No. 687,855. Patented Dec. 3, 1901.

H. G. ROTH.

WEIGHING SCALE.

(Application filed Jan. 28, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.

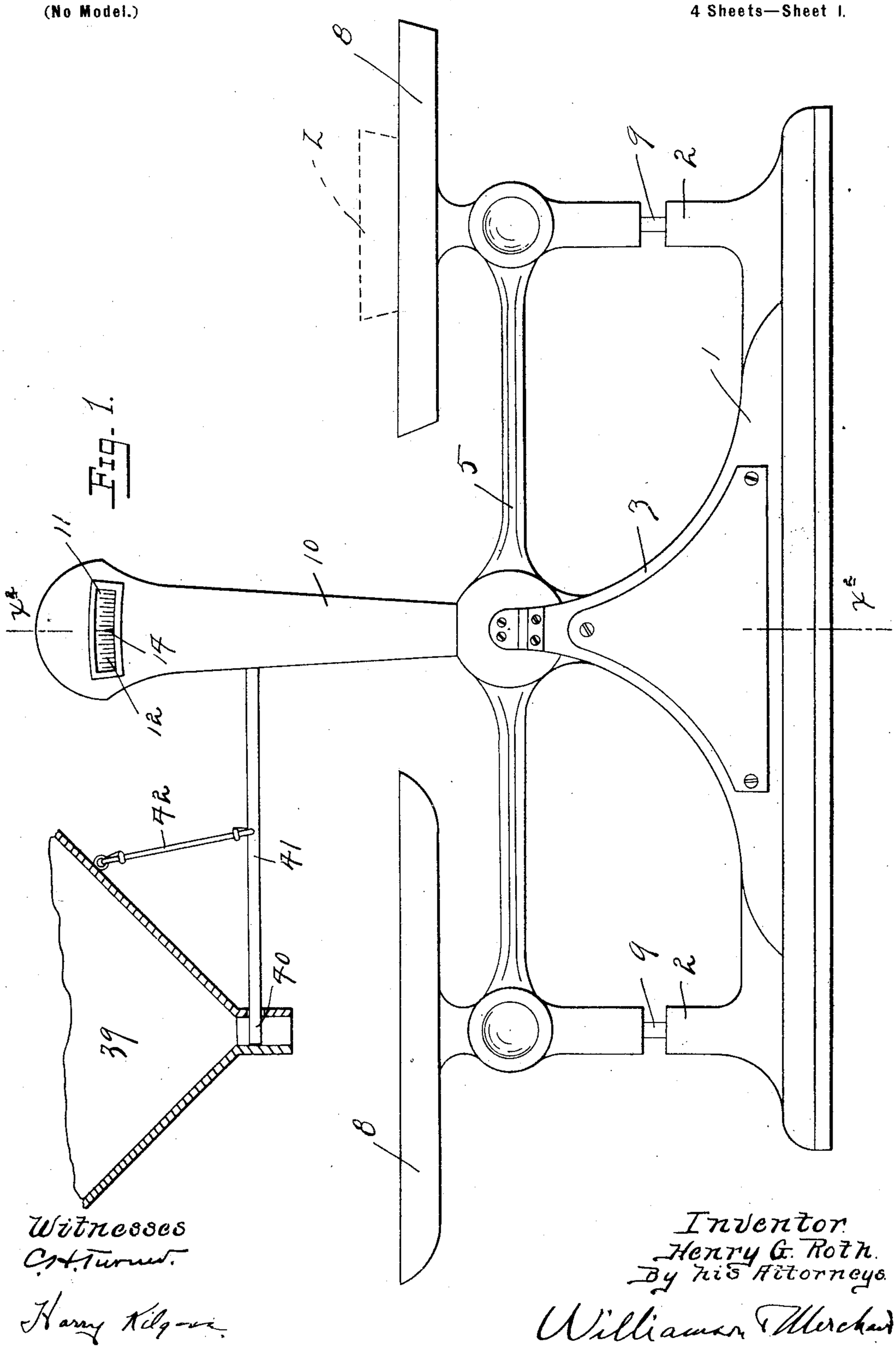

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Fig. 3.

