

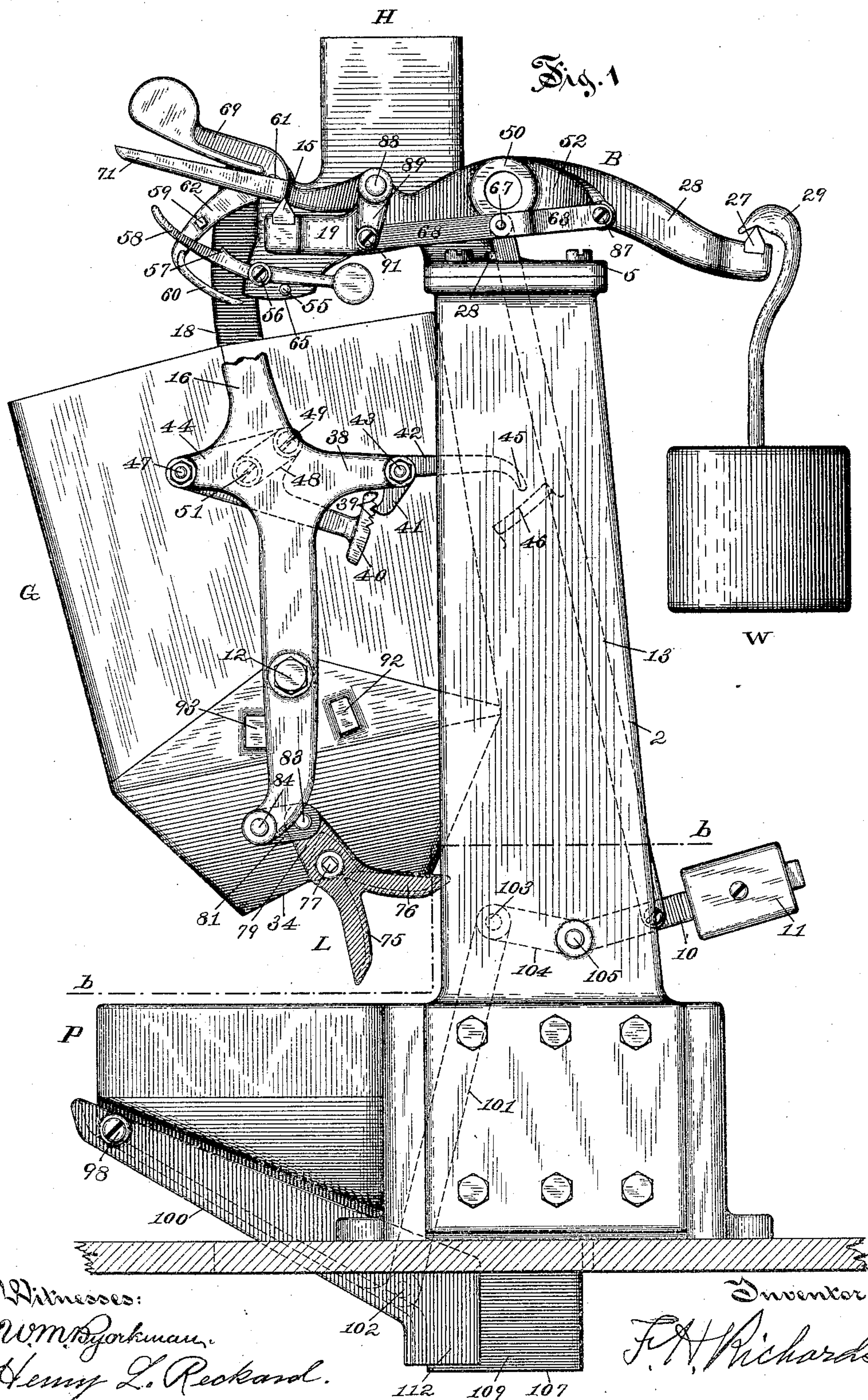
(No Model.)

5 Sheets—Sheet 1.

F. H. RICHARDS.  
GRAIN WEIGHER.

No. 442,713.

Patented Dec. 16, 1890.





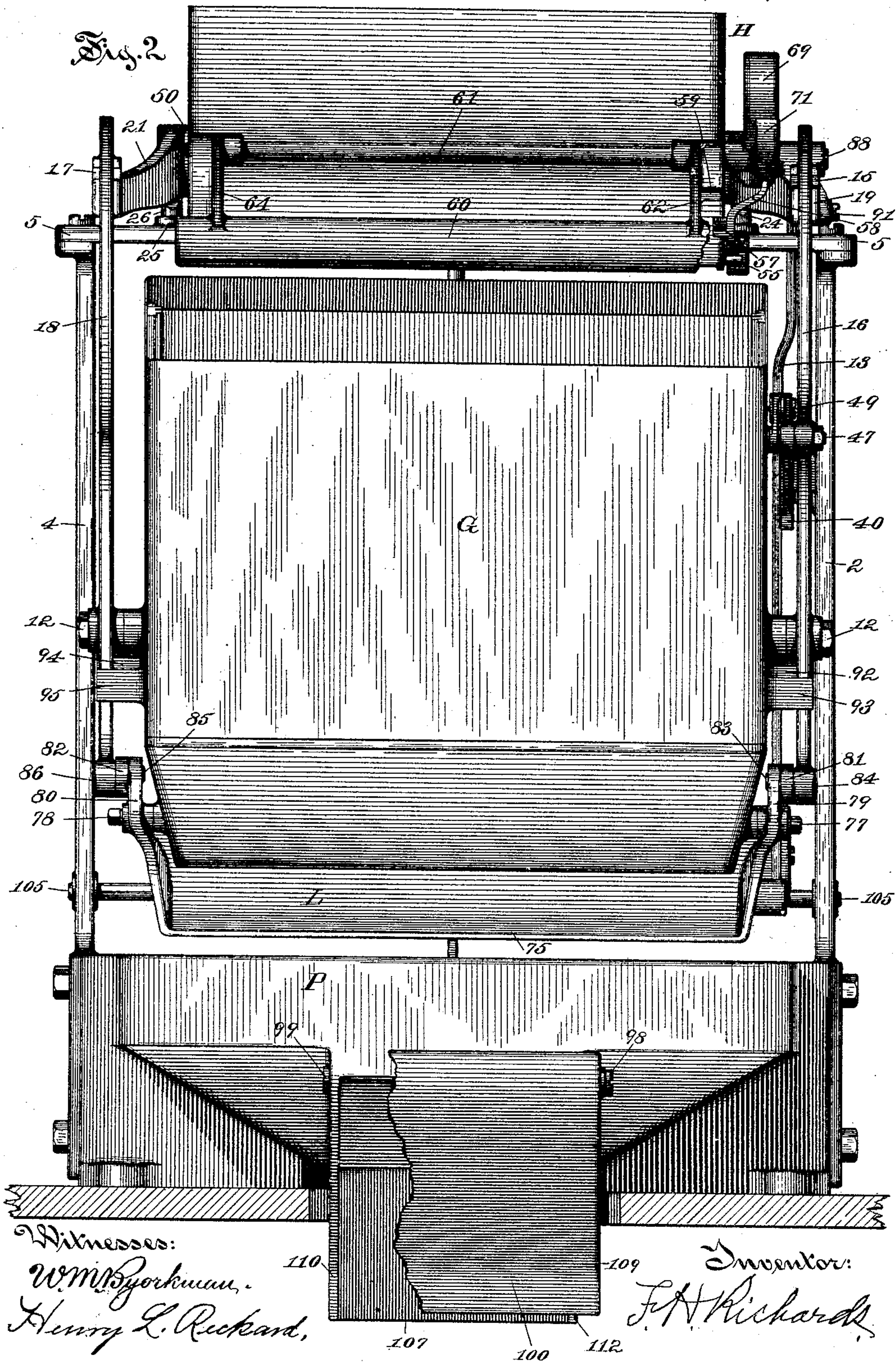
(No Model.)

