

No. 715,460.

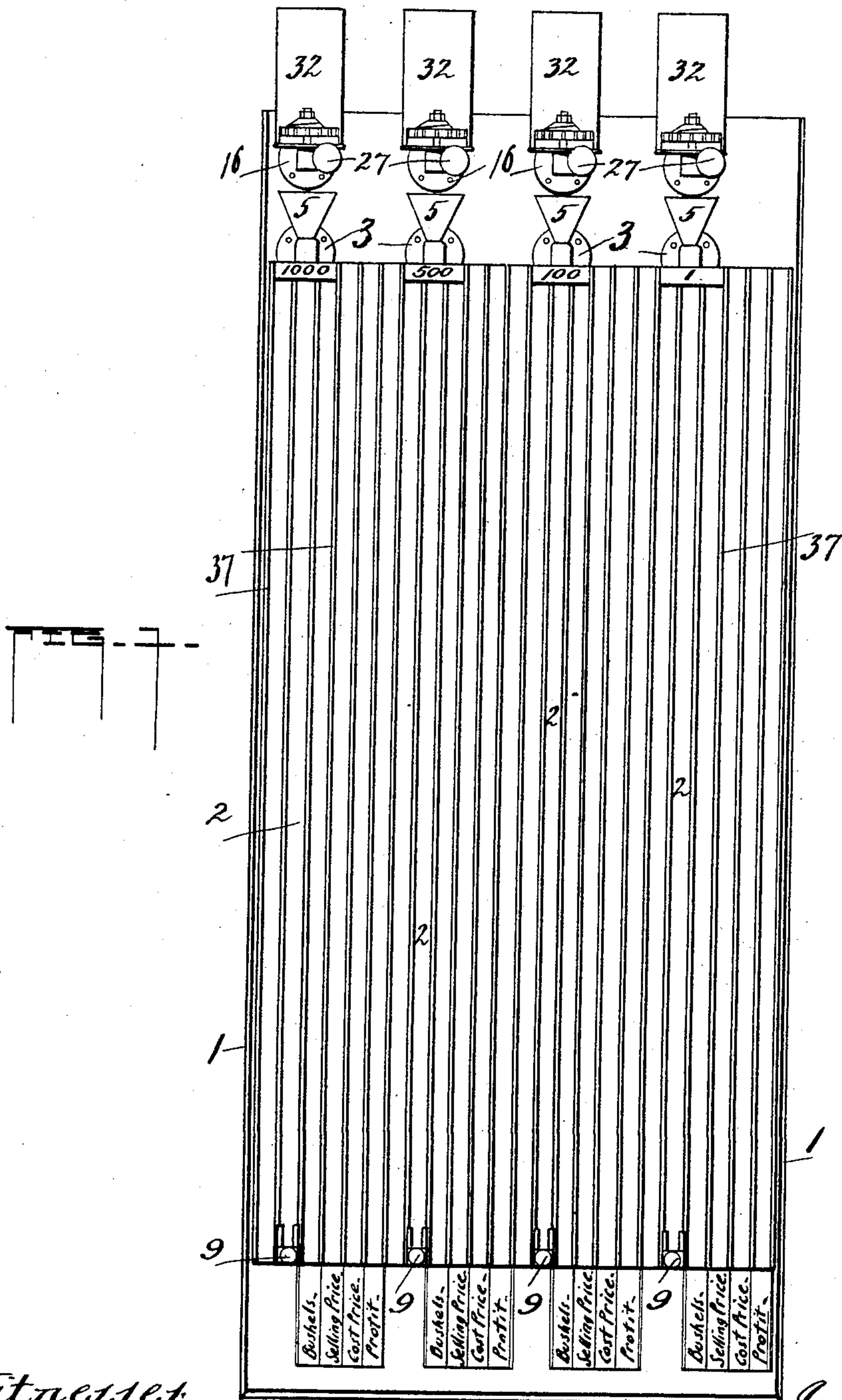
Patented Dec. 9, 1902.

