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J. P. BALDWIN.

AUTOMATIC WEIGHING APPARATUS FOR LIQUIDS.

No. 479,694. Patented July 26, 1892.

Fig. 1.

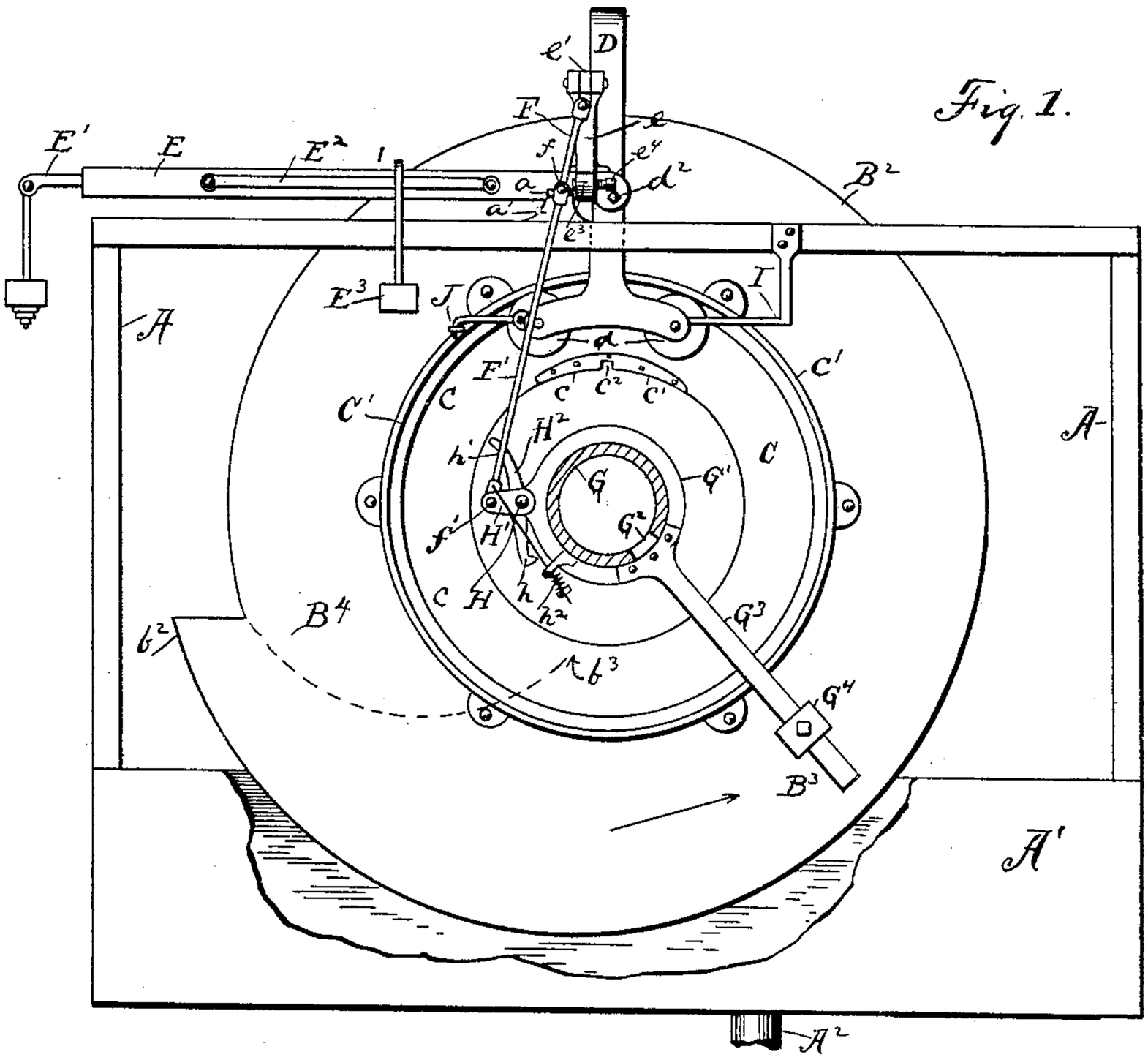
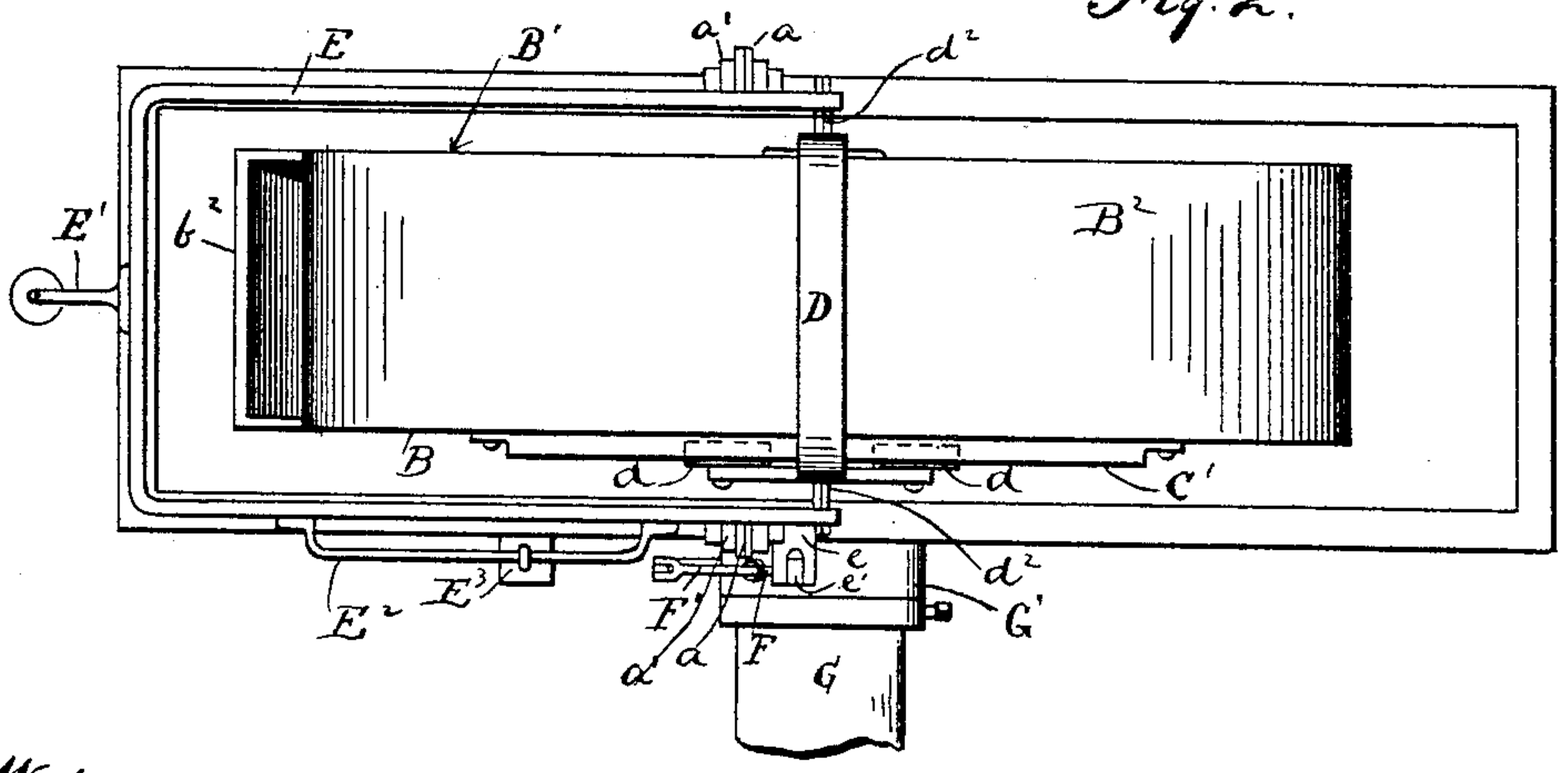