5 Sheets—Sheet 2.

F. H. RICHARDS.  
GRAIN WEIGHER.

No. 442,713.

Patented Dec. 16, 1890.





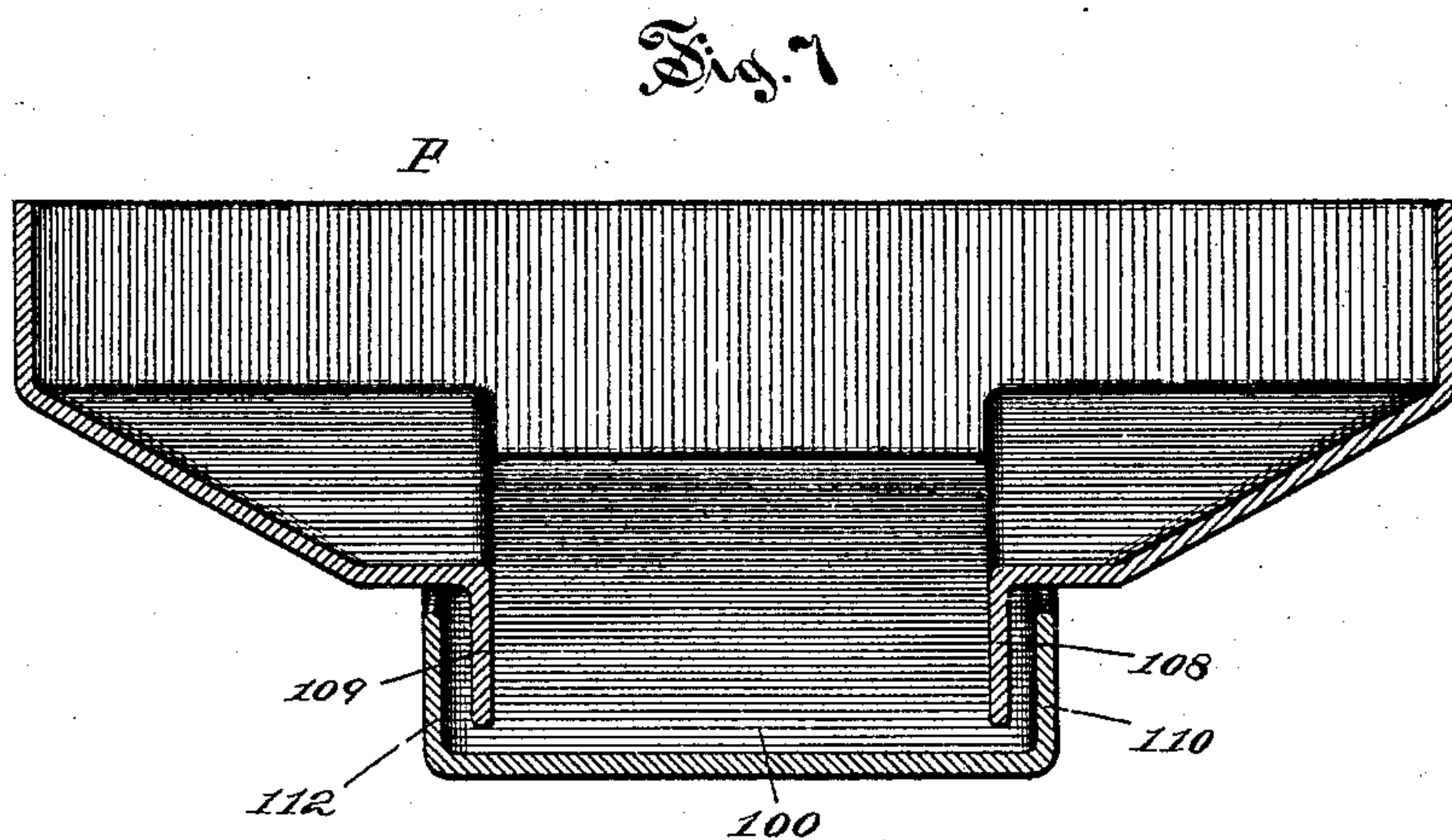
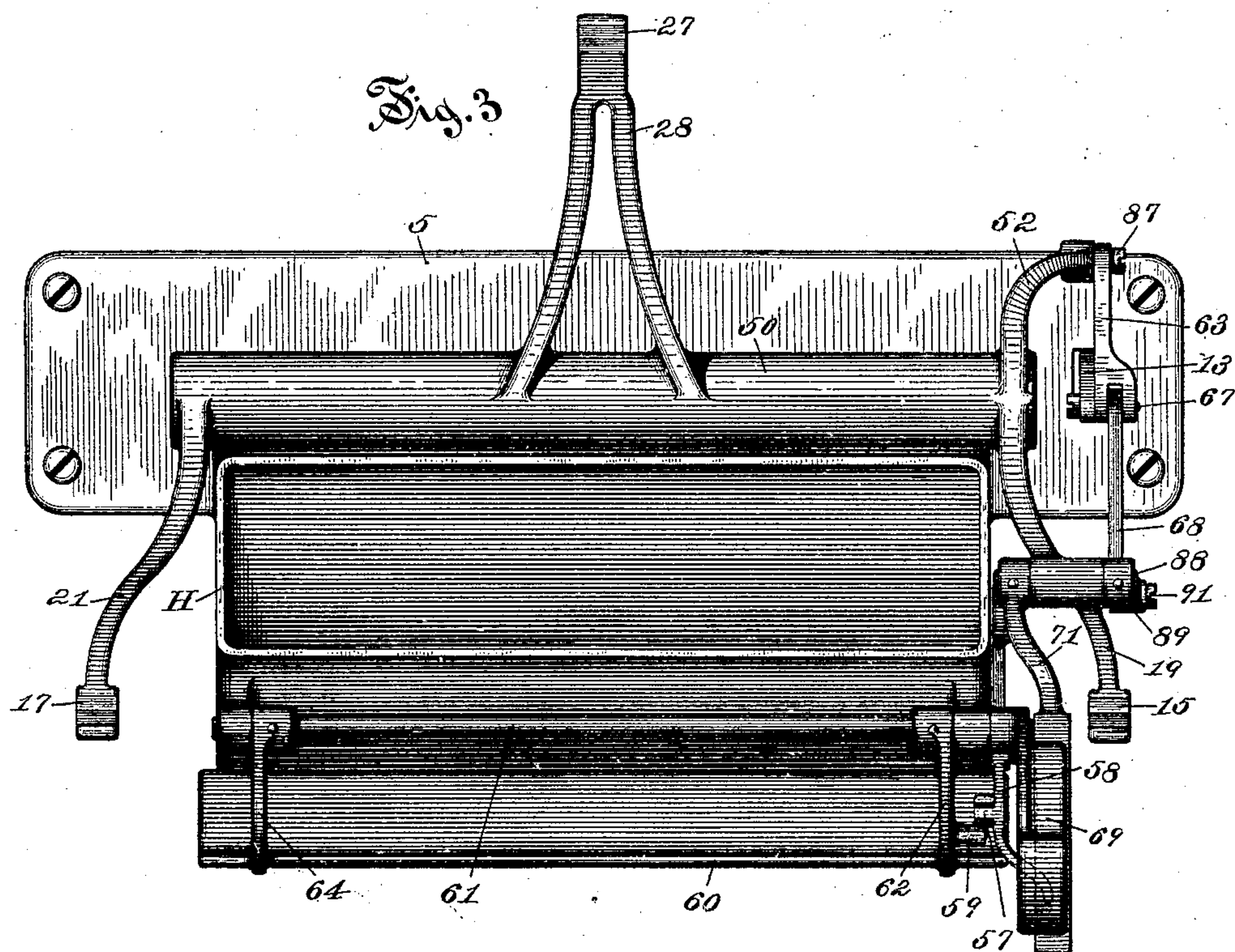
(No Model.)