J. M. DALY.  
GRAVITY COMPUTING MACHINE.

(Application filed Oct. 28, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:  
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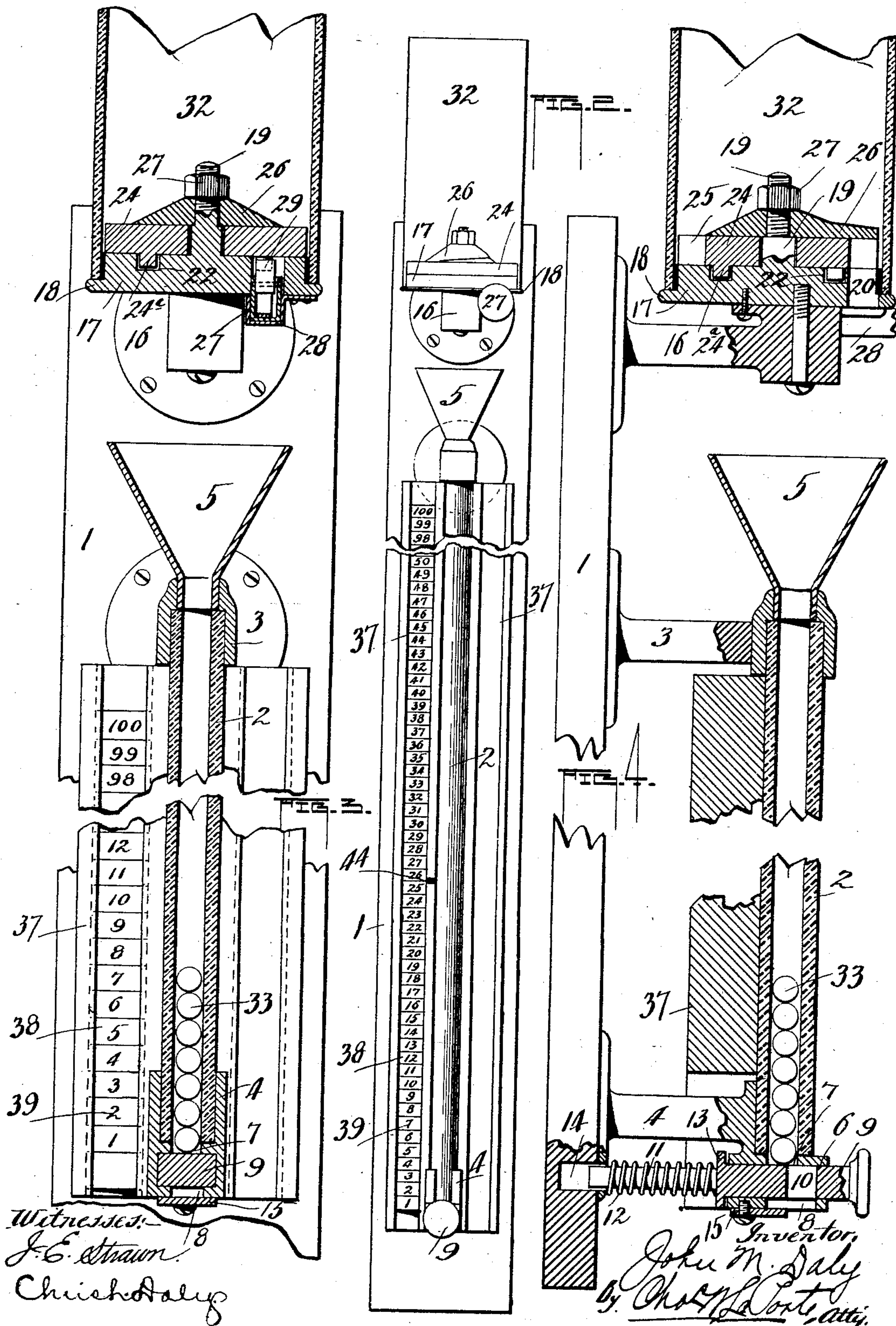
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3 Sheets—Sheet 3.