Fig. 2.



Witnesses.

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Fig. 3.

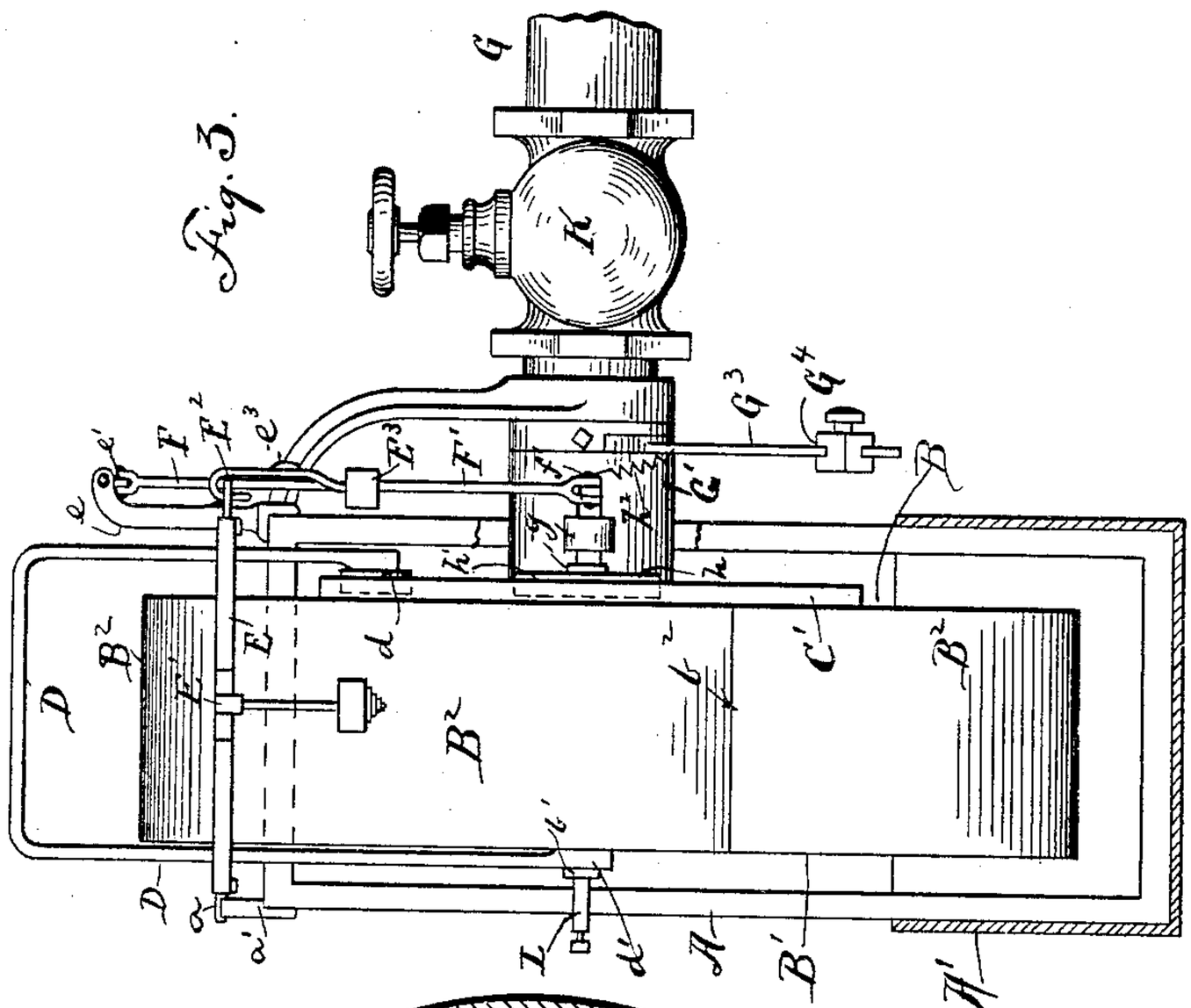
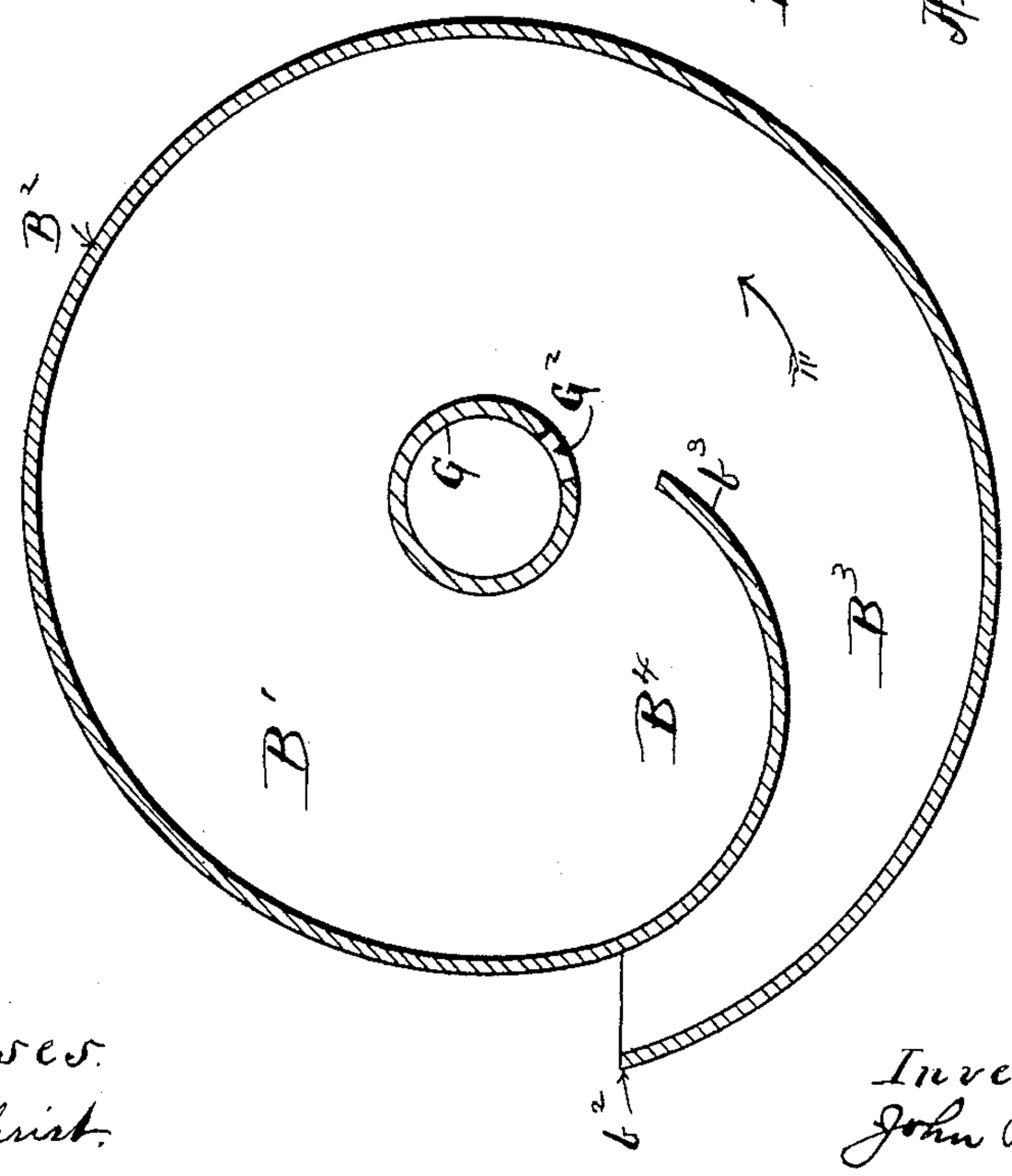


Fig. 4.



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AUTOMATIC WEIGHING APPARATUS FOR LIQUIDS.

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Fig. 6.