5 Sheets—Sheet 3.

F. H. RICHARDS.  
GRAIN WEIGHER.

No. 442,713.

Patented Dec. 16, 1890.



Witnesses:

Wm. J. Gorkman.

Henry L. Rickard.

Inventor:

F. H. Richards



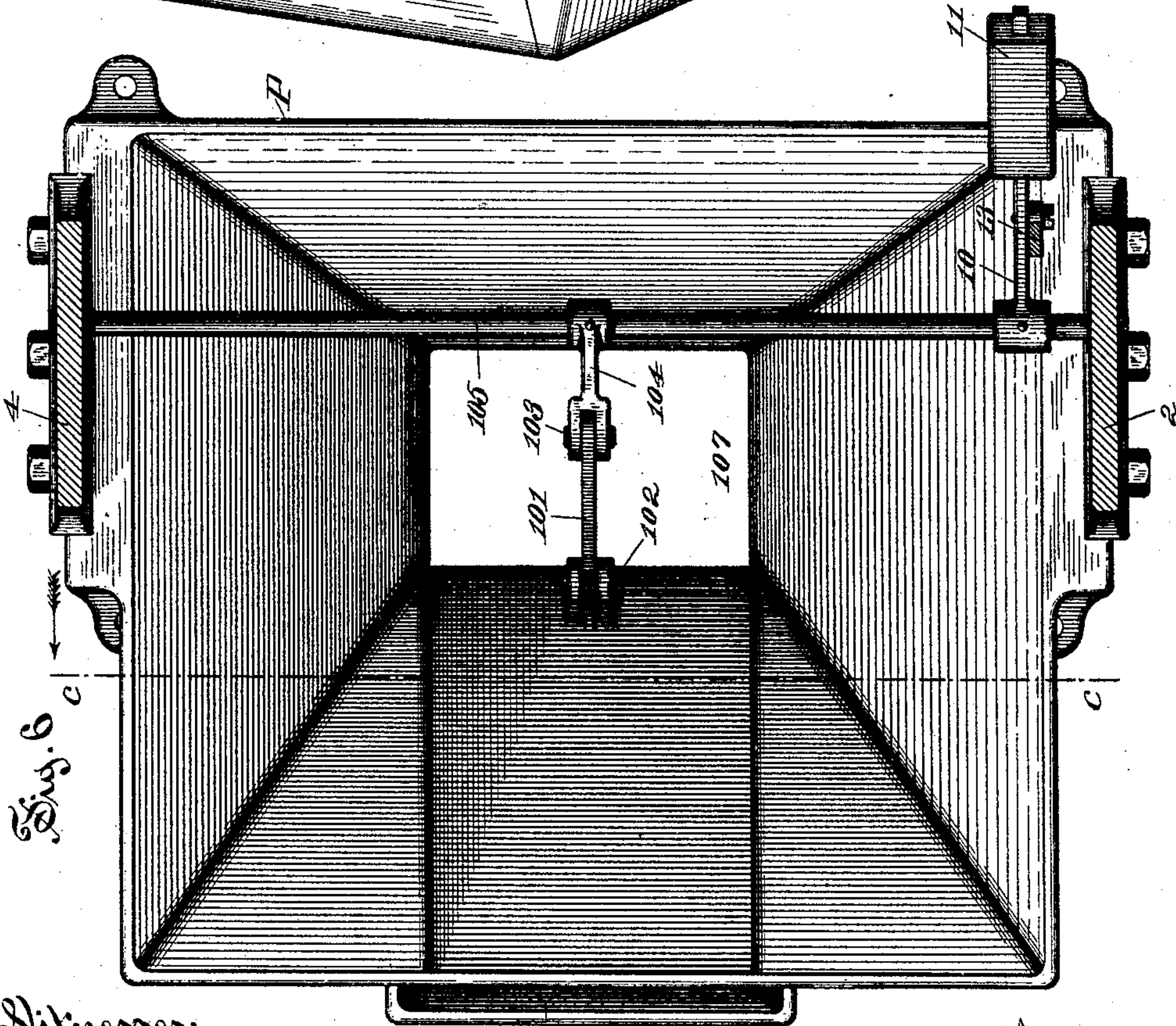
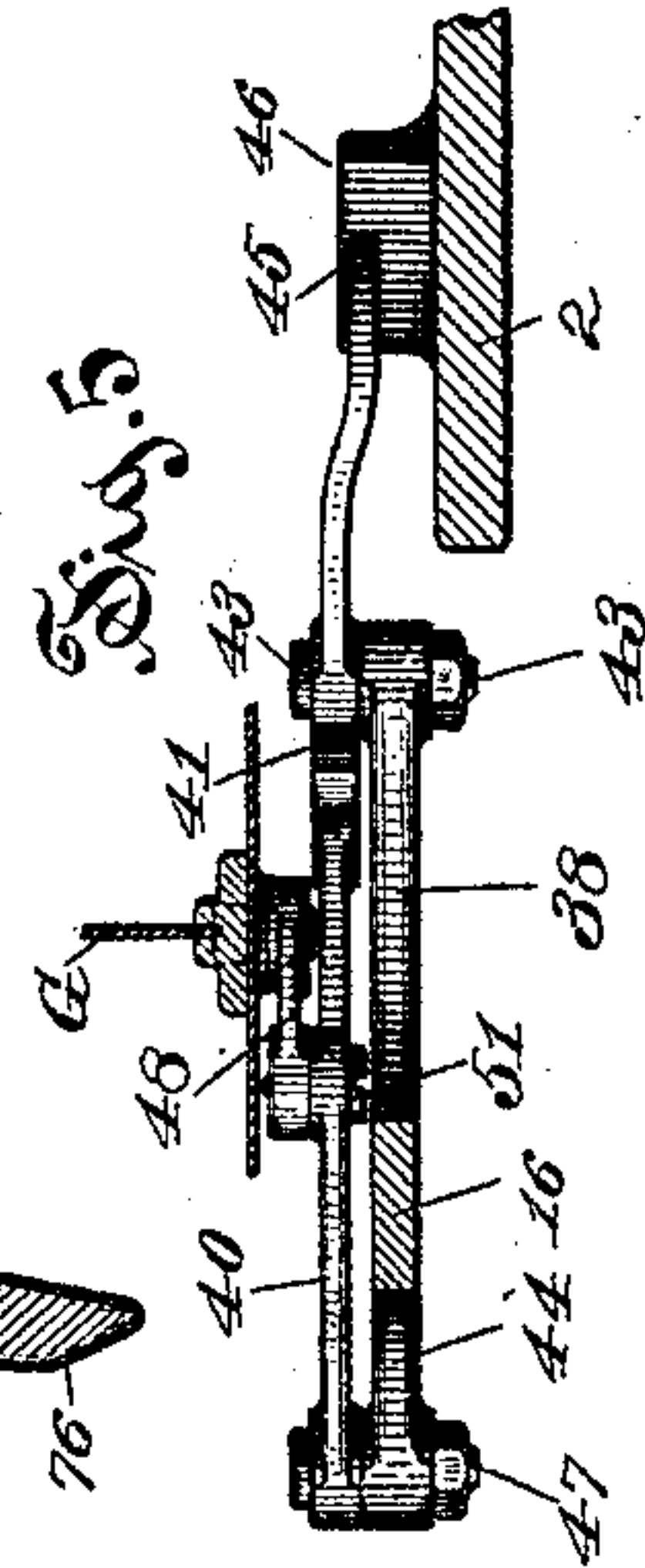
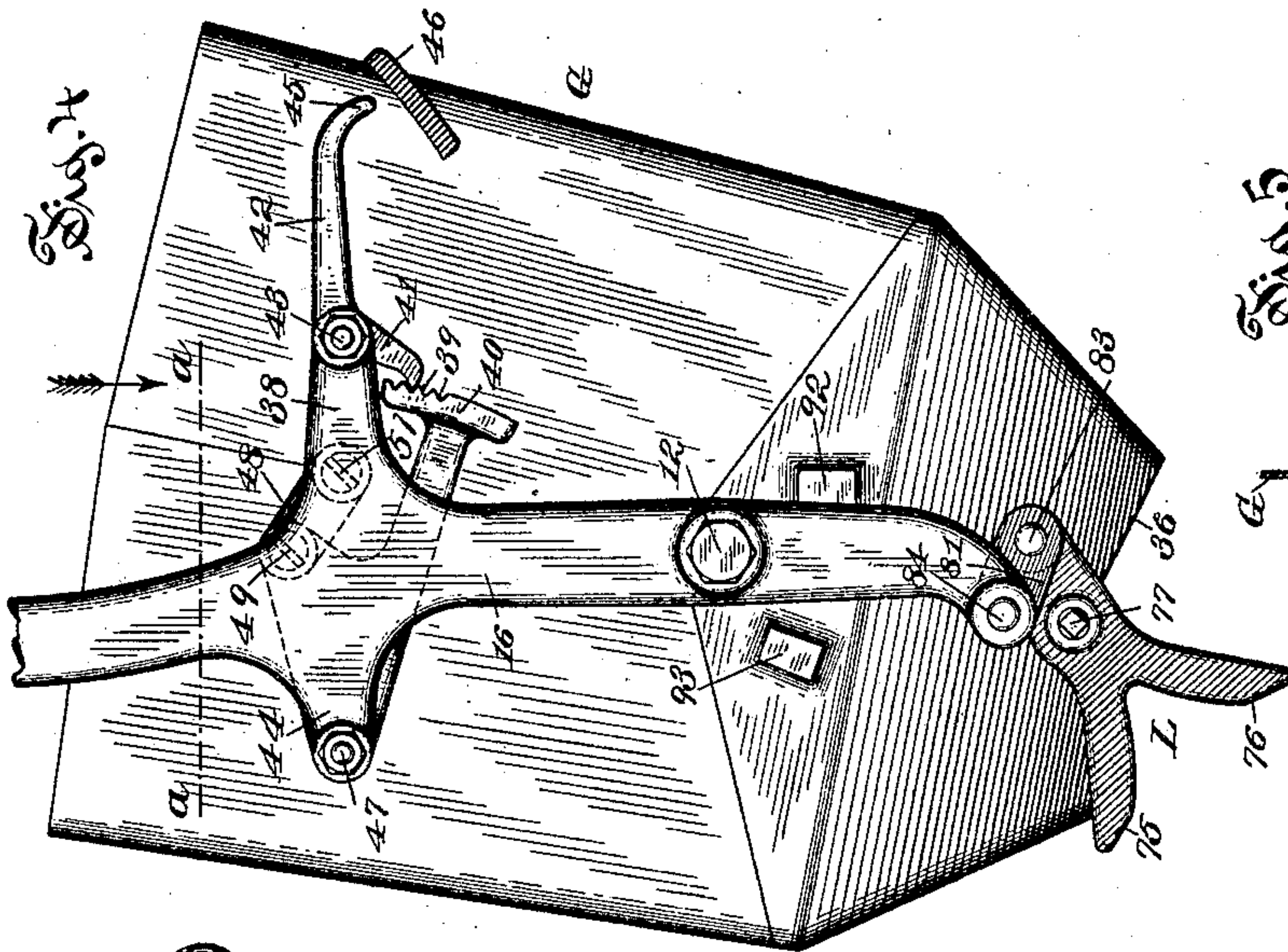
(No Model.)

5 Sheets—Sheet 4.

F. H. RICHARDS.  
GRAIN WEIGHER.

No. 442,713.

Patented Dec. 16, 1890.



Witnesses:

Wm. H. Yorkman.  
Henry L. Reckard.