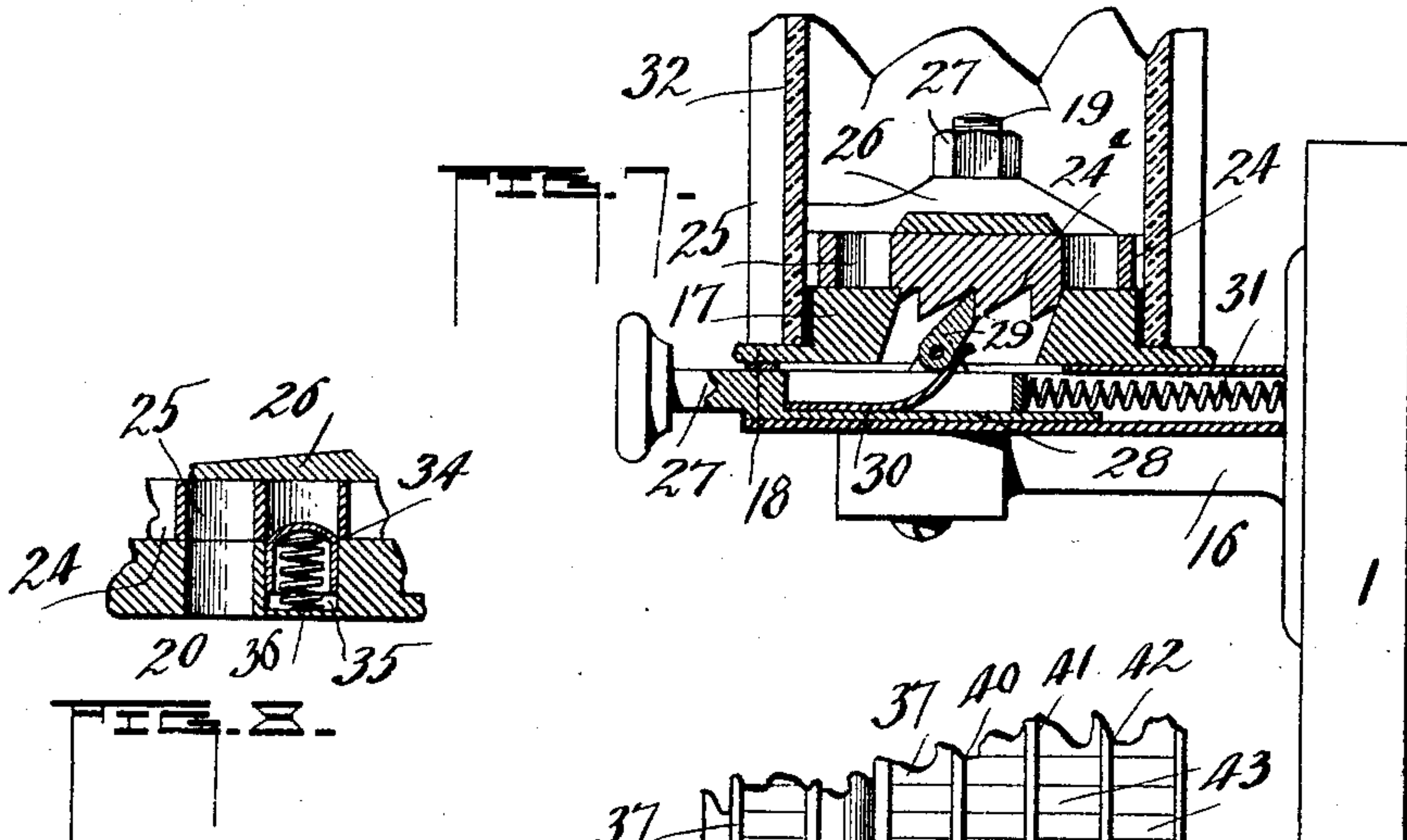
