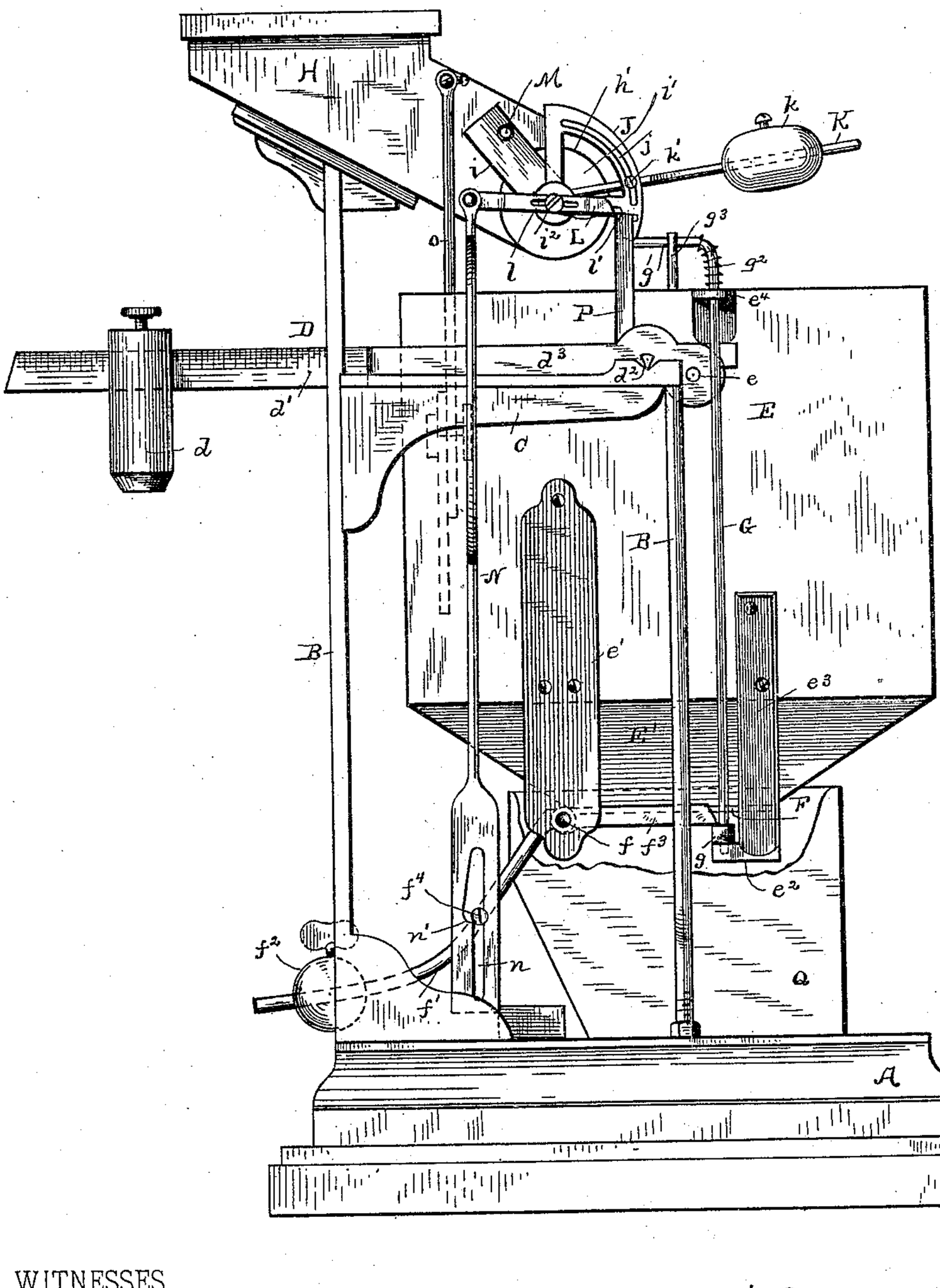
(No Model.) 4 Sheets—Sheet 1.

T. F. GRAY.

AUTOMATIC GRAIN SCALES.

No. 441,658. Patented Dec. 2, 1890.

Fig. 1



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(No Model.) 4 Sheets—Sheet 2.