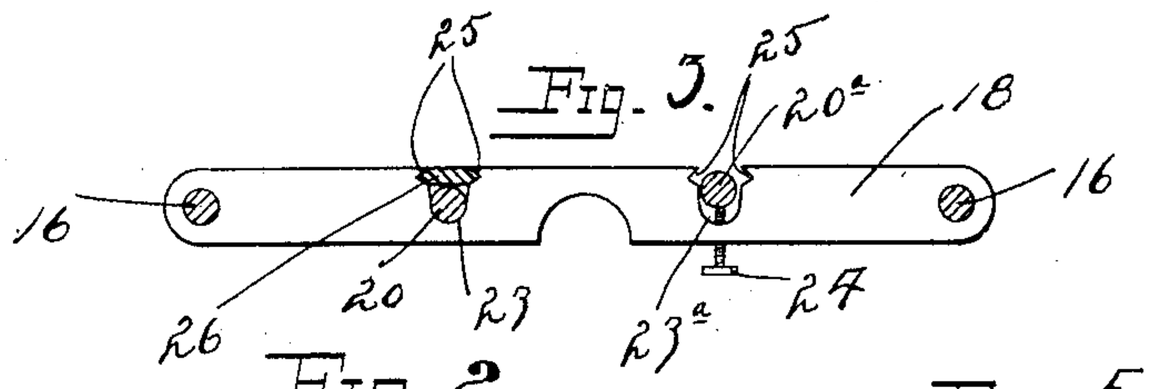

Fig. 4.

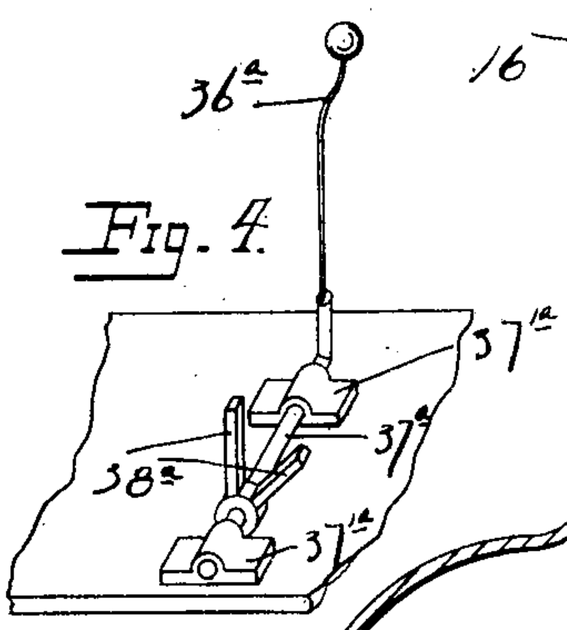

Fig. 2.

Fig. 5.

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Fig. 6.