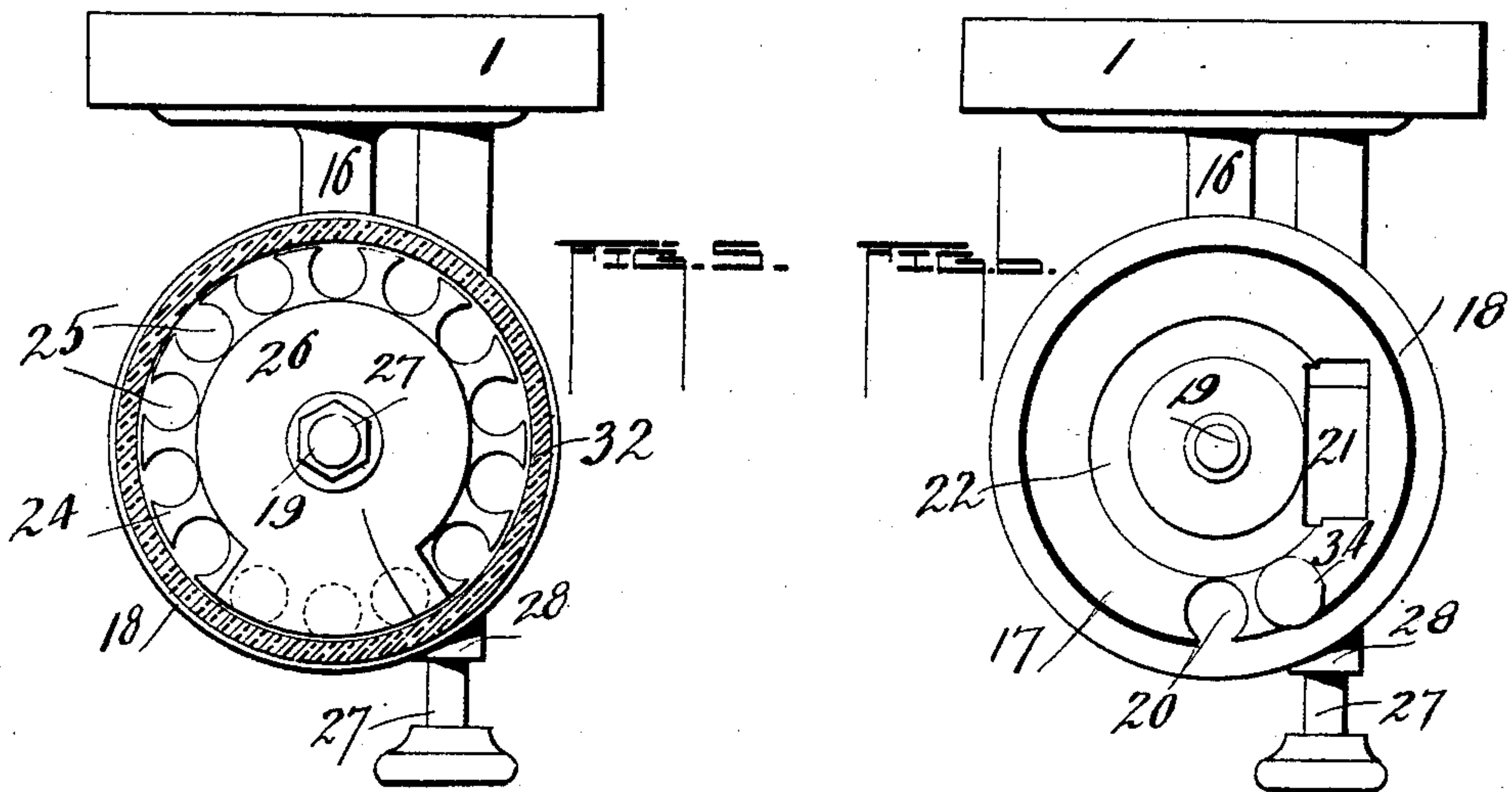


