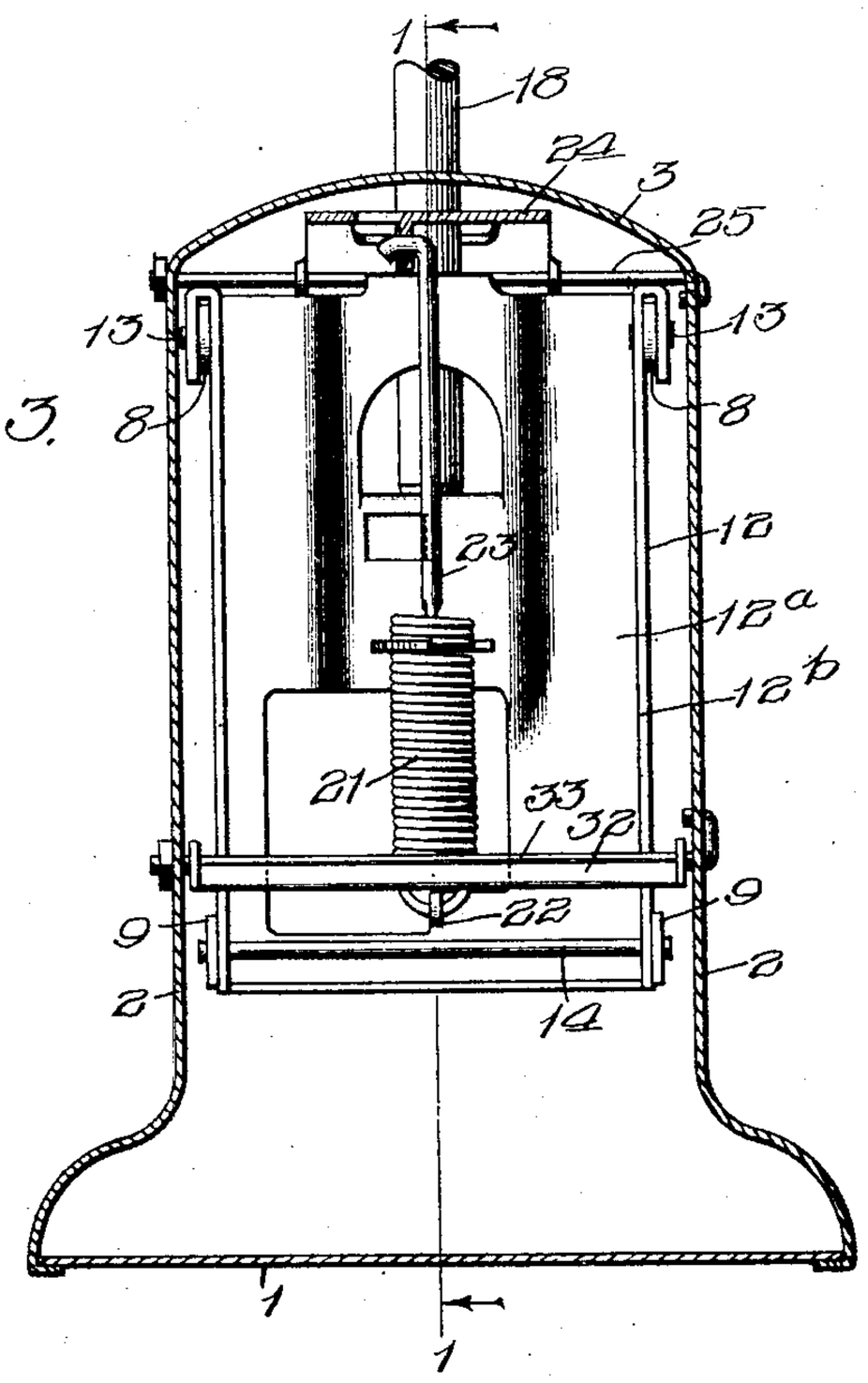
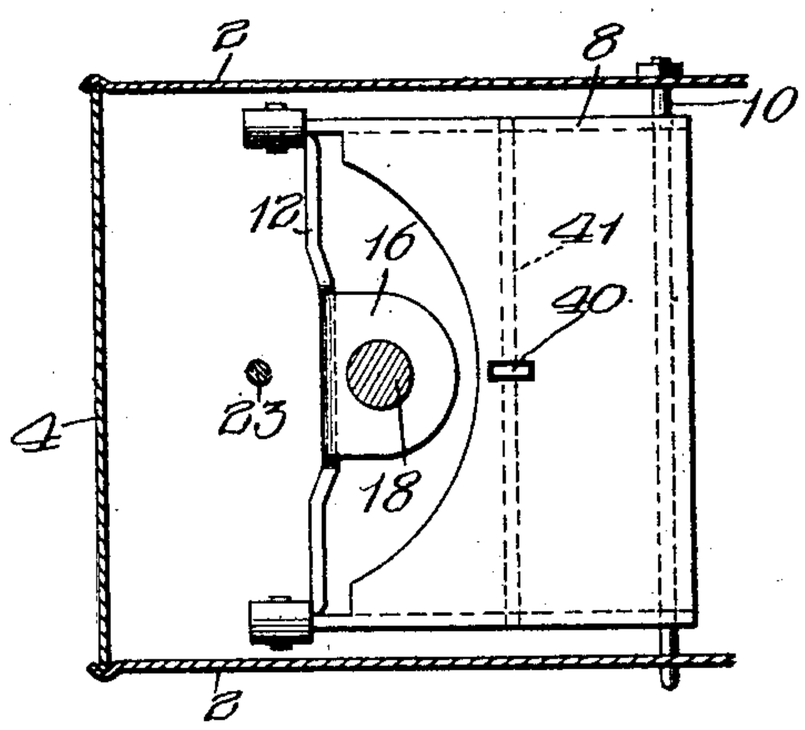