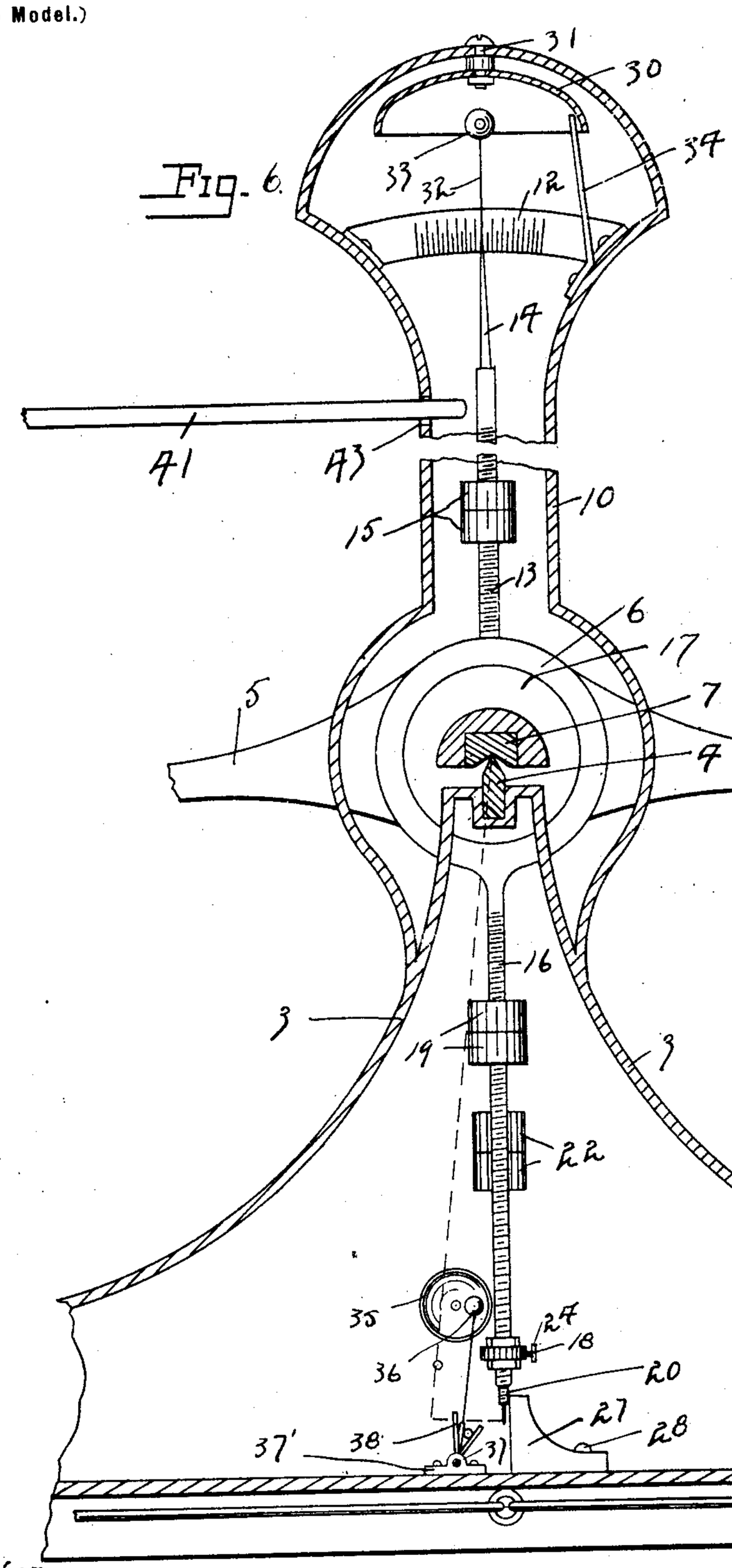

Fig. 7.

