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PATENTED AUG. 30, 1904.

F. W. THOMPSON.
ASSAY BALANCE.

APPLICATION FILED DEC. 26, 1903.

NO MODEL.

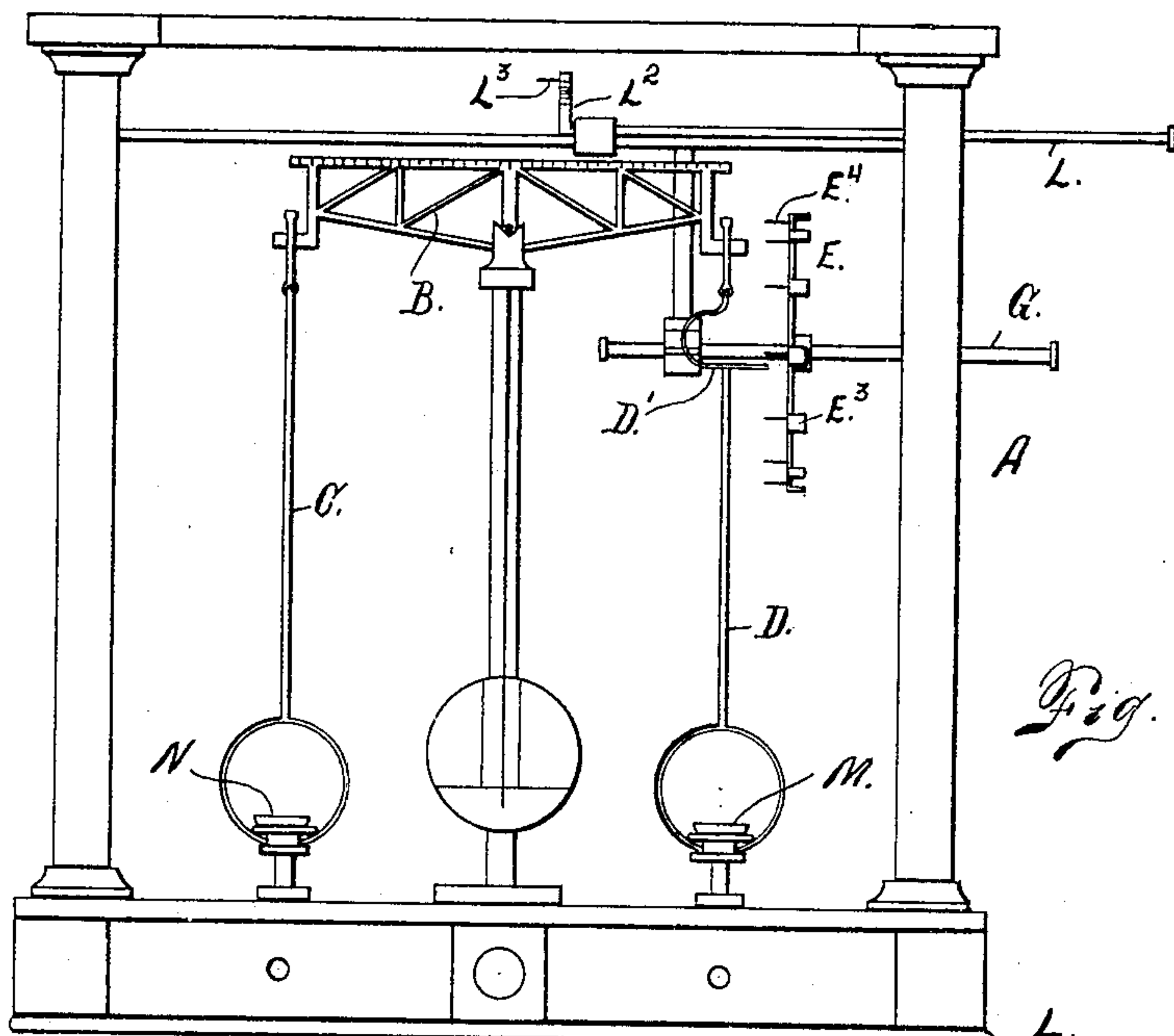


Fig. 1.