Fig. 4.



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MARIUS H. HANSEN, OF CHICAGO, ILLINOIS.

SPRING-SCALE.

967,188. Specification of Letters Patent. **Patented Aug. 16, 1910.**

Application filed February 3, 1909. Serial No. 475,759.

To all whom it may concern:

Be it known that I, MARIUS H. HANSEN, 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 Spring-Scales, of which the following is a specification.

In spring scales, as heretofore constructed, tilting of the platform or of the beam to which the platform is connected, due to the load having been placed upon one side of the platform, has had a tendency to impair the accuracy of the scale.

It is one of the objects of this invention to provide a connection between the indicating mechanism and the platform which will not be affected by tilting of the platform.

Another object of the invention is to provide improved means for adjusting the tension of the scale spring.

A further object is to provide such an arrangement of the mechanism of the scale as will make a slight amount of looseness in the pivotal joints immaterial, and therefore permit of forming the parts largely of sheet metal stampings.

In the accompanying drawings, Figure 1 is a vertical central section through a scale embodying the features of my invention, the view being taken in the plane of dotted lines 1 1 of Figs. 2 and 3. Fig. 2 is a horizontal sectional view in the plane of dotted lines 2 2 of Fig. 1. Fig. 3 is a vertical section on line 3 3 of Fig. 1. Fig. 4 is a horizontal section on line 4 4 of Fig. 1.

In the present embodiment the mechanism is inclosed within and supported by a casing which may be of any suitable form, but which is herein shown as similar to the one illustrated and described in Patent No. 632,525, issued to me on September 5, 1899, and comprising a bottom wall 1, the side walls 2, the top wall 3 and the rear wall 4. The front wall of the casing consists of the portions 5 and 6, the portion 6 being inclined from the vertical and constituting the back of the dial case, the dial being indicated by 7. Two levers 8 and 9 of equal length are pivotally mounted at their forward ends upon pivot rods 10 and 11, respectively. Each of these two levers may consist of a sheet-metal stamping, the body portion of the lever having side flanges, as shown, to give the lever rigidity. Each of the levers 8 and 9 is made relatively wide. Each lever in effect consists of two parallel levers spaced apart and rigidly connected to swing together. The rear ends of the levers 8 and 9 are pivotally connected to a frame or link 12 by means of the rivets 13 and the pivot pin 14, the levers 8 and 9 being substantially parallel. The link 12 is provided with means for suitably supporting the scale pan or platform 15, which means may be generally similar to that illustrated in Patent No. 821,035, granted to me on May 22, 1906. As herein shown, the link or frame 12 is a sheet-metal stamping comprising the plate or body portion 12^a and the marginal stiffening flanges 12^b (Fig. 3). Two perforated ears 16 and 17 are formed upon the plate 12^a to receive the post 18 of the platform 15, said post being supported upon a lug 19 struck up from the plate 12^a, and being readily withdrawable from the ears 16 and 17 for convenience in packing the scale for shipment.

The top wall 3 is provided with an opening 20 through which the post 18 extends. The link or frame 12 and the post 18 constitute a standard for carrying the platform. The weight of the platform 15 and the load placed thereon is carried by a spring, which may be of any suitable form, but is herein shown as in the form of a coiled spring 21 attached at one end to an eye 22 on the link 12 and at its other end to a rod 23 by suitable means, such as that shown in Patent No. 612,968, issued to me October 25, 1898. The upper end of the rod 23 is pivotally connected to a lever 24, said lever being pivotally mounted at one end upon a rod 25 and being engaged at its opposite end by a screw 26 which extends through an opening in the top wall 3 and is supported by said top wall. A coiled spring 27 interposed between the top wall 3 and the lever 24 tends to hold said lever in the position given it by the screw 26. The latter may, if desired, be covered by a cap 28 removably secured to the casing by means of a hook 29 upon one end of the cap and a screw 30 engaging the other end of said cap and the rear wall 4.