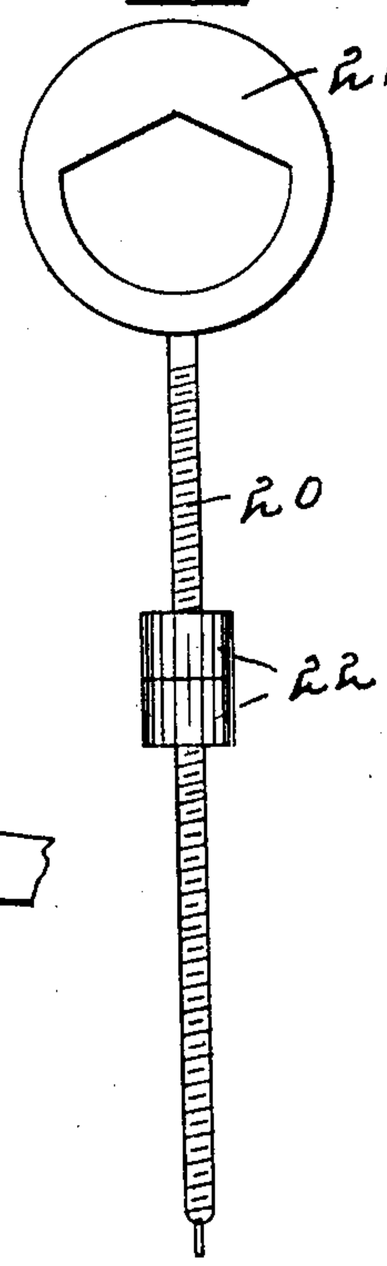

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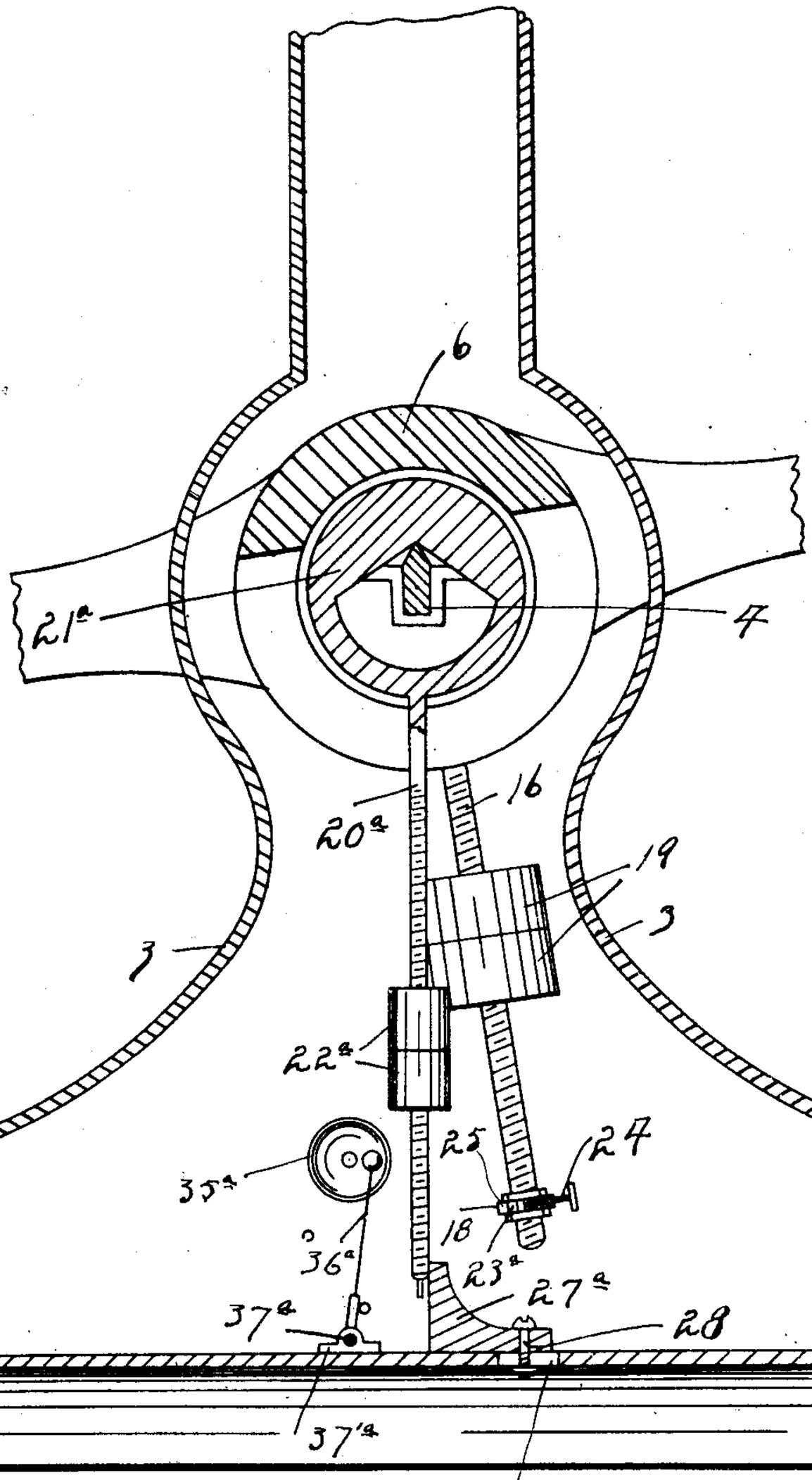
Fig. 8.



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UNITED STATES PATENT OFFICE.

HENRY G. ROTH, OF MINNEAPOLIS, MINNESOTA.

WEIGHING-SCALE.

SPECIFICATION forming part of Letters Patent No. 687,855, dated December 3, 1901.

Application filed January 28, 1901. Serial No. 45,176. (No model.)