Inventor:

F. H. Richards



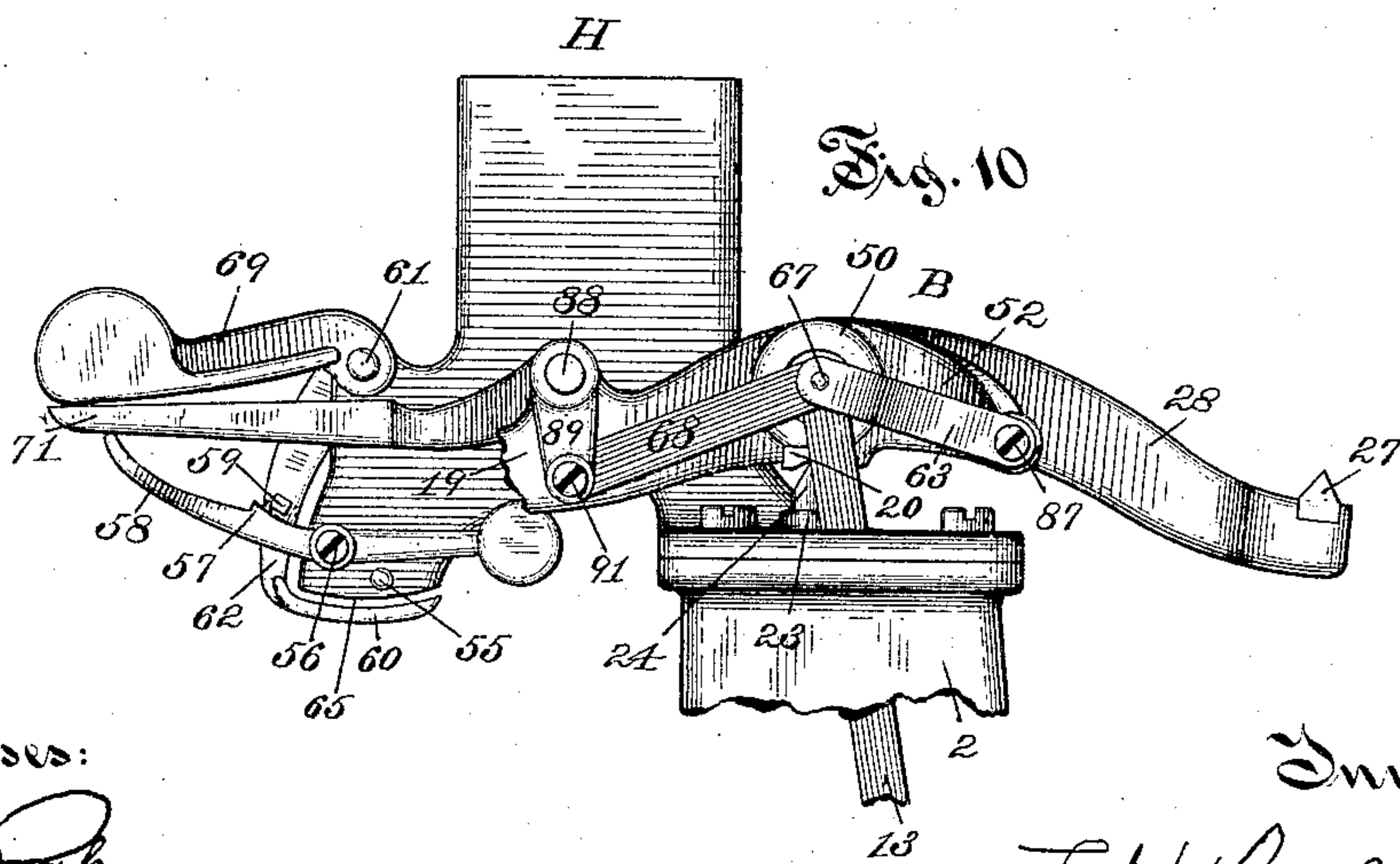