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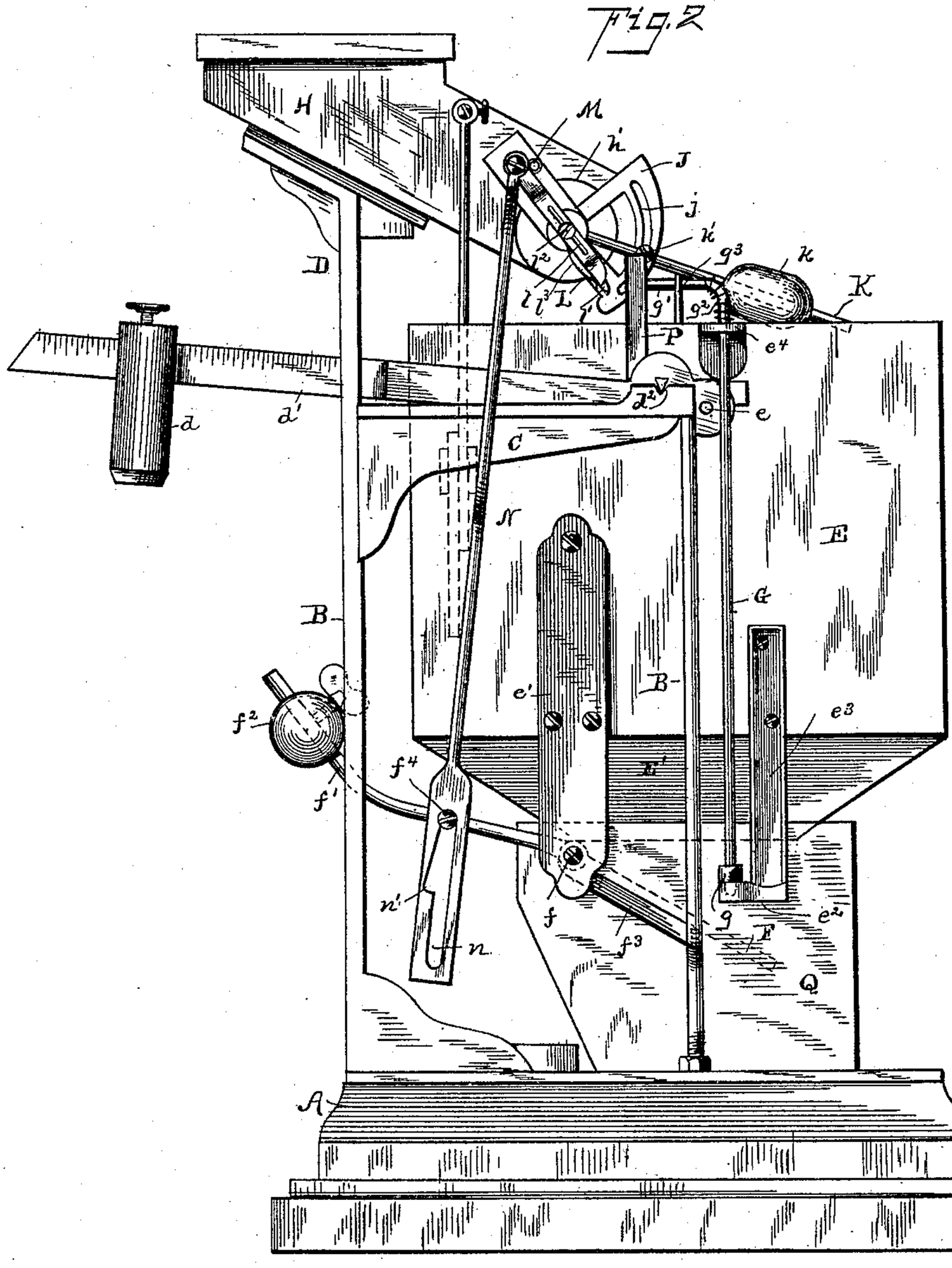
Fig. 2



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AUTOMATIC GRAIN SCALES.