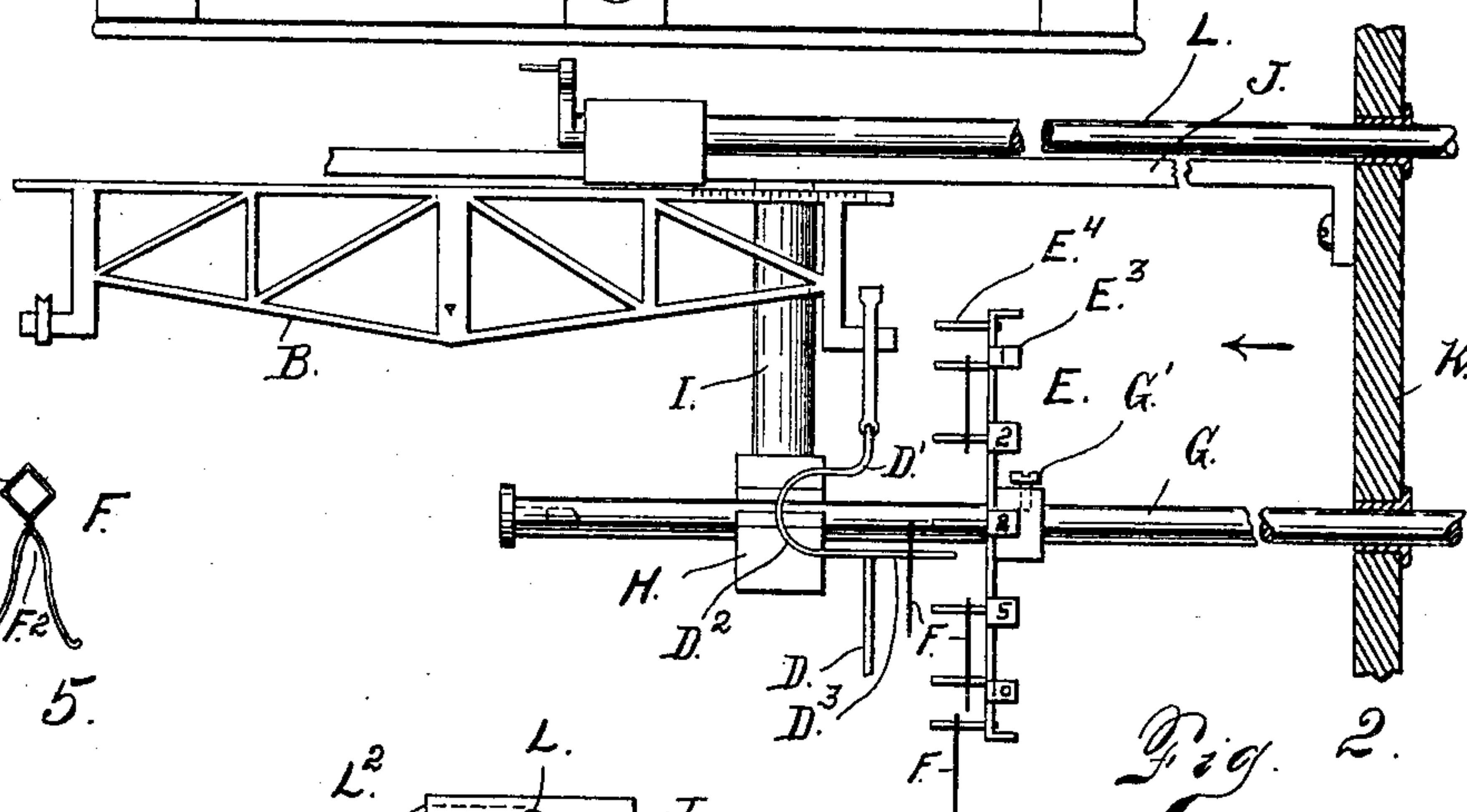


Fig. 2.