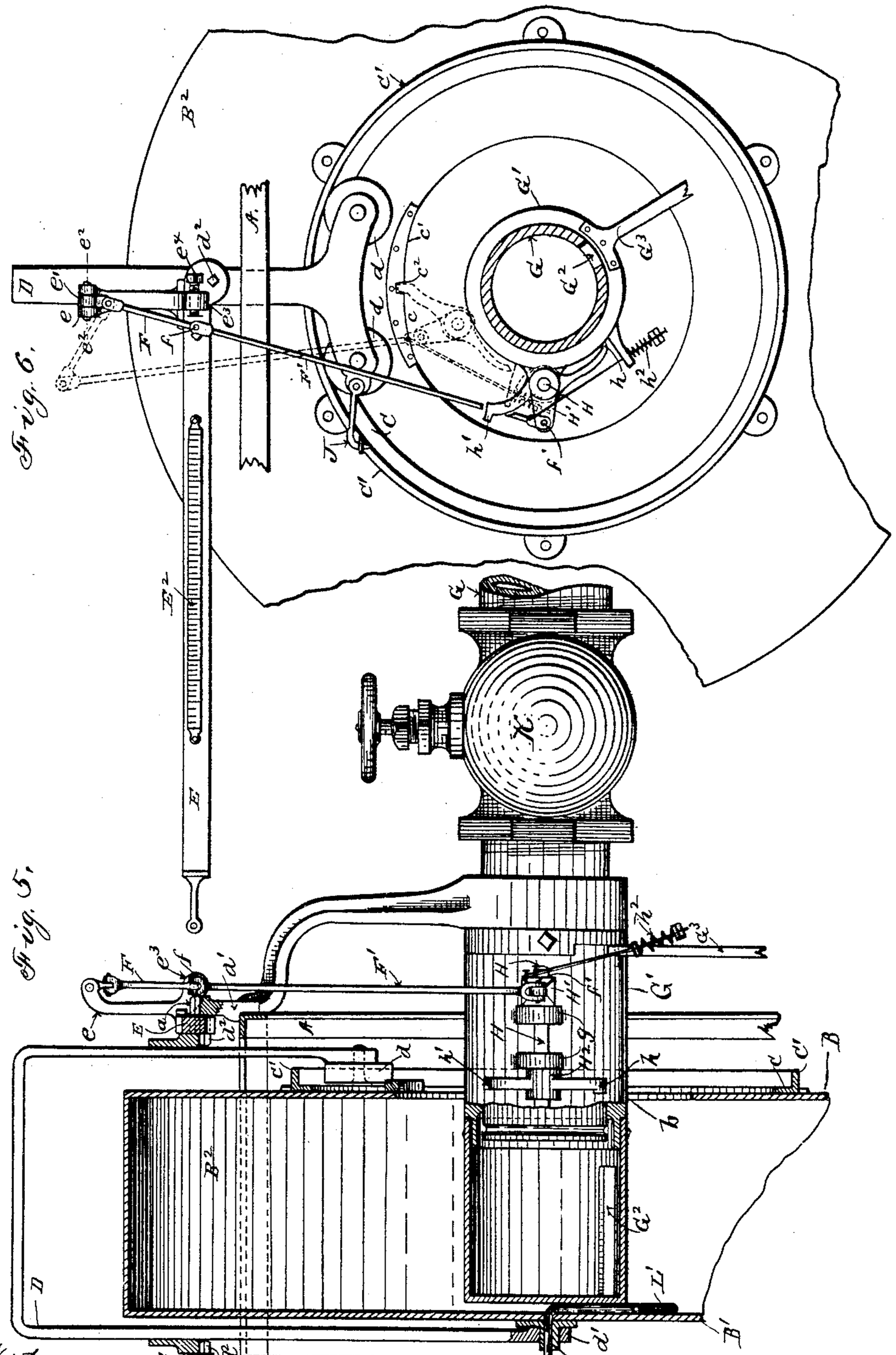

Fig. 5.

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AUTOMATIC WEIGHING APPARATUS FOR LIQUIDS.

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Fig. 9.