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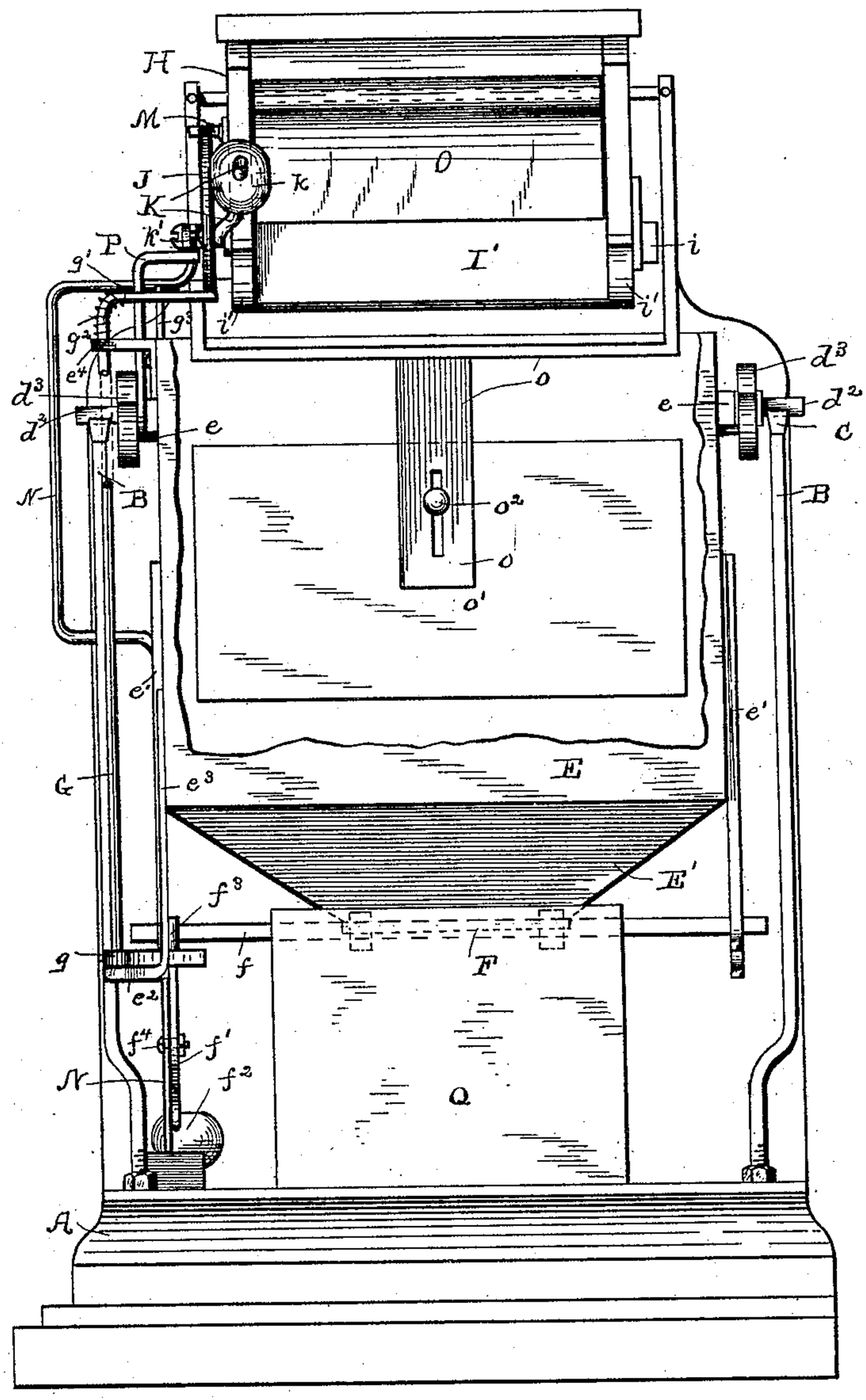
Fig. 3



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(No Model.) 4 Sheets—Sheet 4.

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Fig. 5.

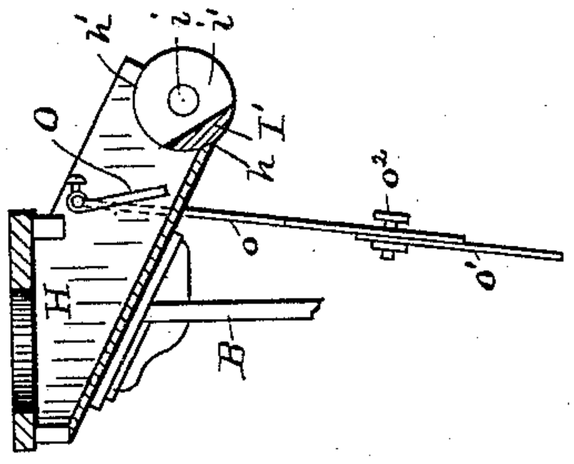


Fig. 5'.