The movements of the link 12 are communicated to a pointer arranged to move

across the dial 7 by means comprising a lever 32. Said lever may be a sheet-metal stamping, as shown, and, as indicated in Fig. 2, its rear end may be widened so as to afford the lever a wide bearing upon the pivot pin 33. To the forward portion of the lever 32 is pivotally connected an L-shaped member 34 carrying a curved rack or segment 35. The segment 35 may be punched or cut from sheet-metal and may be secured to the upright curved portion of the member 34 by suitable means, as, for example, lugs 36 on said member extending through the segment and upset to hold the latter in place. In this instance, the member 34 is pivotally connected to the lever 32 by means of a stud 37 on the forward portion of the member 34, said stud extending through an opening in the lever 32, and by means of a pin 38. The rear end of the member 34 is held against displacement longitudinally of the pin 38 by forming a lug 39 upon said member, said lug extending freely through an opening in the lever 32.

The lever 32 is connected to one of the levers 8 and 9 (in this instance, to the lever 8) by means such as a link 40 pivotally mounted at its lower end upon the pin 38 and at its upper end upon a pin 41 carried by the lever 8. The link 40 is held against displacement longitudinally of the pins 38 and 41 by extending the ends of said link into or through openings in the levers 8 and 32. As shown in Fig. 4, the link 40 is connected to the arm 8 at a point substantially midway between the sides of said arm.

A plate 42 is rigidly secured to the inner face of the dial 7 and rotatably supported by said plate and a bracket 43 fixed to the rear side of the wall 6 is a shaft 44 carrying a pinion 45 which meshes with the segment 35. To the projecting end of the shaft 44 is fixed the pointer 46. The segment 35 is yieldingly held in proper engagement with the pinion 45 by a suitable means, such as a weight 47 attached to the member 34 near its axial center.

It will be understood that the pivotal connections in the mechanisms hereinbefore described are made loose, not only because all the bearings must work freely if the scale is to be sensitive and accurate, but because of the prohibitive expense of making the bearings in a scale of this class both easy and free from looseness. It will be appreciated that friction or "sticking" in the bearings is particularly objectionable—and in fact a fatal defect—in a scale in which the movement of the platform is multiplied on the dial, as in scales of the type herein shown. My invention enables me to construct the bearings in a very inexpensive manner and to make them so loose as to obviate any possibility of binding or "sticking," without making the instrument liable to inaccuracy owing to such looseness of the connections.

In use, when an article is placed upon the platform 15, said platform and the link 12 are depressed against the action of the spring 21, the movement of the link 12 being communicated to the pointer 46 through the lever 8, the link 40, the lever 32, the segment 35, and the pinion 45. If the article be placed upon the front part of the platform 15, the platform, the post 18, and the frame 12 will tilt slightly, with 13 as a fulcrum, thereby moving the arm 9 longitudinally to the left (Fig. 1) as far as the looseness at the points 11 and 14 will permit. Such tilting of the platform, post and frame, and sliding of the arm 9, do not affect the lever 32, since said lever is not directly connected to said parts. Similarly, if the article be put upon the rear part of the platform, the platform, post and frame will tilt in the opposite direction and the arm 9 will be moved to the right, but without affecting the lever 32. If the article be placed on one side of the platform, the arm 8 may twist slightly, but the lever 32 will not be moved thereby, since the link 40 is connected to the middle of the arm 8. It will therefore be seen that the accuracy of the scale is not impaired by reason of looseness in the pivotal joints of the mechanism.

The weight 47 is just sufficient to hold the segment 35 upright and in proper engagement with the pinion. Said segment does not bear against the pinion with greater pressure at one point than at another. The points 37 and 38 being widely separated, the segment cannot tilt forward and back with relation to the lever 32, but always occupies the same relation to said lever, even though the bearings for the L-shape segment-carrier are loose enough to obviate "sticking." It will be observed that the pivot 38 extends at right-angles to the L-shape member 34, whereby slight movements of said member 34 along the lever 32 which might be incident to other forms of attachment are prevented.

The method herein shown for adjusting the tension of the spring 21 insures a straight pull upon said spring and prevents changes in tension due to twisting of the spring or the connecting rod 23.

I would have it understood that I desire not to be limited to the details of construction herein shown and described, for various modifications will occur to persons skilled in the art.