Fig. 5

37	40	41	42	43
26	25	250	175	75
24	24	240	168	72
23	23	230	161	69
22	22	220	154	66
21	21	210	147	63
20	20	200	140	60
19	19	190	133	57
18	18	180	126	54
17	17	170	119	51
16	16	160	112	48
15	15	150	105	45
14	14	140	98	42
13	13	130	91	39
12	12	120	84	36
11	11	110	77	33
10	10	100	70	30
9	9	90	63	27
8	8	80	56	24
7	7	70	49	21
6	6	60	42	18
5	5	50	35	15
4	4	40	28	12
3	3	30	21	9
2	2	20	14	6
1	1	10	7	3

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# UNITED STATES PATENT OFFICE.

JOHN M. DALY, OF PEORIA, ILLINOIS.

## GRAVITY COMPUTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 715,460, dated December 9, 1902.

Application filed October 28, 1901. Serial No. 80,381. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN M. DALY, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have  
5 invented certain new and useful Improvements in Gravity Computing-Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention,  
10 which will enable others skilled in the art to which it appertains to make and use the same.

My invention has reference to a gravity computing-machine, and has for its object a computing-machine or indicating apparatus for use by railroads and warehouses.

15 A further object of the invention is the provision of a tube or series of tubes or other transparent receptacles mounted in a frame and a series of indicating charts or tables carried in juxtaposition to said tubes.

20 The invention consists, further, of slugs or other suitable devices supported by mechanism carried above the tubes and arranged whereby said slugs may be intermittently and successively dropped into the tubes.

25 The invention consists, further, in the provision of mechanism arranged at the bottom of the tubes, whereby the slugs having been dropped into the tubes may be released one by one or be discharged therefrom at one  
30 time; and the invention comprises various details of construction and arrangement of parts, as will be hereinafter more fully described, and pointed out in the drawings herewith, forming a part of this specification, in  
35 which—

Figure 1 is an elevation in outline of my computing-machine. Fig. 2 is an enlarged elevation illustrating a single tube and chart. Fig. 3 is a front elevation and section of parts  
40 shown in Fig. 2. Fig. 4 is a view similar to Fig. 3, but cross-sectioned transversely. Fig. 5 is a sectional plan of the slug-dropping mechanism. Fig. 6 is a detail plan of the base-plate of the slug-dropping mechanism.  
45 Fig. 7 is a detail cross-section of the mechanism for the dropping of slugs. Fig. 8 is a sectional detail. Fig. 9 is a partial elevation of a transparent tube and a series of indicating charts or scales carried adjacent to each  
50 other.

In the present invention is illustrated a computing-machine especially adapted for

use in the accountant's office of railroads and by storekeepers in warehouses; but it is understood that while the invention is applicable  
55 to railroads and warehouses I do not wish to confine myself to this specific use, as it will be found practical for many other and various uses.

The invention as applied to railroads is  
60 used as a ready reference in the accountant's office for the purpose of keeping track of cars received from other roads and of the number of cars transferred from its line to the various lines connecting therewith. For instance, a  
65 railroad will have a machine comprising a tube and chart and auxiliary parts to represent its own road and a series of similar machines to represent the various lines connecting therewith, and from time to time as word  
70 is received by the accountant of cars transferred from the various foreign roads to its own immediate road he will cause to be dropped from the slug-case into the transparent tube as many slugs as is indicated by the  
75 notice of cars received which is indicated by the ready reference-chart of numerals arranged in juxtaposition to the tube. If it be that the notice is to the effect that its own cars have been transferred to various lines  
80 connecting therewith or to any particular one, the accountant will cause to be dropped from the slug-case of the particular road mentioned slugs which will be received in the tube of the machine working in conjunction therewith.  
85 In this way the accountant is relieved of going over a superfluous lot of material to find out how many cars are held of the various connecting-lines by his own road and how many cars have been transferred from his own line  
90 to that of other roads connecting therewith. We will suppose, for example, that the machines are being used by the Rock Island railroad and the accountant's office has received word of cars transferred from the Illi-  
95 nois Central, Santa Fe, and other roads, and that his line has transferred several of their own cars to the Illinois Central, Santa Fe, and other roads. He will drop as many slugs in the tube of the Rock Island machines as  
100 is indicated by the notice and drop as many slugs into the Santa Fe, Illinois Central, and various other machines representing other connections as is indicated by the notice of



cars received by these roads, means being provided at the lower end of the machines or tubes of said machines whereby when the cars have been retransferred to discharge a like number of slugs from the various tubes, which may be replaced in the slug-case at the head of the tubes.