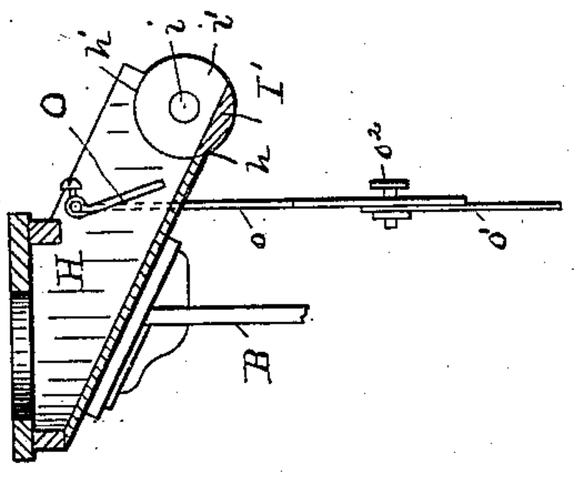


Fig. 7.

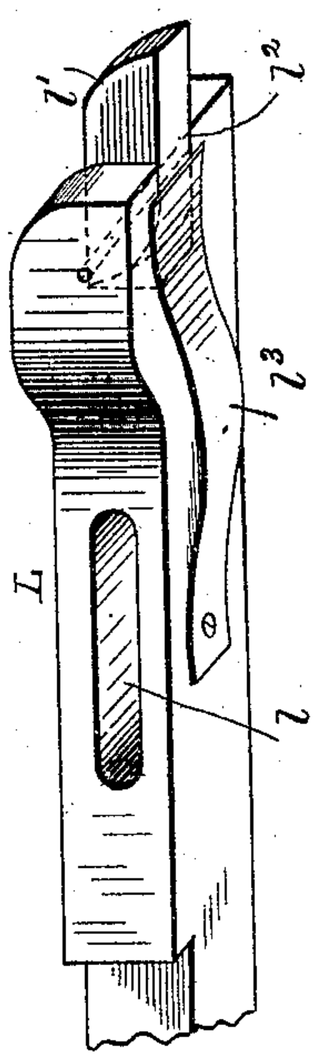
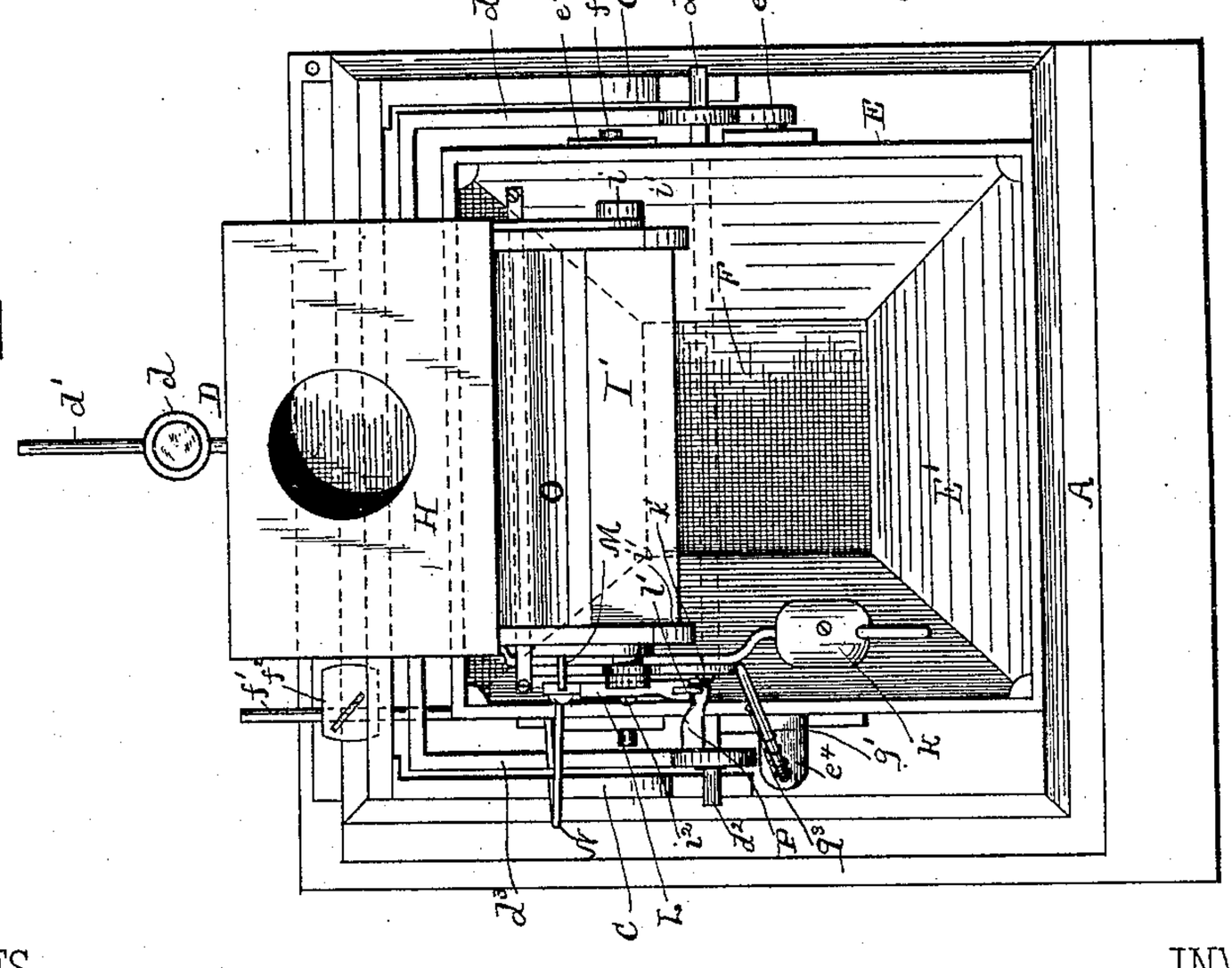