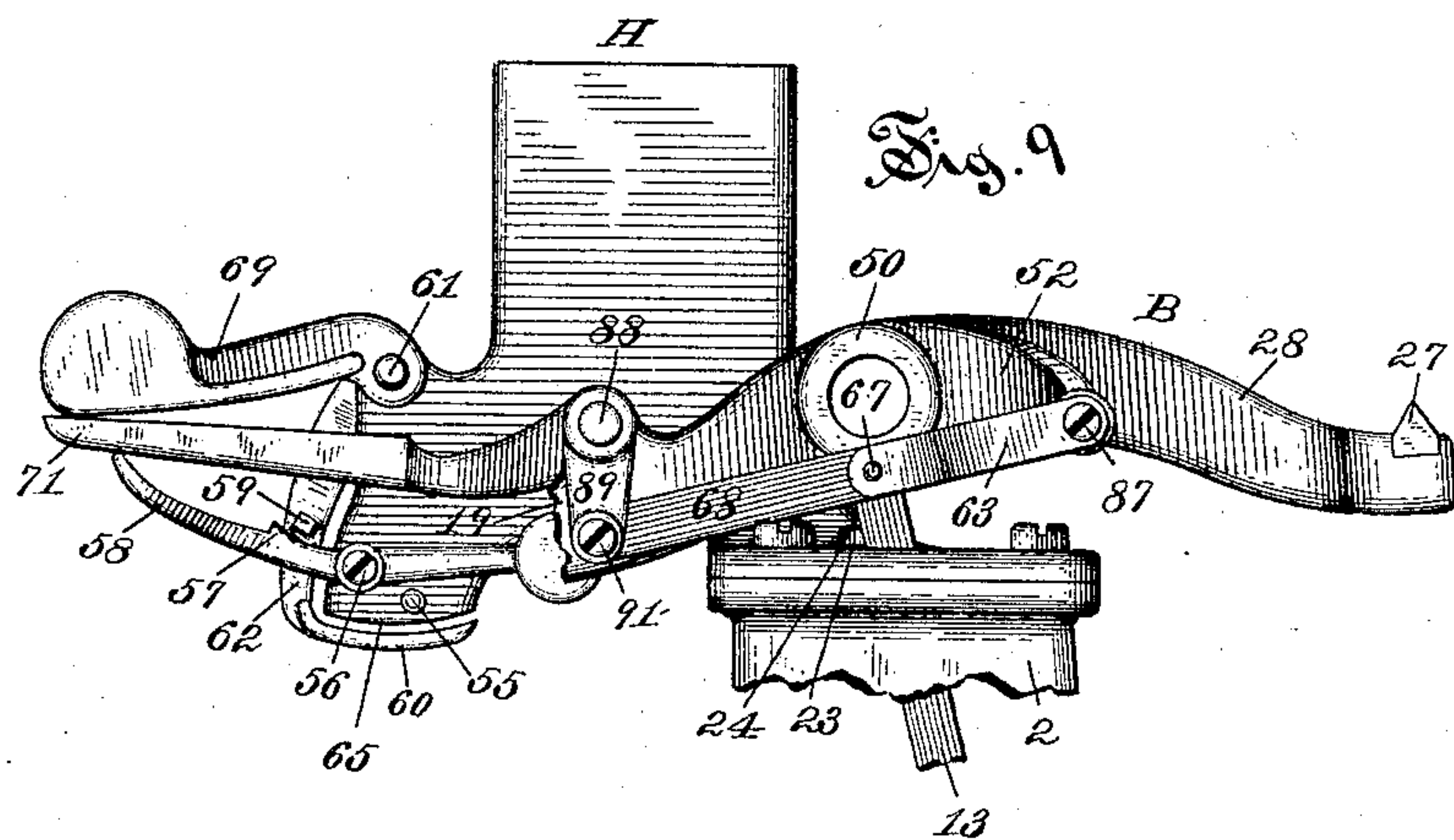
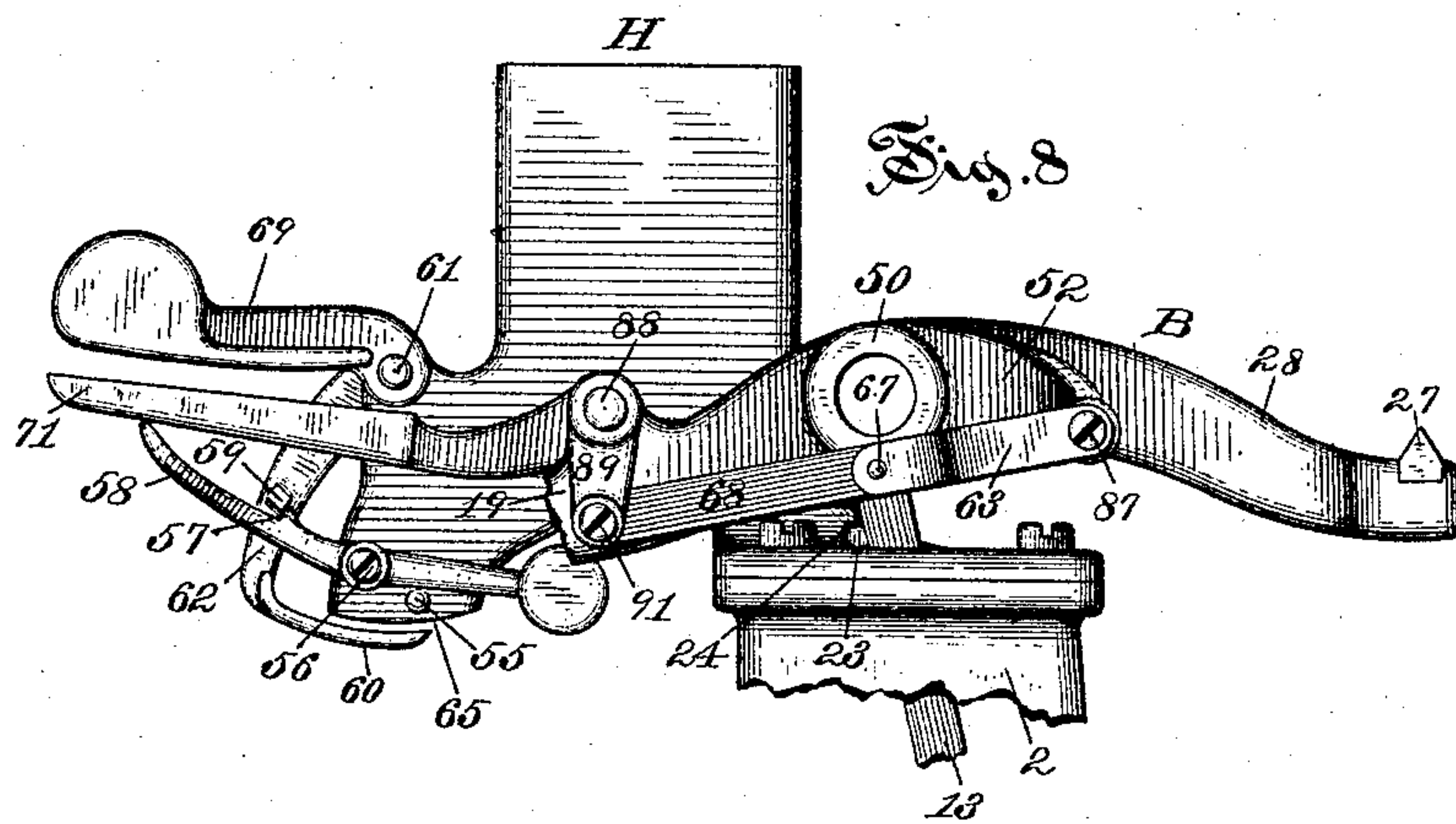
(No Model.)