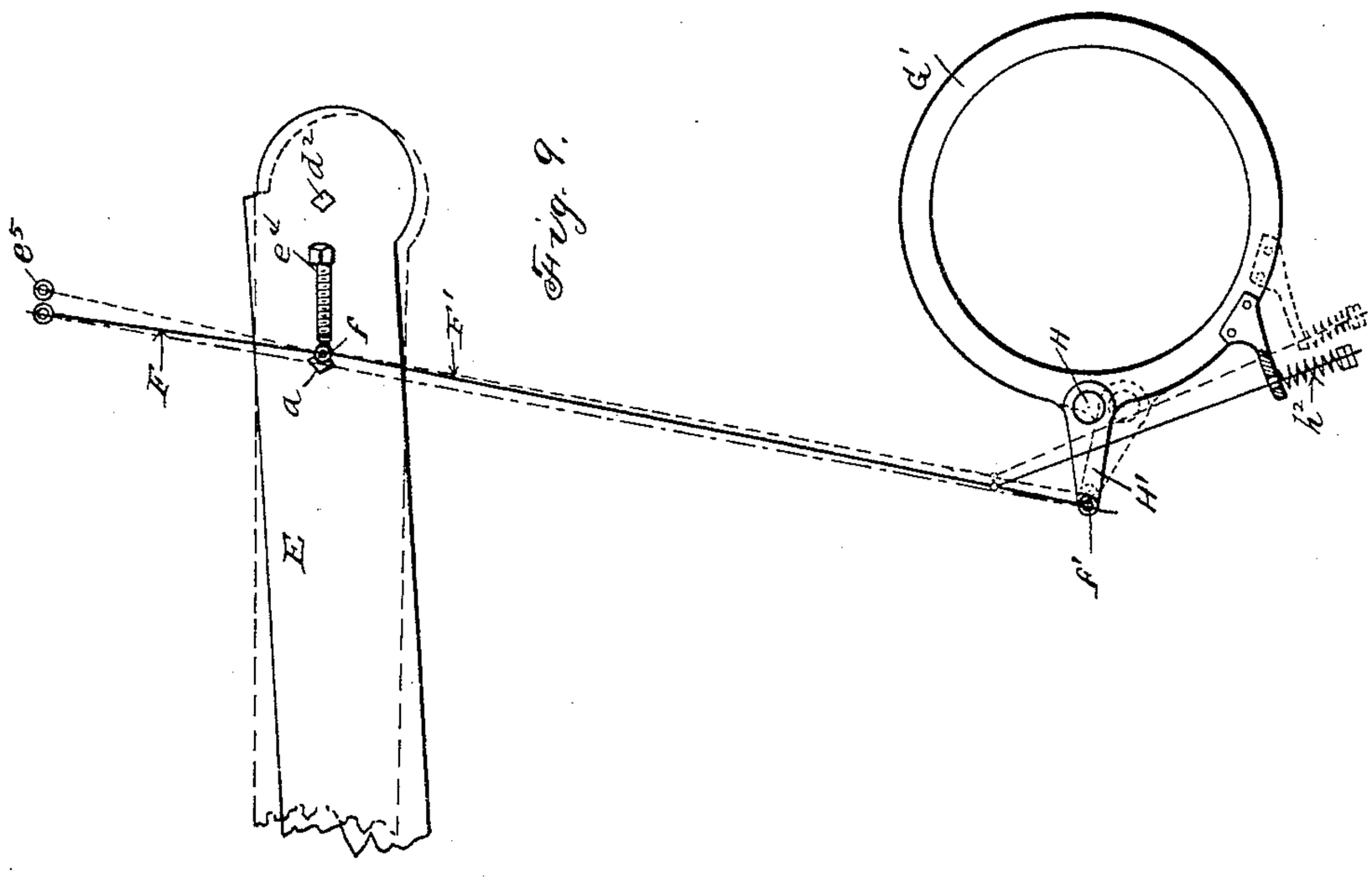


Fig. 7.