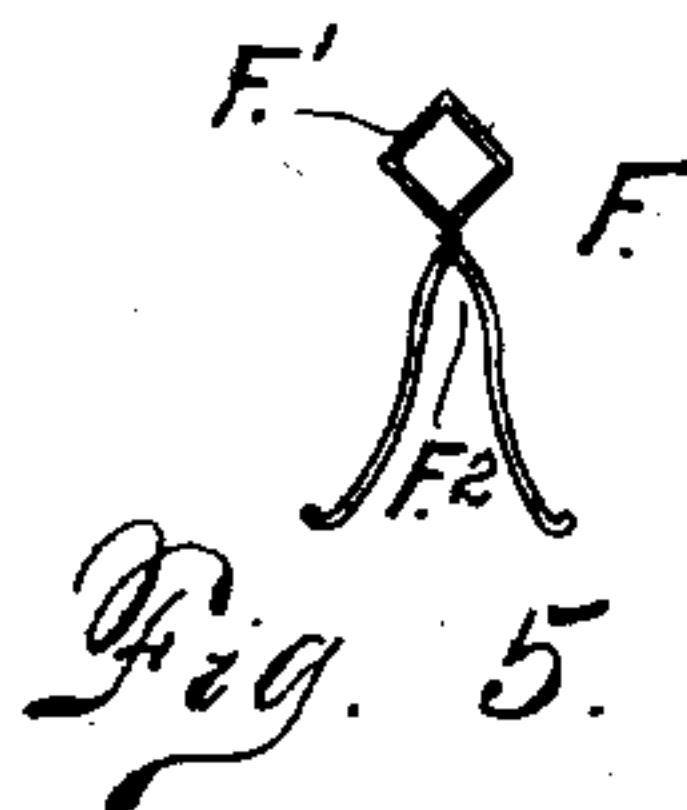


Fig. 5.

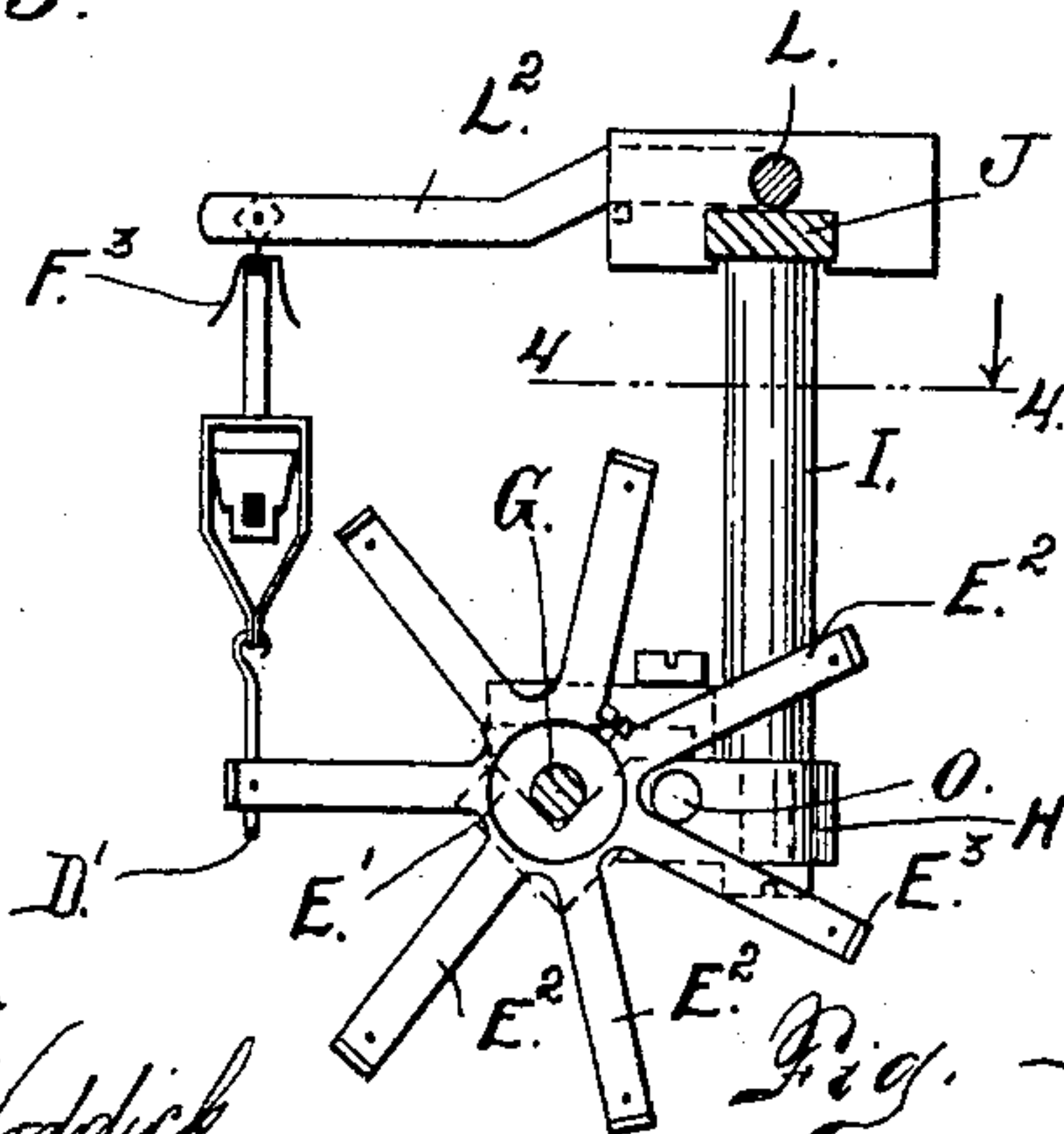


Fig. 3.