When using the machines in warehouses or by storekeepers in large distilleries and other places, I use in connection with the tubes a chart comprising a numerical index for indicating the quantity of material sold, its selling price, cost price, and profit. In this way if the storekeeper was disposing of twelve bushels, barrels, or whatever it might be he would drop that number of slugs into the tube as would be indicated by the chart, which would advise him of the selling price of said goods, the cost price to himself or to his concern, and the profit made on the sale thereof, it being understood that the indicating-chart would be adjusted to suit the merchandise being handled by the storekeeper.

1 refers to a frame-support, and 2 represents a tube or a series of tubes or other transparent receptacles, the same being supported from the frame 1 by means of the castings 3 and 4.

5 is a receiving-funnel arranged at the head of the transparent tubes 2, made of bell-metal, for a purpose to be described. The casting 4, which supports the lower end of the tube or tubes, is arranged with a rectangular opening 6, running transversely of the tube, and has suitable openings 7 and 8 leading from the tube into the casting 4 and from the casting in such a manner as to permit devices carried within the tube to be discharged through and from the casting by means of the openings 7 and 8.

9 is a plug or suitable stem having a slidable relation in the opening 6 of the casting, the same being provided with a transverse opening 10 and a reduced rear extension 11. The plug or stem 9 when in its normal position is such that the opening 10 therethrough will be off center or to the side of the entry of the casting 4 in the tube and is held in such position by means of a coil-spring 12 around the stem 11, bearing against the casting 4, and an enlargement 13 of the plug, there being provided a socket 14 in the frame 1 to enable the plug or stem 9 to be reciprocated, so as to bring the opening 10 therein coincident with the opening 7 in the casting 4 and the lower end of the tube. When released, the plug or stem 9 will be forced back into the position shown in Fig. 4. The opening 8 is shown as an elongated slot partially covered by the swinging covering-plate 15, whose function will be further described.

At the head of the tube or transparent receptacle, or rather above the same, is arranged certain slug-dropping mechanism and receptacle. It comprises casting 16, secured to the frame 1, the casting supporting a circular base-plate 17, with an annular flange 18, a

central bearing-stem 19, a slug-dropping opening 20 therein, and a rectangular opening 21, and 22 is an annular depression or groove. Supported above and upon the base-plate 17 is a perforated revoluble slug-plate 24, with notches or openings 25, forming slug-cells for receiving and delivering slugs to the opening 20 in the base-plate 17. The slug-cells 25 are arranged in a circumferential line in such a manner that when the plate 24 is revolved the cells will successively coincide with the opening 20 in the base-plate. On the lower face of the plate 24 is arranged a circumferential ratchet 24<sup>a</sup>, seated in the groove of the base-plate. The said plate is held in position on the stem 19 of the base-plate, and 26 is a suitable covering-plate and deflector carried above the plate 24, and the plates 24 and 26 are retained by a tap 27 on the outer end of the stem 19. Beneath the base-plate is arranged a slidable member 27, carried in a boxing or housing 28, the same carrying a pawl 29, extending up through the opening 21 of the base-plate and engages with the ratchet-teeth of the plate 24. The pawl is spring-held by a spring 30 and the member normally held in position by a compression-spring 31. (Shown in Fig. 7.)

32 is a tubular receptacle, preferably transparent, supported by the base-plate 17 in the manner shown, and is designed to be filled with slugs 33, similar to those shown in Figs. 3 and 4, although any style slugs may be used, as desired. In the base-plate is arranged a hollow plug 34, carried in a depression or socket 35 alongside of the opening 20. It is held raised, substantially as in Fig. 8, by a spring 36 and is for the purpose of insuring a stopping of the plate 24 as the openings 25 therein are coincident with the opening 20 in the base-plate. It will be seen as the plate is revolved the plug 34 will be depressed and raised to engage an opening 25 coincident therewith to insure an intermittent stopping movement of the plate.