Fig. 4.



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UNITED STATES PATENT OFFICE.

THOMAS F. GRAY, OF MONROEVILLE, OHIO.

AUTOMATIC GRAIN-SCALES.

SPECIFICATION forming part of Letters Patent No. 441,658, dated December 2, 1890.

Application filed April 30, 1890. Serial No. 349,999. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. GRAY, a citizen of the United States, and a resident of Monroeville, county of Huron, and State of Ohio, have invented certain new and useful Improvements in Automatic Scales, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

My invention relates to automatic grain-scales; and it has for its objects to provide improved means for cutting off the supply before opening the discharge-valve in the scale-hopper; to provide improved means for opening the cut-off valve by the closing mechanism of the discharge-valve, and to provide improved means for adjusting the moment of discharge and for adjusting the throw of the cut-off valve.

Referring to the drawings, Figure 1 represents a side elevation of my improved automatic scale, showing the scale ready to weigh; Fig. 2, a side elevation showing the scale discharging; Fig. 3, a front elevation; Fig. 4, a top plan view; Figs. 5 and 6, vertical sectional views of the feed-spout, primary cut-off valve, and cut-off valve or gate; and Fig. 7, a perspective detail view of the stop-lever of the cut-off-gate mechanism.

In said drawings, the letter A indicates a suitable base having uprights B secured in it, the upper ends of which are connected by horizontal arms C. A forked scale-beam D has a sliding and adjustable counterpoise d upon its graduated beam d', and has knife-edge or other pivotal bearings d^2 for its arms d^3 upon the horizontal frame-arms C.