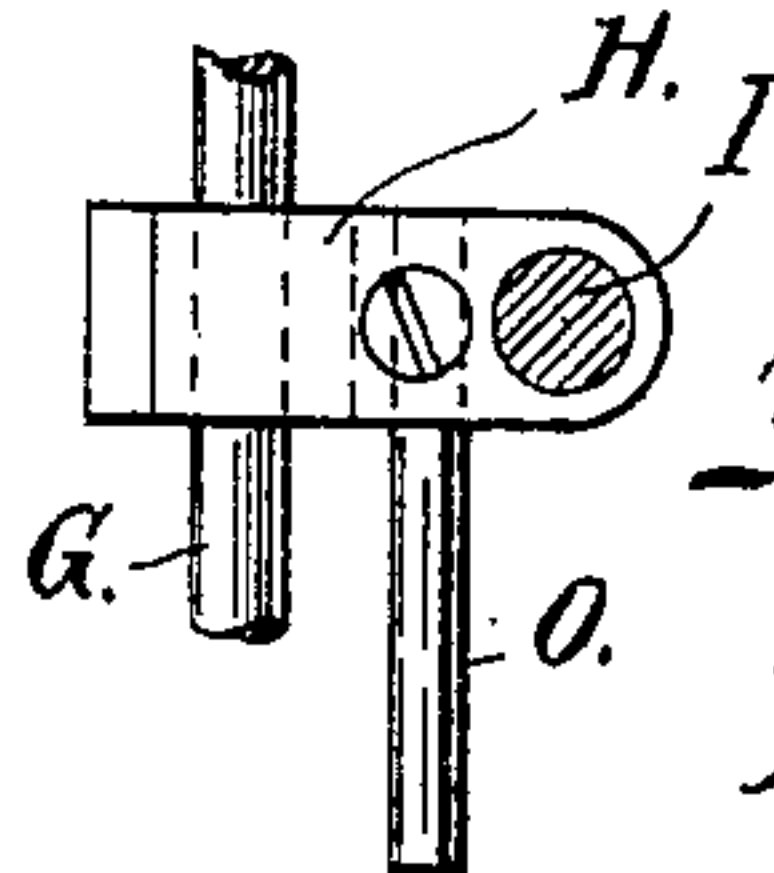


Fig. 4.

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UNITED STATES PATENT OFFICE.

FRED W. THOMPSON, OF DENVER, COLORADO.

ASSAY-BALANCE.

SPECIFICATION forming part of Letters Patent No. 768,829, dated August 30, 1904.

Application filed December 26, 1903. Serial No. 186,711. (No model.)

To all whom it may concern:

Be it known that I, FRED W. THOMPSON, a citizen of the United States of America, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Assay-Balances; and I do 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in fine balances, such as are used for assaying and analytical work.

My object is to avoid the necessity of handling very small weights, such as are ordinarily placed in the pan connected with the extremity of the beam opposite that with which the pan containing the material to be weighed is connected. As these weights are very small, great difficulty is experienced in handling them whether tweezers or the fingers of the user are directly employed.

In using fine balances the weights most generally used are a one-milligram rider for the beam and the following weights, which are placed in the pan by hand as occasion requires: one one-milligram weight, two two-milligram weights, one five-milligram weight, two ten-milligram weights, and one twenty-milligram weight. To avoid the necessity of handling these weights, I have provided a horizontal support which is a part of and fastened to the usual hanger which carries the pan on one side of the balance. Heavier weights than those mentioned above and which are not difficult to manipulate by hand are placed in the pan in the usual way.

The lighter weights mentioned above or any weights to be used in connection with the special feature of my invention are made of wire and bent in the usual or any suitable form. These are known as "riders," the different riders having different bends or shapes to distinguish them from the others. In my invention a rider-carrier mounted on a spindle, the latter having both a rotary and longitudinal movement, is employed. This rider-

carrier is provided with radial arms, each of which contains a pin adapted to hold one rider. Each pin is intended to contain one rider, and the radial arm is provided with an angular piece upon which the gravity of the riders on the pin of that arm is indicated. This rider-carrier is arranged in suitable proximity to the horizontal part connected with the hanger of one side of the balance, whereby through the instrumentality of the rider-carrier riders may be placed upon the said horizontal part of the hanger or removed therefrom at the will of the operator without touching the riders and through the simple manipulation of the spindle, whose outer extremity protrudes through the side of the case of the balance. This permits the rapid and convenient manipulation of the riders without opening the case of the balance.