To drop a slug from the slug-retaining case, the member 27 is reciprocated in a manner to cause the pawl 29 through the ratchet 24<sup>a</sup> to partially revolve the plate 24. The slugs being deflected from the deflector 26 into the cells 25 will be caused, as the cells are coincident with the opening 20 in the base, to drop therethrough and into the funnel 5, arranged above the tube 2. The position of the opening 20 in the slug-receptacle is such that as the slugs drop from the case they will hit the conical side of the funnel, and the funnel being made of bell-metal acts as an indicator or check upon the slugs as they drop from the funnel into the tube 2, and as the slugs drop into the tube they rest upon the plunger 9 in the manner shown in the figures, and to release them one at a time the plunger 9 is pushed inwardly, which will permit the lowermost slug to drop into the perforation 10, and as the plunger is released it will spring back into its present position and



release the slug therefrom, which drops out through the opening 8. In case it is desired to release all of the slugs at one time from the tube the plunger will be held in its inward position and the plate 15 swung out of the way, which will permit the slugs to drop through the elongated opening 8. This means of releasing all at one time may be modified in many ways.

Supported on the frame 1 in juxtaposition to the tube or tubes is provided one or more channel-ways 37, in which are carried strips of suitable material 38, detachably secured therein, and upon these strips is printed a numerical index or table 39, one or more of which represents the number of slugs which are carried in the tube. If desired, this numerical index may be inscribed upon the tube itself.

In Figs. 1 and 9 is illustrated the method of using the machine when applying it to warehouses, wherein the channel-ways, which for convenience will be referred to as 40, 41, and 42, in which are carried strips of material 43, on which is printed a multiplication-table indicating the selling price of an article, the cost price, and profit, and beneath each of these tables is a card or other suitable device, upon which are printed the words "Selling price," "Cost price," and "Profit," and the channel adjacent to the tubes may be referred to as "Bushels," &c., as shown. To understand this better, suppose there were sold seven bushels at a cost price of seven cents, the profit being three cents. Thus if seven slugs be dropped in the tube it would indicate to the storekeeper at a glance that the seven bushels would amount to seventy cents, the cost price amounting to forty-nine cents, and the profit on the seven bushels amounting to twenty-one cents. It is understood that the tables would be changed to suit the cost of merchandise handled by the warehouse. On one of the face-plates of the channel-way adjacent to the tube it is designed to place a suitable character or other sign, as at 44. It may be at any point desired thereon and is for the purpose of notifying the storekeeper that when a given number of slugs have been dropped into the tube indicating the number of bushels, barrels, or whatever it may be that has been sold his stock of this particular goods is low and must be replenished. At the head of the tubular receptacle when arranged in a series, as shown in Fig. 1, I arrange a strap upon which is indicated the number of bushels, barrels, &c., represented by the slugs. As shown, the extreme left-hand receptacle indicates that each slug represents one; the second, one hundred; the third, five hundred, and the fourth one thousand. This arrangement, as well as other features of the device, may be modified and rearranged in many ways without departing from the spirit of invention herein.

Having thus fully described my invention,

what I claim, and desire to secure by Letters Patent of the United States, is—

1. The herein-described computing-machine, comprising, a transparent receptacle having a conical inlet of bell-metal, a detachable index, slugs coacting with the index and slug-dropping and slug-releasing mechanism independent of each other, substantially as described.

2. The herein-described, computing-machine, comprising, one or more tubes having conical inlets of bell-metal, a series of detachable indexes or charts slidable in ways in juxtaposition to the tubes, and devices arranged to be dropped into said tubes coacting with said indexes, and discharging mechanism arranged at the bottom of each tube, substantially as described.

3. The herein-described, computing-machine, comprising, one or more transparent receptacles having conical inlets of bell-metal, removably-arranged indexes parallel with said receptacles, slug-dropping mechanism above and independent of each tube, slugs carried by said mechanism to be dropped into the tubes, first engaging the conical inlets of the tubes and coacting with said indexes, and means for releasing the slugs from the receptacles, substantially as described.

4. A computing-machine, comprising a tube supported from a suitable base, channel-ways parallel with and in juxtaposition to the tube, strips upon which is arranged a numerical index detachably carried in the channel-ways, a slug-dropping mechanism arranged above the tube, suitable slugs carried by said mechanism, the mechanism arranged to be intermittently actuated for dropping the slugs therefrom into the tube and the means for intermittently releasing them from the tube one at a time or all together, as and for the purpose described.