The scale hopper or receptacle E has pivotal bearings e in the extreme ends of the forked arms d^3 of the scale-beam and is formed with a contracted funnel-shaped bottom E', having an opening, which is closed by a discharge gate or valve F. Said valve is pivoted with its shaft or pintle f in the lower ends of strips or brackets e', secured upon the sides of the hopper, and said shaft has a rearwardly-extending arm f', upon which adjustably slides a counterpoise f^2 and a forwardly-extending lock-arm f^3, which is engaged, when the valve is closed, by an inwardly-projecting arm g upon the lower end of a vertical shaft G, which is journaled to rock in a bearing e^2 in the lower end of a bracket e^3 upon the side of the lower portion of the hopper and in a bearing e^4 at the upper edge of said hopper. The upper end g' of said shaft is bent inward to form an arm, and a spring g^2 is wrapped around said shaft and secured to the upper bearing e^4 and to said arm, so as to force said arm rearward against a pin or stop g^3, which limits its play.

The inclined feed-spout H is supported upon the extended upper ends of the rear uprights B, and has transverse bearings in its lower open end.

The trunnions i, which project from the circular end pieces i' of the cut-off valve or gate I', are journaled in said bearings, and said valve or gate forms a segment of a cylinder, so that its upper face will form a flat surface and is the secant of said cylinder segment, while the lower face will form a segment of a cylinder periphery. The lower edge h of the bottom of the spout is concaved to correspond to the cylindrical surface of the gate, and the sides of the hopper are cut out at h' to correspond to the end piece of the same, and said gate may be revolved upon its trunnions to either cut off said spout when turned up or to form a continuation of the bottom of the spout when turned down, as plainly illustrated in Figs. 5 and 6 of the drawings.

A cam or eccentric sector J is secured upon one of the trunnions of the rocking or revolving cut-off gate and bears with its eccentric edge against the arm g' of the vertical rock-shaft G and turns the same forward when tilted down. An arm K is pivoted at its inner end to the trunnion, has a weight k adjustably sliding upon it, and is adjustably secured to the cam J by means of a clamp-screw K', which slides in a segmental slot j in said cam.

A stop-lever L is secured with a longitudinal slot l in its middle upon a set-screw i^2, which enters the end of the trunnion of the cut-off gate I', and a finger l' is pivoted in an open slot l^2 in the forward end of said lever and may be tilted downward in the same, but is prevented from being tilted upward by having its inner end abutting against the inner end of the open slot. A flat spring l^3

is secured with its inner end upon the under side of the lever and bears with its free end against the under side of said finger, serving to return it to and keep it in its normal position. This lever, pivoted finger, and spring is illustrated in detail upon an enlarged scale in Fig. 7 of the drawings.

A stud or stop M projects from the side of the spout and serves to limit the swing of the lever L, and through it of the cut-off gate, cam, and weighted lever.

A vertical rod N is pivotally connected to the rear arm of the lever L and has a longitudinal slot *n* in its lower end, which slot is formed at its middle with an enlargement forming a shoulder or offset *n'*. A stud f^4, which projects from the discharge-valve lever *f'*, slides up and down in said slot and may engage with said shoulder, which then forms a catch for said lever-arm.

A primary cut-off valve O is pivoted across the spout above the cut-off valve I', and has the upper ends of a forked arm *o* secured to the ends of its shaft or trunnions. The lower end of said arm has a longitudinal slot, and a float or board *o'* is adjustably secured to the arm by means of a set-screw o^2 in said slot.

An upright stop-bracket P projects upward from one side of the hopper, and has the finger *l'* of the stop-lever L normally resting against its upper end.

A chute Q is arranged in the base of the scale to receive and convey the weighed material from the discharge-valve.