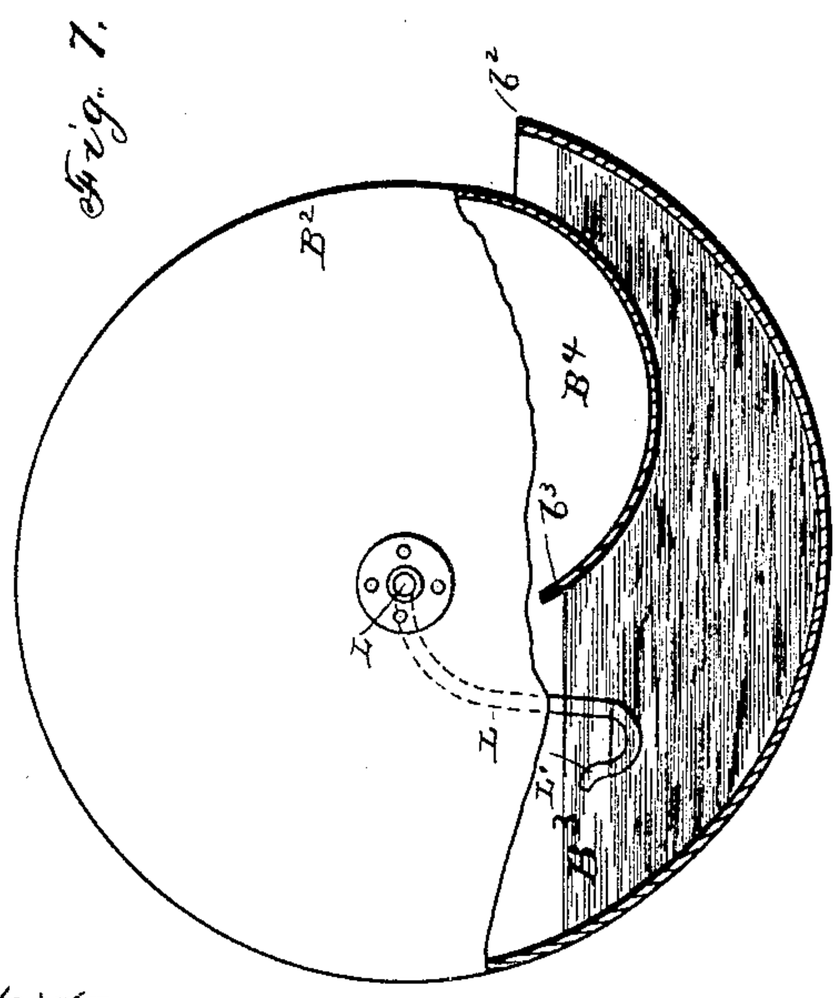
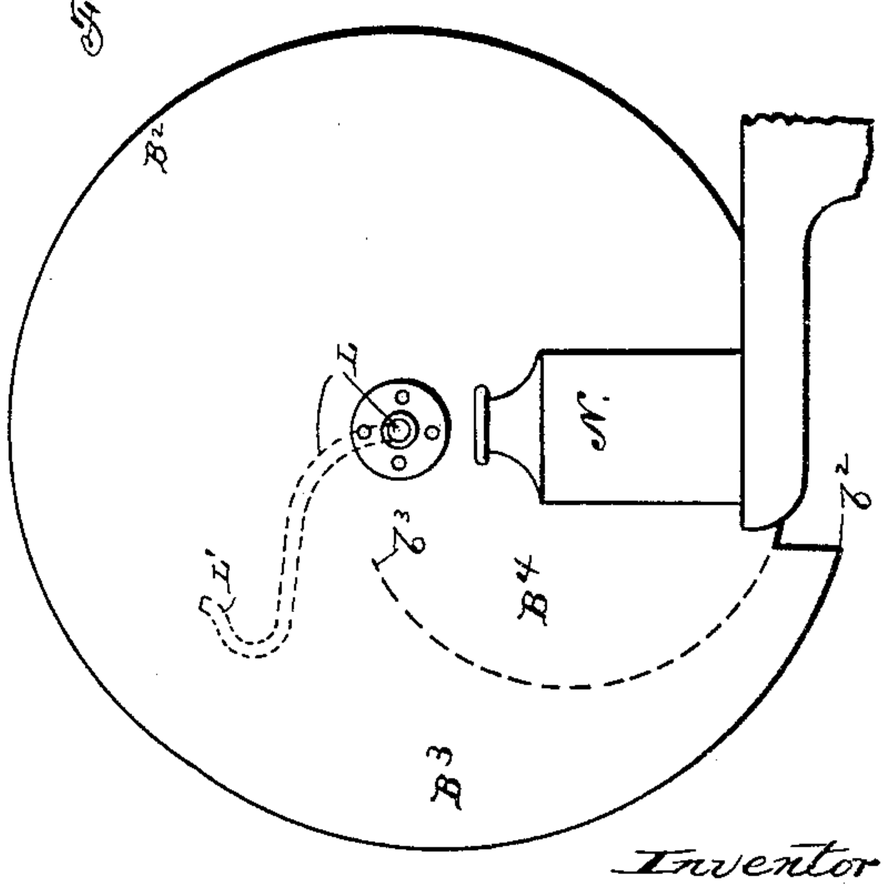