To all whom it may concern:

Be it known that I, HENRY G. ROTH, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Weighing-Scales; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to that type of weighing-scales known as "gravity-scales," and wherein balancing-beams and counterweights are employed, in contradistinction to scales of the type usually designated as "spring-scales;" and my said invention has for its object to improve the type of scales to which it relates in the several particulars hereinafter noted in the specification and specifically pointed out in the claim.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a view in side elevation, showing the scale constructed in accordance with my invention and showing also an attachment thereto for supplying material to be weighed, the hopper of said attachment being shown in section. Fig. 2 is a transverse vertical section taken approximately on the line x^2 x^2 of Fig. 1, some parts being shown in full and others being broken away. Fig. 3 is a horizontal section on the line x^3 x^3 of Fig. 2. Fig. 4 is a detail in perspective, showing the hammer and immediately-connected parts of a gong or alarm device of novel construction. Fig. 5 is a detail in side elevation of a key for locking certain of the parts together. Fig. 6 is a vertical longitudinal section taken approximately on the line x^6 x^6 of Fig. 2, some parts being broken away. Fig. 7 is a detail in side elevation of one of the so-called "balancing-pendulums," and Fig. 8 is a vertical longitudinal section, taken approximately on the line x^8 x^8 of Fig. 2.

The numeral 1 indicates the base-casting of the scale, the same, as shown, having ordinary tubular end guides 2 and having at its central portion a transversely-extending and vertically-tapering housing 3, which serves as a support for a knife-edged fulcrum-bar 4.

The numeral 5 indicates the balancing-beam of the scale, which beam is provided at its central portion with a transversely-extended bridge 6, provided at its ends with bearing-blocks 7, (usually termed "agate" blocks or bearings,) that are mounted to work freely on the upper edge of the fulcrum-bar 4 in the ordinary manner. At its ends the balancing-beam 5 is provided with pivotally-connected trays 8, mounted in the ordinary manner, and provided with depending stems 9, which work in the guide-sleeves 2 of the base 1.

There is nothing novel in the scale construction so far described, and it may be assumed to be ordinary or standard construction, although as a matter of fact the central base-section or housing 3 is designed to permit of the application of certain of the features of my invention.

Secured to and rising from the central housing 3 is a stack or hollow tower 10, which is provided near its upper end with a segmental sight-opening 11, through which a graduated scale 12 may be seen. A vertical rod or stem 13, secured at its lower end to the central portion of the bridge 6, heretofore noted, extends vertically upward through the stack 10 and is provided with a pointer or finger 14, which works over the graduations of the scale 12. The rod 13 is preferably screw-threaded, and on the same is adjustably secured by screw-threaded engagements a pair of weights 15.

A pair of depending legs 16, the lower portions of which are, as shown, in the form of screw-threaded rods, and the upper portions of which are flattened and perforated at 17, so as to embrace and avoid contact with the fulcrum-bar 4, are rigidly secured at their upper ends to the bridge 6 of the balancing-beam 5. Also, as shown, the lower ends of these legs 16 are connected by a transverse bar 18, and each is provided with a pair of adjustable counterweights 19, having screw-threaded engagements therewith. Furthermore, in this preferred construction a pair of counterweighting-pendulums, as shown, in the form of screw-threaded rods 20 and 20^a, are independently fulcrumed by means of

perforated heads 21 and 21ª on the said fulcrum-bar 4. With this construction a pair of adjustable weights 22 has screw-threaded engagement with the rod or pendulum 20, and a similar pair of weights 22ª is likewise mounted on the rod or pendulum 20ª. The transverse connecting-bar 18 (see Fig. 3) is shown as provided with notches 23 and 23ª, in which the lower ends of the pendulums 20 and 20ª normally loosely rest. A set-screw 24, working through the bar 18, serves to vary the normal relative position of the pendulum 20ª with respect to said bar. At the outer extremities of the notches 23 and 23ª the bar 18 is formed with key-seats 25, in which keys 26 (see Fig. 5) are adapted to be dropped to lock the said pendulums 20 and 20ª with respect to said bar 18; but as this locking action is not one to be immediately considered it should at this time be passed with the simple statement made.

In the paths of the lower ends of the pendulums 20 and 20ª, respectively, are located stops 27 and 27ª. These stops are adjustably and removably secured to the bottom plate of the base-casting 1, as shown, by means of nutted bolts 28, which work through slots 29 in the said bottom plate. The adjustment of these stops will be hereinafter considered in connection with the description of the operation.