5 Sheets—Sheet 5.

F. H. RICHARDS.  
GRAIN WEIGHER.

No. 442,713.

Patented Dec. 16, 1890.



Witnesses:

W. M. Dyckman.  
Henry L. Rickard.

Inventor:

F. H. Richards.



# UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE  
PRATT & WHITNEY COMPANY, OF SAME PLACE.

## GRAIN-WEIGHER.

SPECIFICATION forming part of Letters Patent No. 442,713, dated December 16, 1890.

Application filed February 20, 1890. Serial No. 341,196. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Grain-Weighers, of which the following is a specification.

This invention relates to regulator grain-weighers operated by the power or weight of the grain weighing.

My invention has for its object the simplification and improvement of this class of grain-weighers, and also to reduce and cut off the column of grain and to regulate the machine, using only one valve.

In the drawings accompanying and forming a part of this specification, Figure 1 is a side elevation of an automatic grain-weigher embodying my improvements. Fig. 2 is a front elevation of the same, some parts being broken away the better to show certain details. Fig. 3 is a plan view of the upper portion of the machine. Fig. 4 is a side elevation of the grain-bucket and accessory devices. Fig. 5 is a horizontal sectional view in line *a a*, Fig. 4, showing the parts immediately below said line, together with a section of one side of the frame-work. Fig. 6 is a plan view of the regulator-hopper and accessory parts and showing the uprights of the frame-work in section, the view being taken in line *b b*, Fig. 1. Fig. 7 is a vertical section of the regulator-hopper, the view being taken in line *c c* of Fig. 6, looking in the direction indicated by the arrow. Figs. 8, 9, and 10 are side elevations of the upper portion of the machine similar to the upper part of Fig. 1, showing the successive steps of the operation of the valve mechanism.

Similar characters designate like parts in all the figures.

The frame-work for carrying the operative parts of this machine usually, and as shown in the drawings, comprises two side frames or uprights 2 and 4, held together by the top plate 5, carrying the supply-chute H, and by the hopper P, which in this case constitutes the base of the machine.