In practice the material to be weighed is fed into the spout, preferably in a continuous stream, from a bin or an elevator or other conveyer, and passes over the flat side of the segmental gate I' into the hopper. As the material accumulates in the hopper and the quantity desired to be weighed at one time is nearly reached, the float or board *o'*, which has previously been adjusted at the required height upon the arm, will be pushed rearward by the material piling up in the hopper, and the primary cut-off gate O will be gradually tilted toward the inclined bottom of the feed-spout and will cut off the stream of material to a thin sheet or stream. When the required quantity has been collected in the hopper, sufficient to overcome the weight of the counterpoise *d* upon the scale-arm, which poise has previously been adjusted at the required distance from the fulcrum of the scale-beam, the entire hopper will drop and the stop-bracket P upon the same will be withdrawn from beneath the stop-lever L, which will permit said lever, the cam J, and the cut-off gate to be rocked or revolved by the descent of the weight *k*, the curved side of said gate entirely cutting off the supply of material through the feed-spout. The rocking of the gate and of the cam and lever will raise the rod N, so that the stud upon the discharge-valve arm will be at the lower end of the slot in the same. The rocking of the cam will force the arm *g'* of the vertical rock-shaft forward against the tension of the spring for the same, and this will tilt the stud *g* upon the lower end of said shaft out from under the end of the discharge-valve locking-lever f^3, so that said valve may be tilted open by the weight of the material in the hopper against the weight of the counterpoise f^2. As the discharge-valve is tilted down the stud f^4 moves up in the slot *n* to the upper end of the same. When the material in the hopper has run out of the same, the counterpoise *d* will again raise the empty hopper, the counterpoise f^2 will close the discharge-valve, and, as it and the arm *f'* descend, the stud f^4 will engage the shoulder in the slot *n* of the vertical connecting-rod and draw said rod down, opening the cut-off gate and returning all the parts to their normal positions. The pivoted and spring-actuated finger *l'* of the lever L may slip by the stop P and spring out over it, retaining said lever, and consequently all the other gate operating and controlling parts, in their normal positions. The weight f^2 upon the discharge-valve arm *f'* is so much heavier than the weight *k* that it may raise said weight and overcome whatever frictional or other resistance may be in the rocking or tilting of the cut-off gate and its operating mechanism. The weight or counterpoise *k* may be exactly adjusted upon its arm to the point where it will tilt the cam and the gate when they are released, and the arm K may be adjusted in relation to the plane of the gate so as to tilt the latter more or less into or across the spout, according to the thickness of the stream of material passing through the same. The lever L may be longitudinally adjusted upon the screw i^2 so as to have its pivoted finger *l'* rest with more or less of its length upon the stop P, so as to be released by the lowering of said stop with less or more promptness, according to the quantities to be weighed in the hopper at one time. When a large quantity of material is to be weighed, the lever is moved forward so as not to be released from the stop until the stop and hopper have descended a comparatively greater distance than when a small quantity is to be weighed, when the lever is moved back so that the finger may be released by a slight downward movement of the hopper and gate.

As the under side of the cut-off gate is rounded and slides against the correspondingly-concaved edge *h* of the bottom of the spout, a snug fit may be had between said parts so that no particle of the material to be weighed will enter between them, and thus either be crushed or obstruct the movement of the gate. The circular ends of the gate, fitting and revolving in the correspondingly-shaped ends of the sides of the spout, will form continuations of said sides, and thus admit of a perfect cut-off or closing of the spout when the gate is revolved.

In this scale no more material can be fed into the hopper than is exactly required to

drop the latter and tip the scale-beam, as the gate is immediately closed when the hopper drops, and the discharge-valve will not be opened until the cut-off gate for the supply has been closed. The cut-off gate and the supply into the hopper will be opened by the closing mechanism for the discharge-valve, so that no material will flow into the hopper until the discharge-valve is closed. In this manner all waste or surplusage of material will be avoided. In the automatic scales generally in use it has been necessary to allow for this waste or surplusage which passes through the hopper before and after it is being emptied in the adjustment of the counterpoise upon the scale-beam, while in this scale the counterpoise may be exactly adjusted to the weight desired to be discharged at each time.

The entire scale structure is simply constructed, and the operating parts of the same are not liable to be injured or get out of order by use. The scale may be connected with its spout to any suitable supply source and will automatically and exactly weigh desired quantities of material and deliver the same in exact and perfectly-separated quantities.

The foregoing description and accompanying drawings set forth in detail mechanism embodying my invention. Change may be made therein provided the principles of construction respectively recited in the following claims are employed.

I therefore particularly point out and distinctly claim as my invention—

1. In an automatic scale, the combination, with a vertically-movable counterbalanced hopper, of a pivoted cut-off gate for the supply, a weighted lever arranged to close said gate by its weight, and a stop-lever upon said gate provided with a spring-actuated finger at its end which bears against the upper end of said hopper, substantially as set forth.

2. In an automatic scale, the combination, with a vertically-movable counterbalanced hopper provided with a projecting stop-bracket, of a pivoted rocking cut-off gate for the supply, a weighted lever connected to close said gate, and a stop-arm or lever adjustably secured to said gate and bearing with its end against said stop-bracket, substantially as set forth.