Fig. 8.



Witnesses
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Ward Hoover.

Inventor
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UNITED STATES PATENT OFFICE.

JOHN PAUL BALDWIN, OF NEW ORLEANS, LOUISIANA.

AUTOMATIC WEIGHING APPARATUS FOR LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 479,694, dated July 26, 1892.

Application filed September 3, 1890. Renewed May 19, 1892. Serial No. 433,535. (No model.)

To all whom it may concern:

Be it known that I, JOHN PAUL BALDWIN, of New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Automatic Weighing Apparatus; 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 pertains to make and use the same.

My invention relates to improvements in automatic weighing apparatus, the object being to weigh while in transit liquids, semi-liquids, or any material that will flow—as, for instance, any of the cereals.

With this object in view, my invention consists in certain features of construction and in combination of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of my improved device with the valve K removed. Fig. 2 is a plan. Fig. 3 is a front elevation. Fig. 4 is a central vertical section of the container. Fig. 5 is a central longitudinal section in detail, enlarged, with portions broken away. Fig. 6 is a front elevation in detail exhibiting the automatic mechanism in full and also in dotted lines with portions broken away. Figs. 7 and 8 are rear elevations of the container or drum in extreme positions of revolution, displaying the sampling mechanism L. Fig. 9 is a diagrammatic view with the mechanism in varied positions.

A supporting-frame A is preferably constructed of angle-iron, the lower section of the frame being inclosed, preferably, by metal plates, so as to constitute a pan or tank A′, the latter having a suitable discharging-pipe A^2. A weighing-container of the volute or scroll shaped variety is provided, this container comprising in the main front and rear heads B B′ and a circumferential metal sheet B^2 connecting the two heads, the two ends of this sheet overlapping each other some distance, the outer and inner ends of this sheet being shown at b^2 and b^3. (See Figs. 1 and 4.) The front head B has a central opening b of considerable size for receiving without contact the induction-pipe G and attachments. The rear head B′ is provided with a hollow axial trunnion b'. Head B is provided with an external flat ring or circular plate C, the latter having a forwardly-projecting annular peripheral flange C′. This flange is concentric with the axis of the container and is adapted to bear and travel on rollers d d, by means of which the front end of the container is supported. The internal edge of ring C has inclines c c' leading to and from notch c^2, and, except the notch and a projection, hereinafter mentioned, and inclines, this inner edge of ring C is concentric with the axis of the container.

D is a yoke standing in the upright position shown, the forward leg of the yoke bearing rollers d d aforesaid and the rear leg of the yoke being provided with a box d', that serves as a journal-bearing for the hollow trunnion b' aforesaid. It will be seen, therefore, that this yoke supports the weighing-container, and the yoke in turn is pivotally mounted at d^2 d^2 on the forked scale-beam E. The prongs of the scale-beam are fulcrumed at a a on the standards a' a', the latter being mounted on the supporting-frame in the position shown. The pivotal bearings at a a and d^2 d^2 aforesaid are usually provided with so-called "knife-edges."