Having briefly outlined my improved construction, as well as the function it is intended to perform, I will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a front view of the ordinary assay-balance equipped with my improvements. Fig. 2 is a fragmentary view of a balance, showing my improvements. In this view the scale is considerably larger than in Fig. 1. Fig. 3 is an end view of Fig. 2 looking in the direction of the arrow, the spindles being shown in cross-section. Fig. 4 is a section taken on the line 4 4, Fig. 3, looking downwardly, the spindle upon which the rider is carried being broken away. Fig. 5 is a detail view of a rider F shown upon a larger scale than in the other views.

The same reference characters indicate the same parts in all the views.

Let A designate the case and general framework of an ordinary assay-balance which is provided with the usual balance-beam B. The hanger C on one side is of ordinary construction, and the hanger D on the opposite side is provided intermediate its extremities with a hook-shaped part D', which is bent to the left of the line of the hanger, as shown at D², while it has a free extremity extending to the right of the line of the hanger, as

shown in D^3 . This free extremity of the hook-shaped part occupies a horizontal position both at the right and left of the vertical hanger part D, and it is upon this horizontal part that the small riders are placed and from which they are removed through the instrumentality of the rider-carrier E. This rider-carrier E consists of a hub E^1 , provided with a number of radial arms E^2 . The outer extremities of these arms, which are flat, are bent outwardly or toward the right, referring to Fig. 2, forming small plates E^3 . Each radial arm near its outer extremity is provided with a pin E^4 , extending at right angles to the arm and projecting in a direction therefrom opposite the projection of the parts E^3 . Upon these small pins E^4 are placed the riders F, which are preferably of the construction shown in Fig. 5, being composed of wire and provided with an outer part F^1 , through which the pins E^4 of the carrier pass, and the crotch part F^2 , which rests upon the horizontal part D^3 of the hanger D. The weight of the rider upon any pin E^4 is indicated by marking the same upon the small plate E^3 of the rider-arm with which the corresponding pin E^4 is connected. The rider-carrier E is mounted upon a spindle G by means of a set-screw G^1 , which passes through the hub of the carrier to engagement with the spindle. This spindle G is supported in a bearing H, mounted on the lower extremity of a depending part I, whose upper extremity is secured to a top bar J, mounted on the frame of the balance. The spindle G has a further bearing in the wall K of the case. (See Fig. 2.) The spindle G is both revoluble and longitudinally movable in both of its bearings. Its outer extremity projects beyond the wall of the casing, as best shown in Fig. 1 of the drawings, whereby it is accessible to the user without opening the case.

The riders which by means of my improvements I substitute for weights are of slightly different construction from that employed in connection with the balance-beam B. The balance-beam rider is shouldered to fit the beam or to conform to the shape of the edge of the beam upon which it rests, while the riders employed in connection with my improved features are crotched, as shown in Fig. 5, since the parts engaged by these riders are very small. One of the balance-beam riders is shown in Fig. 3 of the drawings and designated F^3 . The riders of different weight should vary somewhat in design to enable those accustomed to their use to distinguish between them at a glance. The rider on the balance-beam B is manipulated by means of a rod or spindle L, slidably and revolubly movable in the upper part of the case. This feature, however, is of ordinary construction and has nothing to do with my present invention. Upon this rod L is mounted an arm L^2 , provided with a pin L^3 for use in changing the position of the rider upon the balance-bar.

The pans connected with the different hangers are designated by the reference characters M and N. The pan N is the one in which the material to be weighed is placed, while the pan M is the one in which weights are ordinarily placed in the usual construction of balance, but in which only weights of larger size are placed in balances equipped with my improvements, since all the smaller-sized weights are done away with by the substitution of the riders F, as heretofore explained.