The grain-bucket G, of the double-chambered type or class used in the well-known "Hill grain-scale," and having the discharge-

spouts 34 and 36, is suspended under the chute H and discharges its load of grain intermittently, in the manner substantially as shown in prior Letters Patent of the United States. Said bucket G is journaled at 12 in bearings formed in the hangers 16 and 18, which are suspended by V-shaped bearings on the pivots or knife-edges 15 and 17, respectively, of the principal arms 19 and 21 of the scale-beam B. This beam has V-shaped bearings 20 and 22, one at each end of the hollow shaft 50 thereof, which rest on the pivots or knife-edges 24 and 26, that are suitably supported, as by bearings 23 and 25, on the frame-work. Opposite to arms 19 and 21 an arm 28 extends rearwardly, and is provided with a pivot or knife-edge 27, on which the main or counter weight W is suspended by a hook 29. The oscillation of the bucket G within the hangers is limited by suitable stops, as 92 and 94 and 93 and 95, which stops may also be any other of the well-known kinds which are shown in prior Letters Patent for like purposes. The spouts 34 and 36 are alternately closed by the closer L, which is pivotally supported on the bucket, and is operated by some suitable connection with the hangers thereof.

The form of bucket-closer here shown consists of the two oppositely-disposed and suitably-shaped plates or closers proper 75 and 76, formed integral and having the arms 79 and 80 and pivoted to the bucket G at 77 and 78. Said plates are preferably cup-shaped, as shown, so as to hold the grain without closing against the edges of the bucket-spouts. To the upper ends of the arms 79 and 80, respectively, are pivoted at 83 and 85 one end of the links 81 and 82, whose opposite ends are pivoted at 84 and 86, respectively, to the lower ends of the said hangers. By this means the closer L constitutes a connecting rock-shaft controlling the relative movements of the hangers and their movements relative to the bucket; also, the stops 92 94 and 93 95 serve to limit the movement of the closer by limiting the movement of the bucket in its hangers, for the closer-plates 75 and 76 do not close against the bucket-spouts, but stand free thereof.

The operation of the closer L will be evi-



dent from comparison of Figs. 1 and 4, where-  
in the bucket is shown in opposite positions.  
In Fig. 1 the rearward (right hand) chamber  
is closed, while in Fig. 4 the forward (left  
5 hand) chamber is closed. The movement of  
the closer is, when thus constructed and ar-  
ranged, simultaneous and coincident with the  
oscillating movement of the bucket.

For locking the bucket in its respective po-  
10 sitions I have provided means of a composite  
nature, in which are combined a toggle-joint  
and a latch for locking said device. By this  
means great power, together with sensitive-  
ness of action, is obtained.

15 The toggle-joint part of this apparatus com-  
prises the lever 40, pivoted at 47 to the arm  
44 of hanger 16, and the link 48, pivoted to  
said lever at 49 and at 51 to the bucket. The  
detent latch or lever 42 is pivoted at 43 to the  
20 arm 38 of the hanger 16, and is operated by  
the end 45 thereof striking the stop or abut-  
ment 46, here shown formed on the inner side  
of the upright 2. The short arm or detent-  
pawl 41 of said lever 42 engages with the  
25 notches 39 of the said lever 40. In practice  
several notches 39 are formed on the lever 40,  
as shown, so that any slight variation in the  
stroke of said lever will not prevent pawl 41  
from locking the same. Besides, the toggle-  
30 joint centers do not in practice always come  
to precisely the same relative positions or an-  
gles, especially since the bucket tends to re-  
bound when it shifts its position, so that some  
means is desirable for instantly locking the  
35 bucket though its stroke should vary some-  
what. When the bucket descends the arm  
45 is lifted by bracket 46, and thus disen-  
gages the pawl 41 from the lever 40. This le-  
ver is then first lifted by the link 48 (which  
40 shifts from its position in Fig. 1 to that in  
Fig. 4, or vice versa) and then lowered there-  
by. During or immediately following the lat-  
ter movement the bucket ascends and allows  
the pawl 41 to re-engage said lever-notches,  
45 and thus relock said lever in substantially  
its first position, but with the link and bucket  
in their opposite positions. It will be observed  
that the angle of the toggle-centers is such as  
to overcome the "angle of repose," and thus  
50 render the detent apparatus always operative  
by the force of the loaded bucket whenever  
the detent-pawl is disengaged.

The hopper P forms, as stated, a part of the  
frame-work of the machine. On one side it  
55 has an opening, under which the movable bot-  
tom 100 is placed, and is connected to operate  
the regulator devices. On the sides of said  
opening are the side walls 108 and 109, which  
work between and clear of the side walls 110  
60 and 112 of the plate 100. The said movable  
bottom or "regulator" is pivoted at 98 and 99  
to the said hopper, and at its lower end is con-  
nected by a rod 101, pivoted thereto at 102,  
with the arm 104, which is fixed to the rock-  
65 shaft 105, that is journaled in the uprights 2  
and 4. The weight arm or lever 10, furnished  
with the counter-weight 11, is shown fixed to

said shaft 105 for normally upholding said  
regulator. When the plate 100 is raised or  
lowered, the grain works freely between the 70  
said side walls 108 and 109 and 110 and 112,  
and thus prevents clogging; also, the plate  
being inclined, as shown, the grain which  
works in between said side walls also moves  
gradually down the plate toward the dis- 75  
charge-chute 107, thus further avoiding any  
clogging. To said arm 10 is attached the lower  
end of the connecting-rod 13, whose upper  
end is pivoted at 67 to the links 63 and 68.  
The link 63 is also pivoted at 87 to the arm 52 80  
of the beam B. The point 67 should substan-  
tially coincide with the axis of the scale-beam,  
which is the line of its supporting knife-  
edges. The link 68 is pivoted at 91 to the  
arm 89, which is fixed to the stud or shaft 88, 85  
that is journaled in a bearing formed there-  
for on the arm 19 of the scale-beam. The  
shiftable valve actuator or arm 71 is also fixed  
to the shaft or stud 88, and is adapted to be  
shifted by means of the regulator devices from 90  
its position in Figs. 1, 8, and 9 to that in Fig.  
10, just described. Said actuator when oper-  
ated by said regulator devices acts on the  
cam-shaped valve-lever 69 (which is fixed to  
the valve-shaft 61) to open or close valve 60 95  
independently of the movement of the beam  
B. The valve 60 is carried by the arms 62 and  
64, which are fixed to the valve-shaft 61, that  
is journaled in suitable bearings formed on  
the supply-chute II. A valve-catch 59 is 100  
formed on the valve-arm 62 to engage with  
the catch 57 of the stop-lever 58, that is coun-  
terweighted and is pivoted at 56 to the chute  
II. A fixed stop or pin 55 is provided to limit  
the upward movement of said lever 58. When 105  
the major part of a load of grain has been de-  
livered into the grain-bucket, the beam B  
gradually descends, thus allowing the valve  
60 (through the action of the beam-arm 71 and  
the weighted arm 69) to partially close under 110  
the mouth 65 of the chute II and reduce the  
column of grain to the proper size for the "drip"  
to complete the load. Said reducing movement  
is completed when the catch 59 comes against  
the stop or catch 57, thereby stopping the fur- 115  
ther closing of the valve 60, as shown in Fig. 8.  
The drip now continues until the beam de-  
scends below the poising-point, as in Fig. 9,  
when, the load being fully made up, the de-  
scend of the beam carries the arm 71 down 120  
upon the outer end of the lever 58, and thus  
disengages said stop 57 from the catch 59,  
thereby allowing the valve 60 to fully close  
and cut off the flow of grain entirely. At  
this time the parts assume the positions 125  
shown in Fig. 9. On the arm 71 disengaging  
the catch 57 the valve suddenly closes by  
reason of the weight of the lever 69, which  
lever immediately prior to said disengage-  
ment stands free of said arm, as in Fig. 8. 130  
On said valve closure the outer end of said  
lever 69, by reason of the suitable proportion  
of the several parts, strikes the arm 71, as in  
Fig. 9, thus applying to the beam a sudden



and powerful downward thrust for carrying down the bucket to surely and promptly disengage the bucket-detent apparatus; and it will be observed that during the poising period of the beam movement the beam is free of all contact with the valve mechanism.