At E′ is shown a suitable device connected with the scale-beam for attaching a weight of, say, twenty-five pounds (more or less) to balance the liquid in the container that is to be discharged at the next complete revolution of the container. There is also provided a secondary scale-beam E^2, the same being attached to the primary scale-beam, the secondary scale-beam being provided with a movable poise E^3 for balancing such of the liquid as has not been discharged from the container with the previous revolution of the latter. The secondary scale-beam and poise is to test the accuracy of the weighing from time to time. On the forward prong or arm of the scale-beam, and located directly over the adjacent fulcrum a thereof, is mounted an upwardly-projecting arm e, the free end of this arm being forked and overhanging the scale-beam on the forward side thereof, and to and between these prongs is pivoted a block e', the axis of this pivot being on line e^2 e^2, and to this block is pivoted the upper toggle-arm F,

this pivotal axis being at right angles to axis e^2 e^2 aforesaid, whereby is had a universal joint; but block e' is not supposed to turn on axis e^2 e^2, except to accommodate itself to the line of the toggle-arms F F′ to avoid the possibility of these toggle-arms being cramped. The toggle-arms are pivotally connected at f, and opposite this joint is located toe e^3, projecting from arm e, this toe bearing a set-screw e^4, adapted to engage the toggle when the scale-beam is in its normal or horizontal position and with the toggle-arm to the right and slightly beyond a straight line from e to f' (see Fig. 9) and joint f in approximately the axis of the scale-beam.

G is the induction feed-pipe for conveying the liquid to the weighing-container, this pipe extending centrally through opening b of the forward head B. On the inner section of pipe G is mounted a sleeve G′, adapted to rotate easily on the pipe. This sleeve overhangs the inner or discharging end of the pipe and the inner end of the sleeve is closed. The overhanging section of the sleeve has a side opening or discharging-spout G^2. (See Figs. 4, 5, and 6.) With the weighing-container in the position shown in Fig. 1 and with spout G^2 turned toward the right hand the discharge will be into section B^3 of the container. When enough liquid is thus discharged into the container to elevate the scale-beam, the sleeve is then automatically turned on the axis, so that spout G^2 discharges into section B^4 of the container. The liquid in this latter section is entirely to the one side of the center of gravity of the container, and hence the liquid in this section will tend to rotate the container in the direction that will empty the contents of section B^3 into the tank A′. Meantime, with such revolution of the container, the liquid in section B^4 will run into section B^3. For automatically shifting the sleeve and spout through the medium of the toggle-arms F F′ aforesaid means are provided as follows:

G^3 is a vibrating or pendulum lever depending from the forward end of sleeve G′, this lever and spout G^2 being located on the same side of the sleeve, this lever being provided with a weight G^4, that is adjustable lengthwise the lever. When the sleeve is turned so that spout G^2 discharges into section B^3 of the container, the lever and weight G^3 G^4 will have been turned to the right hand and their center of gravity raised from such position. If the parts were free, the lever and weight would by gravity and momentum swing so far toward the left hand that spout G^2 would discharge into section B^4 of the container. Sleeve G′ is provided with ears or lugs g, (shown on the left-hand side of the sleeve,) these lugs being pierced to receive a small shaft H, this shaft being parallel with the axis of the sleeve. The forward end of the shaft H is provided with a rock-arm H′, to which latter the lower end of toggle-arm F′ is pivoted, the pivotal pin f' extending through a ball, (not shown,) the latter having a corresponding seat in the rock-arm. This ball-and-socket joint prevents the possibility of cramping the toggle-arm in case the parts were not in perfect alignment, it being desirable to have the toggles operate as nearly frictionless as possible. The opposite end of rock-shaft H is provided with a cross-bar H^2, rigidly attached thereto, the lower end h of this bar turning inward, (see Figs. 1 and 6,) so as to engage the sleeve when arm H′ is approximately in a horizontal position, member h therefore serving as a stop to limit the depression of rock-arm H′. The upper end h' of the cross-bar is adapted to engage, successively, inclines c c' and to enter notch c^2 under certain conditions hereinafter mentioned. A spring h^2, preferably spiral, connects with the sleeve and with, for instance, toggle-arm F′, as shown. The tension of this spring is for holding the toggle-arm firmly against set-screw e^4 at certain stages of operation, and also to turn the rock-arms and shaft in the direction to throw member h' outward or toward the adjacent edge of ring C. A steady-rod I (see Fig. 1) is pivoted to yoke D and to the supporting-frame to hold the yoke in approximately a vertical plane; also, a hook J is provided to hold the container from turning when it is necessary to test the accuracy of the machine until such time as the hook is unfastened by hand. This hook, however, is used exclusively for testing purposes, as the machine is automatic.