3. In an automatic scale, the combination, with a supply-spout having the end of its bottom concave, of a cut-off gate having circular end pieces pivoted in said spout and formed in the shape of a cylinder segment, having its curved surface bearing against the concave end of said spout bottom and its flat side forming a continuation of said bottom, substantially as set forth.

4. In an automatic scale, the combination, with a supply-spout having the ends of its sides cut out on a circular line and having the end of its bottom cylindrically concaved, of a cut-off gate formed in the shape of a cylinder segment to form a continuation of said spout-bottom with its flat side and to bear into said concave end with its round side, and provided with circular end pieces which fit into said circularly cut-off ends of the sides of the spout and revolve in the same, forming continuations of said sides, substantially as set forth.

5. In an automatic scale, the combination, with a vertically-movable counterbalanced weighing-hopper provided with a stop-bracket, of a feed-spout, a cut-off gate pivoted to rock in said spout, a weighted arm or lever adjustably secured to the pivot of said gate to close the same, and an arm secured longitudinally adjustable upon the pivot of said gate, and provided with a downwardly-tilting spring-actuated finger in its end which may rest upon said stop-bracket, substantially as set forth.

6. In an automatic scale, the combination, with a pivoted feed-gate having means for automatically closing it, and an eccentric-cam upon said gate, of a hopper, a discharge-valve for said hopper, a latch for said valve, and an arm engaged by said cam and connected to operate said latch, substantially as set forth.

7. In an automatic scale, the combination, with a pivoted feed cut-off gate having means for closing it, and an eccentric-cam upon said gate, of a hopper, a swinging discharge-valve in said hopper, and a rock-shaft provided with a stud which locks said valve and with an arm which bears against said cam, substantially as set forth.

8. In an automatic scale, the combination, with a pivoted feed-gate having means for automatically closing it, and an eccentric-cam upon the pivot of said gate, of a scale-hopper, a pivoted discharge-valve in the bottom of said hopper, and a rock-shaft journaled upon said hopper and provided with a latch-stud for said valve at its lower end, an arm upon the upper end of said shaft and bearing against said cam, and a spring forcing said arm against said cam, substantially as set forth.

9. In an automatic scale, the combination of a pivoted feed-gate having means for automatically closing it, an arm secured to the pivot of said gate, a hinged discharge-valve having a counterbalancing-arm for closing it, and a rod attached to the arm of said gate and provided with a catch engaged by said counterbalanced valve-arm in its descent, substantially as set forth.

10. In an automatic scale, the combination of a pivoted feed-gate having means for automatically closing it, an arm secured to the pivot of said gate, a hinged discharge-valve having a counterbalancing-arm for closing it provided with a laterally-projecting stud, and a rod attached to the arm of said gate and formed with a slot for the stud of said counterbalancing-arm, said slot having a catch for engaging said stud when the arm descends, substantially as set forth.

11. In an automatic scale, the combination

of a feed-gate pivoted to rock upon trunnions at its ends, a weighted lever upon one trunnion and serving to close said gate, an arm projecting opposite to said lever and secured upon the trunnion, a downwardly-opening discharge-valve, a weighted arm upon said valve closing the same and provided with a stud, and a rod pivotally secured to the arm upon the gate-trunnion and formed with a longitudinal slot having an upwardly-facing shoulder or offset at its middle for engaging said stud, substantially as set forth.

12. In an automatic scale, the combination of a rocking or revolving feed cut-off gate, an eccentric-cam upon the trunnion of said gate, a weighted arm upon the trunnion for closing said gate, a stop-lever adjustably secured upon said trunnion, a vertically-movable hopper, a stop upon said hopper engaging said stop-lever, a discharge-valve in said hopper, a rock-shaft upon said hopper and having a latch for said valve, and an arm bearing against the cam, a weighted arm for closing said valve and provided with a stud, and a rod pivoted to the rear end of the stop-lever and formed with a longitudinal slot having a shoulder or offset for said stud, substantially as set forth.

In testimony that I claim the foregoing to be my invention I have hereunto set my hand this 21st day of April, A. D. 1890.

THOS. F. GRAY.

Witnesses:
WM. J. MEAD,
F. W. HEYMAN.