For regulating the action of the machine the hereinbefore-described regulator apparatus is employed to shift the arm 71 on the scale-beam, as illustrated in Fig. 10. In this figure the scale-beam stands in the position shown in Fig. 1; but the rod 13 has been operated to throw upward the links 63 and 68, and thus throw the shiftable valve-actuator 71 into its inoperative position. This movement of said actuator lowers the lever 69 and at the same time strikes the lever 58, so that the catch 59 cannot strike the catch 57. This insures the complete closing of the valve. When a sufficient quantity of grain has accumulated in the hopper P to carry down the regulator-plate 100, the connections described, acting through the shaft 105 and the said actuator-shifting devices, shifts the actuator on the beam, as shown in Fig. 10, and thus closes the valve to stop the machine, and when said accumulation is sufficiently reduced the regulator counter-weight reversely operates said devices and shifts the said actuator into its operative position, thus opening the valve, as in Fig. 8, and starting the machine. Thus the machine is completely operative, both for regular weighing and for self-regulation by the use of a single valve.

It will of course be understood that other kinds of regulators than the regulator herein shown may be used for effecting the shifting of the valve-actuator on the scale-beam. One such other regulator is shown and described in Letters Patent of the United States No. 410,116, granted to me August 27, 1889. The valve herein described together with the lever 69 thereof are parts of a combination not of my invention, but which is described and claimed in the application of C. H. Cooley, Serial No. 338,818, filed January 31, 1890.

That feature of the grain-weigher herein described which consists in the shiftable valve-actuator normally operated by the scale-beam and exceptionally operated by the regulator is broadly claimed in a separate application, Serial No. 340,814, filed February 20, 1890, to which reference may be had.

Having thus described my invention, I claim—

1. In a grain-weigher, the combination, with a double-chambered oscillating bucket supported by hangers suspended from the scale-beam, of the closer journaled on the bucket and operatively connected with the hangers, said closer having two closer-blades for the two bucket-spouts, respectively, and being pivoted to the bucket between the spouts thereof, all organized and coacting substantially as described to operate the closer simultaneously and in coincidence with the movement of the bucket in its supporting-hangers.

2. In a grain-weigher, the combination, with the oscillating bucket journaled in the hangers and having two discharge-spouts, of the closer L, journaled to the bucket between said spouts and having the two closer-blades constructed and arranged substantially as set forth, and the links connecting the closer-arms with the hangers below the bucket-axis, whereby the bucket and closer movements are simultaneous and coincident.

3. In a grain-weigher, the combination, with the hangers and with the oscillating bucket G journaled therein, of the closer L, journaled on the bucket and having the closer-blades 75 and 76, arranged to stand when closed free of the bucket, connections, substantially as described, operatively connecting said hangers and closer, and stops limiting the movement of the closer by limiting the movement of the bucket in the hangers.

4. In a grain-weigher, the combination, with the oscillating grain-bucket having the discharge-spouts 34 and 36 and supported and operating substantially as set forth, of the closer L, pivoted to said bucket at 77 and 78 and comprising the two oppositely-disposed concaved plates 75 and 76.

5. In a grain-weigher, the combination, with the oscillating bucket supported by hangers, substantially as described, of a bucket-detent apparatus consisting in a toggle connected at one end to the hanger and at the other end to the bucket, and detent devices, substantially as described, carried by the hanger and arranged to engage one part of said toggle and adapted to be operated to lock and unlock said toggle.

6. In a grain-weigher, the combination, with the oscillating bucket supported substantially as described, of the toggle connecting the bucket and its supporting-hanger, one element of said toggle having one or more catches thereon, the pawl engaging said catches to lock the toggle, and a stop operating to disengage said catches on the descent of the bucket.

7. In a grain-weigher, the combination, with the oscillating bucket supported by hangers, substantially as described, of the toggle-lever pivoted to the hanger and having detent-catches, the link connecting said lever and the bucket, the detent-lever pivoted to the hanger and adapted to engage said detent-catches, and means operating said detent-lever on the descent of the bucket to disengage the same from said catches.

8. In a grain-weigher, the combination, with the scale-beam carrying a valve-actuating arm, substantially as described, shiftable on said beam, of the valve and its lever operated by said arm, and a stop-arm pivotally supported on the frame-work and arranged to hold the valve partially open for obtaining the drip, said parts being organized and coacting to disengage the valve on the beam going below the poising-point by said shiftable arm engaging the stop-arm.



9. In a grain-weigher, the combination, with the scale-beam having a shiftable valve-actuator, substantially as described, of the valve actuated substantially as described by said  
5 actuator and having a catch, the stop-arm arranged to engage said catch to hold the valve partially open, and regulator apparatus operating to shift said actuator on the beam to allow the valve to close and to hold said stop-  
10 arm disengaged from the valve-catch.

10. In a grain-weigher, the combination, with the scale-beam, of the arm 71, pivoted thereto and having the arm 89, the links for shifting said arm 71 on the beam, and regu-  
15 lator apparatus for actuating said links.

11. In a grain-weigher, the combination, with the scale-beam, of the valve provided with a valve-lever, the valve-actuator pivoted to the beam and adapted for actuating the  
20 valve through said lever, regulator apparatus shifting said actuator on the beam, and valve-stopping devices, substantially as described,

arranged to be operated by said actuator on the downward movement of the beam and on the shifting of said actuator on the beam. 25

12. In a grain-weigher, the combination, with the scale-beam, of the valve pivotally supported substantially as described and having the lever 69, the stop-arm 58, normally engaging the valve to hold the valve partially  
30 open when the beam is partially lowered, and the shiftable arm carried on the beam and normally operating to open the valve on the rising of the beam and to disengage said stop-  
35 arm on the full descent of the beam, and actuator-shifting apparatus arranged to shift said arm 71 on the beam to close the valve and disengage said stop-arm when the beam is up.

FRANCIS H. RICHARDS.

Witnesses:

HENRY L. RECKARD,  
W. M. BYORKMAN.