In operating the device with the parts in the position shown in Fig. 1, the scale-beam having been balanced, the twenty-five-pound weight attached, and the poise on the secondary-beam placed at zero, valve K of the induction-pipe is opened, whereupon the liquid discharges into section B^3 of the container. When a sufficient quantity of liquid for one weighing has accumulated in the container, the outer end of the scale-beam is tilted upward. This movement of the scale-beam carries the upper end of arm e toward the right hand relative to Fig. 1, as shown at point e^5, Fig. 9, thereby tripping the toggle—that is to say, permitting the pendulum to deflect the toggle-arms to approximately the position shown. The tripping of the toggle releases the sleeve, lever G^3, and weight G^4, and the lever and weight by gravity, and then by momentum swing toward the left hand, so as to revolve the sleeve, whereupon member h' by the recoil of spring h^2 engages notch c^2, and thereby locks the sleeve, lever, and weight in position at the left hand, the toggle meantime by the rotation of the sleeve having assumed approximately the position shown in dotted lines, Fig. 6, and in the meantime the turning of the sleeve will have directed the spout toward section B^4 of the container, and consequently this section will have received a considerable quantity of liquid, and the

liquid in this section being to the one side of the center of gravity of the container, as is also weight G^4 in its position at the left hand. Hence both these forces tend to rotate the container in the direction of the arrow, whereupon the container commences to revolve slowly, and as soon as the contents of section B^3 discharge into tank A′ the scale-beam will return to its horizontal or normal position, thereby returning arm *e* to its upright position. Sleeve G′ being locked to the container by means of member *h′* (see Fig. 6, dotted line) engaging notch c^2, the sleeve of course rotates with the container, thereby swinging lever G^3 toward the right hand, and the turning downward of the side of the sleeve-bearing shaft H tends to straighten the toggle-arms. When the lever G^3 has been returned to its starting-place and the toggle-arms have approximated a straight line, they prevent further downward movement of the end of rock-shaft attached by pin *f′* to these toggle-arms. After this a slight further rotative movement of the sleeve would cause the toggle to draw upward on rock-arm H′, (see Fig. 9,) and this would rock shaft H in the direction to withdraw member *h′* from notch c^2, and this would release the sleeve mechanism from the container aforesaid. At the same time the sleeve G′, with one end of the spring h^2, moves relatively away from the other end of spring attached to the toggle and causes sufficient tension to hold the toggle-arms against the set-screw e^4. As soon as member *h′* is drawn out of notch c^2 sufficiently to pass the sleeve the pendulum or lever G^3 is resisted in its movements by the toggle and can only return slowly to its normal position after the incline *c′* has moved out of its way, and the toggles, being a trifle beyond a straight line against set-screw e^4, would prevent a retrograde movement of the sleeve. Meantime the spring h^2 has been restored to its normal position and ceases to exert any stress that would prevent subsequent tripping of the toggle. Hence lever G^3 and weight G^4 would be held at their place of beginning at their right hand. The center of gravity of the liquid in compartment B^3 is directly below the axis of the container. Additional to this tendency of the container to rest in stable equilibrium a small projection on the annular ring strikes the right-hand roller *d* and stops the rotation of the container. When liquid is diverted into B^4, the left-hand wheel supports the greater part of the weight of the container and the annular ring and its projection are easily raised over the right-hand roller. As the drum or container rolls, the projection does not strike the left-hand roller *d* for the reason that this roller tracks on a different part of the annular ring. Weight G^4 may be adjusted lengthwise of its lever, so that the lever in its capacity of a pendulum may turn toward the left hand quicker or more slowly, and thereby deliver more or less liquid into section B^3 of the container. I may remark that the toggle-arms and connected mechanism may be quite light, as they have little labor to perform, and that the upward pressure or stress is exerted approximately against the axis of the scale-beam.

The object of the pendulum of lever G^3 is not to rotate the container just a revolution, as this is accomplished by the contents of the container unwinding from the same, but to divert the liquid from B^3 to B^4, so as to leave the proper weight in B^3—in other words, to make the last weighing accurate.

L is a bent tube approximately of the form shown in Figs. 7 and 8, the bent section L′ thereof being so located in section B^3 of the container as to be filled with liquid in filling this section of the container. This tube extends out through the center of the hollow trunnion and with each rotation of the container the contents of the tube are discharged into a sample bottle N. With such construction for each batch of liquid weighed and discharged from the container samples of uniform quantity may be automatically secured.

A revolution counter may be attached to the machine, if desired, to number and register the revolutions made by the drum or container.

What I claim is—

1. In automatic weighing apparatus, the combination, with a rotatable container of the volute or scroll shape variety suspended from a weigh-beam, of an induction-pipe and a sleeve journaled thereon, the latter having a side discharge and adapted to discharge into different sections of the container according as the sleeve is rotated to different positions, and mechanism, substantially as indicated, for oscillating the sleeve and holding the latter in different positions, substantially as set forth.

2. In automatic weighing apparatus, the combination, with a container of the variety specified suspended from a weigh-beam and an induction-pipe and sleeve, substantially as indicated, of a pendulum-lever connected with the sleeve and a toggle adapted to hold the pendulum-lever at the one extreme of its throw, such toggle being connected with an attachment of the weigh-beam with the arrangement such that the tilting of the weigh-beam tilts the toggle and releases the pendulum-lever, substantially as set forth.

3. In combination, a weigh-beam, a container, a feed-pipe, and sleeve, substantially as indicated, a pendulum-lever connected with the sleeve, a toggle operatively connected with the sleeve and with the weigh-beam in position to be tripped by the tilting of the latter, the toggle being adapted to lock the sleeve in the one position of the latter, and a dog for locking the sleeve with the container in the reverse position of the sleeve,

the dog being connected with and operated by the toggle, substantially as set forth.

4. The combination of a rotative container, substantially as indicated, with a bent tube, the bent section being so located inside the container as to be filled with each charge of the container, such tube having a discharge outside the container, the arrangement being such that the tube is emptied with each revolution of the container, substantially as set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 4th day of July, 1890.

JNO. PAUL BALDWIN.

Witnesses:
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