In connection with the mechanism above described I employ in this preferred arrangement several gongs or alarm devices. One of these gongs or alarm devices comprises a bell 30, secured, as shown, by a bolt 31 within and to the top of the stack or tower 10, as best shown in Fig. 6. To sound this bell 30, the pointer 14 on the upper end of the rod 13 is provided with a spring-blade or stem extension 32, to the upper end of which is secured a hammer or clapper 23. The arrangement is such that an extreme movement of the balancing-beam 5 and rod 13 will not carry the hammer 33 quite into contact with the said bell 30 unless the said movements be made under a fairly considerable speed, in which case the inertia of the said hammer will spring the stem 32 and permit the said hammer to strike and sound the bell. To prevent the hammer 33 from striking the bell when moved toward the right with respect to Fig. 6, a stop-finger 34 is secured to the stack 10 and projected into the path of the said hammer. Another gong or alarm device is actuated by the pendulum 20, and it comprises a bell 35, secured to one side of the housing 3, and a coöperating hammer or clapper 36, the stem of which projects radially upward from a small rock-shaft 37, suitably mounted in bearings 37′, secured on the bottom plate of the base-casting 1. The rock-shaft 37 extends transversely of the scale and is provided at its inner end with a pair of radial prongs 38, one or the other of which always lies in the path of the depending lower end of the pendulum 20. The hammer 36, under the rocking movements of the shaft 37, is adapted to be moved from one side to the other of a vertical line drawn through the axes of said shaft and of said bell 35. Hence the said hammer will normally stand in either extreme position into which it is thrown. The relation of the prongs 38 of the shaft 37 to the arc of movement of the depending free end of the pendulum 20 is such that when the hammer 36 is thrown to the right, with respect to Fig. 6, the left-hand prong 38 only will stand within the path of movement of the said pendulum, and, on the other hand, when the said hammer 36 is thrown to its extreme position toward the left the right-hand prong 38 only will stand in the path of movement of the said pendulum. It will of course also be understood that whenever the hammer 36 is moved past the dead-center it will fall by gravity into contact with the bell 35. The bell 35 is shown as much smaller than the bell 30, and it is intended that the tone of the same may be readily distinguished from that of the said bell 30.

The hopper attachment illustrated in Fig. 1 would be used only in cases where large quantities of such articles as tea, coffee, spices, &c., are put up in a large number of small packages, so as to justify the use of a scale continuously for that purpose. The hopper is indicated in part by the numeral 39, and the mouth of the same is adapted to be opened and closed by a cut-off gate 40 in the form of a slide which works through the depending neck portion of said hopper. The gate 40 is connected to a vibrating stem 41, which, as shown, is suspended from the hopper 39 by a flexible connection 42. The free end of the stem 41 works through a perforation 43 in one side of the stack 10 and is, in a manner hereinafter described, adapted to be struck by the rod 13 of the upper weight 15 to thereby automatically close the hopper-gate 40.

For coöperation with the pendulum 20ª the same sort of an alarm device as that provided for the pendulum 20 may be used. Such an alarm device is indicated by the characters 35ª, 36ª, 37ª, and 38ª, which parts indicate, respectively, the bell, the hammer, the rock-shaft, and the prongs, which prongs are engaged and actuated by the pendulum 20ª.

Operation: The mechanism above described is capable of being adjusted or set in a great many different ways, so as to give various actions. Some, but not all, of these possible actions will now be given. For our first illustration it will be assumed that both pendulums 20 and 20ª are loose, that the weights 15 and the weights 19 on the depending legs 16 and weights 22ª on the pendulum 20ª are brought into such relative positions that when the weighted end of the balancing-beam 5 is moved downward and the pointer 14 to the right said weights and parts which carry them will be counterpoised or equally balanced, and we will further assume that