5. A computing-machine or indicating apparatus, comprising a transparent tube, an index adjacent to the tube, a funnel at the head of the tube of bell-metal, a slug-case carried above the funnel comprising a base-plate, a revoluble cellular plate carried upon the base-plate and means of actuating said revoluble plate, slugs carried within said case arranged to be dropped into the funnel of the tube and from thence into the tube coacting with said index and means of releasing the slugs from the tube, as and for the purpose described.

6. In a computing-machine, the combination of a transparent receptacle having a conical inlet of bell-metal, removable indexes adjacent thereto, slugs arranged to be dropped into the tube, a slug-case removed above the tube comprising a base-plate supporting a transparent holder, a revoluble plate on the base-plate having cellular openings in its edge, a discharge-opening in the base-plate coincident with said cellular openings in the revoluble plate, and means for imparting an inter-



mittent rotary movement to the cellular plate, substantially for the purpose described.

7. A computing or indicating apparatus, comprising a frame, an index or chart thereon, 5 a tube adjacent to said index having a conical inlet of bell-metal and an inclosure for the bottom thereof, a transparent case arranged above the tube, slugs coacting with said tube and chart carried by said case, an outlet from 10 said case and mechanism for intermittently dropping from the case slugs which engage with the sides of the conical inlet as they drop into the tube, a plunger capable of being reciprocated within the inclosure at the lower 15 end of the tube having a transverse opening for receiving the slugs as the plunger is reciprocated and the means of releasing the slugs from the plunger, as and for the purpose described.

8. A computing-machine consisting of a transparent receptacle, a case arranged above the receptacle, slugs retained by said case and means for dropping the slugs from the case into the receptacle, a numerical index 25 arranged at one side of the tube and one or more multiplication-tables upon the opposite side, as and for the purpose described.

9. A computing-machine, consisting of one or more vertically-arranged tubular recepta- 30 cles, a series of divided channel-ways arranged intermediate the receptacles, suitable cases arranged above the receptacles, slugs or equivalent devices to be dropped into the receptacles held within the cases and the 35 means of dropping them from the cases into the receptacles, a series of indexes and multiplication-tables carried in the channel-ways, the indexes adjacent to one side of the receptacle indicating the number of slugs as they 40 are dropped therein representing quantity of merchandise sold, and the multiplication-tables indicating the selling price, cost price, and profit, as and for the purpose described.

10. A computing-machine, consisting of a 45 tubular receptacle, a case arranged above the receptacle, slugs or other equivalent devices

retained by said case and means for dropping the slugs therefrom into the receptacle, a series of tables or indexes carried parallel with the receptacle, one a numerical index in suc- 50 cessive order and the additional tables or indexes arranged with suitable multiplication-tables for the purpose described, and an indicating-sign or other character located at a suitable point adjacent to the numerical in- 55 dex and receptacle, substantially as set forth.

11. In a computing-machine, the combination with a tubular receptacle, numerical index and other suitable tables, slugs coacting with said receptacle, index or other tables, a 60 slug-dropping mechanism comprising a base-plate with a discharge-opening and a rectangular slot as shown, a revoluble plate carried upon the base-plate arranged with a ratchet upon its lower face and with a series of open- 65 ings or notches forming slug-cells, a reciprocal member spring-held carried beneath the base-plate arranged with means engaging with the ratchets of the revoluble plate whereby said plate may be actuated to intermit- 70 tingly bring the slug-cells coincident with the discharge-opening in the base-plate for dropping the slugs therefrom into the receptacle, as and for the purpose described.

12. A computing-machine, the combination 75 of a slug-case, slugs carried within said case, means of discharging the slugs therefrom, a suitable receptacle for receiving the slugs one upon the other, a numerical index for determining the number of slugs dropped into the 80 receptacle, a sign or other character upon the index as at 43, one or more multiplication-tables carried parallel with the index and a chart for indicating the character of the tables, as and for the purpose set forth. 85

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

JOHN M. DALY.

Witnesses:

J. CAMPBELL,  
E. GIROISARD.