I claim as my invention:

1. In a spring scale, in combination, a casing having an inclined dial; two levers pivotally mounted in said casing and connected together in parallel relation; a pointer; and a pivoted pointer-actuating

lever geared at one end to said pointer and connected intermediate its ends to one of the first mentioned levers.

2. In a spring scale, in combination, two levers each pivoted at one end and of equal length and connected together so as always to remain in parallel relation; a pivoted pointer-actuating lever; and a link connection between the midportion of the last mentioned lever and the midportion of one of the other levers.

3. In a spring scale, in combination, an upper lever and a lower lever of equal length and connected together so as always to remain in parallel relation, each of said levers being pivoted at one end; a pointer-actuating lever; and a link connecting the last mentioned lever to the midportion of the upper lever.

4. In a spring scale, in combination, two levers each pivoted at one end and of equal length; a link connecting said levers together and maintaining them in parallel relation; a platform supported by said link; a pointer-actuating lever; and a link connecting the midportion of said pointer-actuating lever with the midportion of one of the other levers.

5. In a spring scale, in combination, two levers, each pivotally mounted at its forward end; a link pivotally connected to the rear ends of said levers and maintaining said levers in parallel relation; a platform supported by said link; a pointer-actuating lever pivotally mounted at its rear end; and a link connecting an intermediate portion of one of the first mentioned levers to an intermediate portion of said pointer-actuating lever.

6. In a spring scale, in combination, two levers connected together in parallel relation; a platform supported by said levers; an inclined dial; a pointer; a pointer shaft; a lever carrying a gear segment; a pinion on said pointer shaft meshing with said segment; and a link connection between one of the first mentioned levers and the segment-carrying lever.

7. In a spring scale, in combination, a dial; a pointer; a pointer shaft; a lever; an L-shape member pivotally mounted on said lever; a gear segment fixed to one arm of said member; a pinion on said pointer shaft meshing with said segment; means for holding the segment and the pinion in operative relation to each other; a suitably supported platform; and connections between the platform and the lever for moving said lever.

8. In a spring scale, in combination, a dial; a pointer; a pointer shaft; a lever; an L-shape member having a substantially horizontal arm and a substantially vertical arm, the horizontal arm being pivotally mounted at its ends on said lever; a gear segment fixed to the vertical arm of said member; a pinion on said pointer shaft meshing with said segment; a weight attached to said horizontal arm for holding said segment and the pinion in operative relation to each other; a suitably supported platform; and connections between the platform and the lever for moving said lever.

9. In a spring scale, in combination, an upper lever and a lower lever pivotally supported at their forward ends; a link pivotally connecting the rear ends of said levers and maintaining said levers in parallel relation; a pointer-actuating lever pivotally supported at its rear end; a pivot pin carried by an intermediate portion of said pointer-actuating lever; a link pivoted on said pin and pivotally attached to an intermediate portion of the upper lever; an L-shape member pivoted at the forward end of the pointer-actuating lever and pivotally mounted on said pin; a gear segment carried by an upwardly-extending portion of said L-shape member; an inclined dial; a pointer; a pointer shaft; a pinion on said shaft meshing with said gear segment; and means for holding said segment and said pinion in operative relation to each other.

10. In a spring scale, in combination, a dial; a pointer; a pointer shaft; a lever; an L-shape member having a substantially horizontal arm and a substantially vertical arm, the horizontal arm being relatively long, and being pivotally mounted at its ends on said lever, one of the pivots extending transversely of said horizontal arm; a gear segment rigidly attached to said vertical arm; a pinion on the pointer shaft meshing with said segment; means for holding the segment and the pinion in operative relation; and weight-actuated means for moving said lever.

11. In a spring scale, in combination, an upper and a lower lever each pivotally mounted at its forward end, the upper lever being relatively broad; a link pivotally connected with the rear ends of said levers and maintaining said levers in parallel relation; a platform supported by said link; a pointer-actuating lever pivotally mounted at its rear end; and a link connected at its upper end with said upper lever at substantially the longitudinal and transverse centers of said lever, the lower end of the last mentioned link being connected with said pointer-actuating lever.

12. In a spring scale, in combination, an upper and a lower lever, each pivotally mounted at its forward end; a link pivotally connected with the rear ends of said levers and maintaining said levers in parallel relation; a platform supported by said link; a pointer-actuating lever pivotally mounted at its rear end and extending between the upper

and the lower lever; and a link pivoted at its upper end to said upper lever and pivoted at its lower end to said pointer-actuating lever.

13. In a spring scale, in combination, a platform; a spring for supporting said platform; a lever pivotally supported at one end and connected with said spring at a point between the ends of said lever; a stationary portion; a screw supported by said portion and having a screw-thread engagement with the end of said lever opposite to its pivoted ends; and a spring tending to hold said lever in adjusted position.

MARIUS H. HANSEN.

Witnesses:
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