the gravity of the pendulum 20 and its weights 22, which is effective under such movements of the scale-beam 5, act by way of overpoise (directly on the bar 18) and will be added or indicated as part of the load or material which is being weighed. Now, for a concrete example, we will assume that one pound (sixteen ounces) of coffee is to be weighed on the left-hand tray 8 as viewed in Fig. 1. Of course the first thing to be done with the type of scale illustrated is to place the one-pound weight, (indicated by the character *z*,) on the right-hand tray 8. Then, if the hopper illustrated is used, the salesman with his hand draws the stem 41 outward, and thereby opens the gate 40 and permits the coffee to run from the hopper. When the gate 40 was first opened, the legs 16 and pendulums 20 and 20ª and their weights were of course moved out of vertical or neutral positions and were forced to their limits toward the left, with respect to Figs. 1, 6, and 8. We will now further assume that in this extreme position the counterweighting-pendulums 20 and 20ª each act with the force and effect of a two-ounce weight placed on the left-hand or load-receiving tray 8; but it will be remembered that the counterweighting-pendulum 20ª acts as a part of the counterbalance to the accelerating device afforded by the rod 13 and weights 15. When fourteen ounces of coffee have been deposited as a load on the receiving-tray 8, the left-hand or load end of the balancing-beam 5 will commence to move downward, thus indicating in advance by such movement that the proper weight has been reached within two ounces. As the weight of the load is increased over fourteen ounces the load end of the beam 5 will continue to move downward, and the accelerating device, counterweights, and counterpoising-pendulum will be gradually moved toward their vertical or neutral positions, under which movement the overpoising action of the pendulum 20 is gradually decreased from the two ounces indicated to zero. Hence when the sixteen ounces are deposited on the scale the overpoising-pendulum 20 will have ceased to act on the scale-beam. The movement just described of the pendulum 20 causes its lower end to engage the right-hand arm or prong 38 of the rock-shaft 37, and thereby throws the hammer 36 to the right-hand side of its counterpoised position and sounds the bell 35, thereby notifying the salesman, as well as the customer and all other persons within hearing for that matter, that the proper weight is very closely approached. The stop 27 is so set as to prevent the pendulum 20 from swinging toward the right beyond its neutral position under the action of momentum. The stop 27ª likewise prevents the pendulum 20ª from swinging toward the right beyond its neutral position. It is evident that when the counterpoising-pendulum 20ª is thrown out of action the upper weight 15 is "let loose," so to speak, so that under its continued movement beyond its dead-center or vertical position toward the left, with respect to Fig. 6, it operates with increasing leverage and force, which accelerates the continued downward movement of the loaded end of the beam 5. This accelerated motion is important for several reasons. In the first place in the construction illustrated it insures sufficient momeutum to positively sound the bell or gong 30, and in the second place it gives additional speed and power for closing the cut-off gate 40. As it is not desirable that the bell 30 be sounded unless some material overweight of goods is given, the counterpoising-pendulum 20ª is normally set slightly away from its neutral position by the set-screw 24, so that it will not be thrown out of action on the bar 18, and consequently on the balancing-beam 5, until after the proper weight has been slightly exceeded and the accelerating device 13 15 has been thrown slightly beyond its neutral position. The prongs 38ª, from which the bell 35ª is actuated, are so set with respect to the depending end of the pendulum 20ª that the said bell will be sounded when the exact proper weight is measured on the scale. The several bells or gongs employed in this scale are shown as of different sizes, and it is intended that they should have different tones, so that the operator may readily determine whether it is an underweight, exact weight, or overweight that is indicated. The bearings 37′ are detachable, so that the shafts 37, mounted therein, together with the hammers 36 and 36ª and prongs 38 and 38ª, may be thrown out of action on their coöperating bells in cases where this is desired. When this is done, the pendulums 20 and 20ª may be locked to the bar 18 by means of the wedges 26. This being done the various counterpoising-weights 19, 22, and 22ª may be so adjusted as to counterbalance the so-called "accelerating device," in which case the scale will operate substantially as an ordinary balance-scale. In this latter case it is of course evident that the stops 27 and 27ª must be removed from working positions.

It is evident that the greater the overweight of the load or material being sold the more rapid will be the movement of the balancing-beam 5 and parts controlled thereby, and consequently the louder will be the sounds produced by the bells or alarm devices 30, 35, and 35ª. A salesman becomes so accustomed to these varying sounds produced by various overweights that he will be able to determine approximately the amount of overweight by the sound alone. However, the pointer 14, working on the scale 12, will also aid in such determinations, although, of course, it does not attract attention and requires to be closely observed.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

In a weighing-scale, the combination with a balancing-beam, of a superposed weight secured to said beam for movements therewith

above the fulcrum thereof, and a pivotally-suspended weight or pendulum operating on said beam with a force exceeding that of said superposed weight, when moved in one direction from its neutral point of suspension, and when so moved, exerting its weight to force downward the loaded end of the beam, and overpoising the force of said superposed weight, which two weights reach neutral positions, when the beam is balanced, and which superposed weight, upon further downward movement of the loaded end of the beam, adds its moment to the moment of the load and accelerates such movement of said beam.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY G. ROTH.

Witnesses:

MABEL MCGRORY,

FRANK D. MERCHANT.