From the foregoing description it is believed that my improvements will be readily understood. I will assume that the arms E^4 of the rider-carrier E contain a number of riders of various weights, the gravity of the riders being indicated on the parts E^3 , as heretofore explained. It will be readily understood that by the proper manipulation of the spindle G one or more of these riders may be readily placed upon the part D^3 of the hanger, according to the requirements of any particular case. It will also be readily understood that the riders may be easily taken from the part D^3 of the hanger by means of the rider-carrier. In other words, the riders may be readily placed upon the rider-holder D^3 or removed therefrom by the rider-carrier, as circumstances may require. In order to prevent the rider-arms from striking the part D^3 and injuring it, a stop-pin O is mounted upon the bearing H and which passes between the radial arms E^2 of the rider-carrier when the latter is in position for use. There is sufficient space between the radial arms of the carrier to allow the carrier sufficient rotary movement to place the riders upon the part D^3 or remove them therefrom, but at the same time preventing a degree of rotation of the rider-carrier sufficient to strike the part D^3 . It will be understood that in the manipulation of the riders it may be necessary to move the carrier far enough toward the left, referring to Figs. 1 and 2, to cause the part D^3 of the hanger to project between the radial arms E^2 of the rider-carrier. In this event it will be readily understood that if it were not for the stop O the part D^3 might be injured if the operator should turn the rider-carrier too far at any time. The stop-pin O obviates the necessity of exercising any special care in this regard.

In Fig. 2 the numerals on the extremities E^3 of the radial arms designate milligrams and indicate that the riders of the pins connected with the respective arms are of a gravity in milligrams equal to that indicated by the said numerals.

Attention is called to the fact that by reason of the longitudinal movement of the spindle G, carrying the rider-carrier E, the said carrier may be moved outwardly away from the stop-pin O to permit rotary movement of the carrier, whereby any one of the arms E^2 may be brought into the proper relative posi-

tion with reference to the part D³ of the hanger to remove a hanger from the said part D³ or place one thereon, as may be desired.

Having thus described my invention, what I claim is—

1. In a balance of the class described, the combination with the balance-beam, of a hanger connected therewith and provided with a horizontal part adapted to hold riders used as weights, and a rider-carrier mounted in suitable proximity to the said horizontal part, the said carrier being provided with rider-holding pins and being revoluble and longitudinally movable for the purpose set forth.

2. The combination with the balance-beam, of a hanger connected with one arm thereof and fashioned intermediate its extremities to hold riders used as weights, and a multiple rider-carrier mounted to rotate and coöperating with the said rider-holding part of the hanger.

3. The combination with the balance-beam and hangers, of a rider-carrier revolubly mounted and provided with a number of pins adapted to hold riders, the said rider-carrier being mounted in suitable proximity to one hanger of the balance, the latter being equipped to hold riders, and coöperating with the rider-carrier for the purpose set forth.

4. A balance of the class described, provided with a rider-carrier mounted to have both a revoluble movement and a movement in the direction of its axis, the said rider-carrier being provided with radial arms whose outer extremities are bent at right angles to the arms, each arm being provided with a pin also projecting at right angles to the arms and in a direction opposite from the bent outer extremities of the said radial arms.

5. The combination with the balance-beam, of a spindle mounted to have both a revoluble and longitudinal movement, a rider-carrier mounted on the spindle and consisting of radial arms carrying rider-holding pins, a hanger connected with one arm of the balance-beam and provided with a bend intermediate its extremities, the said bent portion being located to coöperate with the rider-carrier whereby

riders may be placed upon the hanger and removed therefrom in the manner described. 50

6. A balance provided with a hanger fashioned intermediate its extremities to hold weight-riders, and a multiple-rider carrier mounted to rotate and coöperate with the rider-holding part of the hanger. 55

7. A balance provided with a hanger fashioned intermediate its extremities to hold weight-riders, and a multiple-rider carrier mounted to revolve and also to move in the direction of its axis. 60

8. A balance provided with a revoluble rider-carrier having radial arms, the said carrier being also movable in the direction of its axis, in combination with a hanger having a horizontal rider-holder coöperating with the rider-carrier, and a stop to limit the revoluble movement of the rider-carrier in both directions. 65

9. A balance provided with a revoluble rider-carrier having radial arms, and a stop projecting between the arms, the space between the arms being somewhat greater in thickness than the stop, the rider-carrier being longitudinally movable to allow its arms to clear the stop for purposes of rotary adjustment. 75

10. A balance provided with a hanger having a multiple-rider-holding part, and a multiple-rider carrier mounted to coöperate with said rider-holding part of the hanger and bodily movable toward and away from said part. 80

11. A balance provided with a hanger having a horizontal part projecting laterally from the body of the hanger and adapted to hold a plurality of weight-riders in combination with a multiple-rider carrier mounted to move bodily toward and away from said rider-holding part of the hanger. 85

In testimony whereof I affix my signature in presence of two witnesses. 90

FRED W. THOMPSON.

Witnesses:

DENA NELSON,
A. J. O'BRIEN.