(No Model.) 5 Sheets—Sheet 1.

C. H. COOLEY.

GRAIN SCALES.

No. 416,714. Patented Dec. 10, 1889.

Fig. 1.

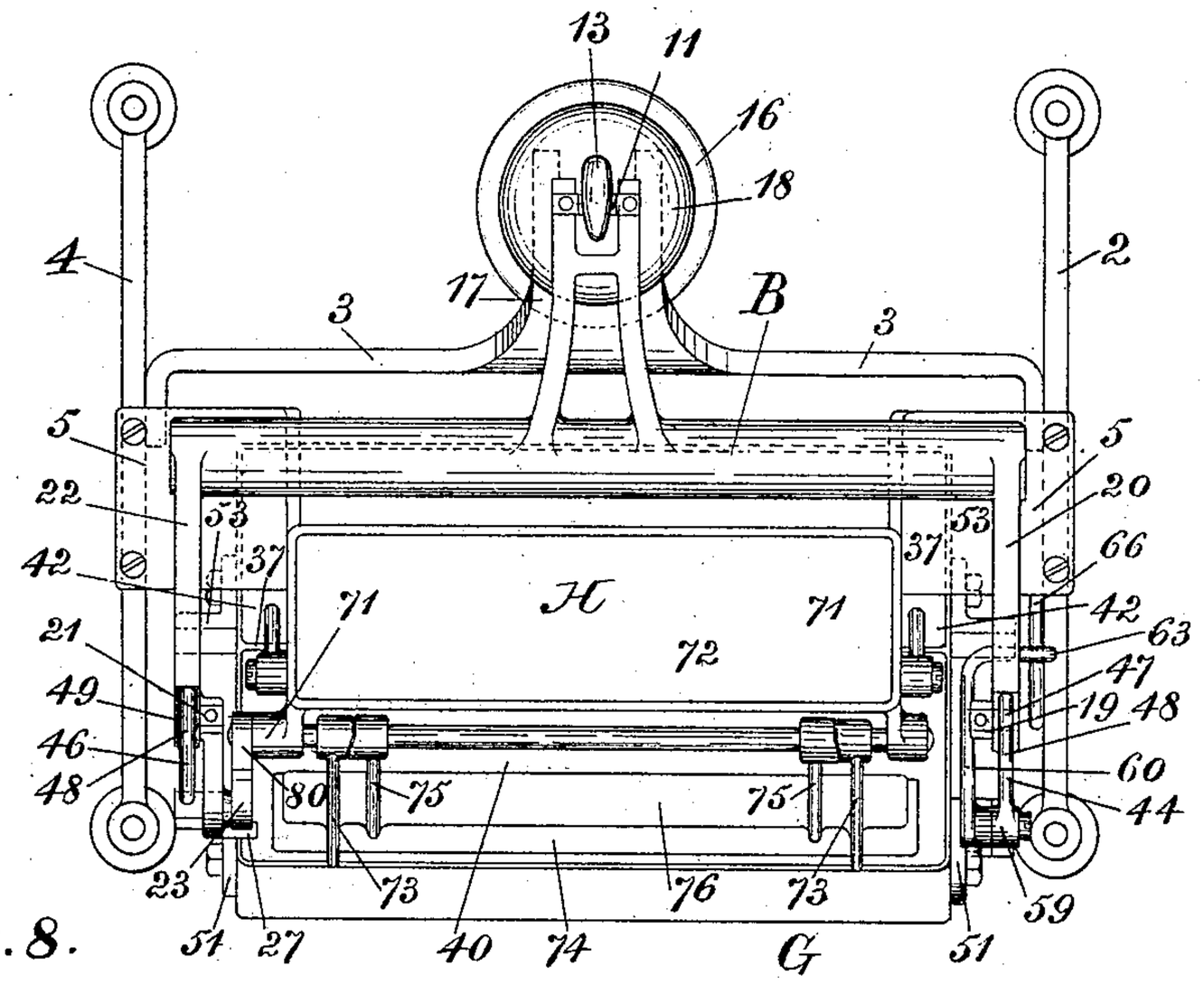


Fig. 8.

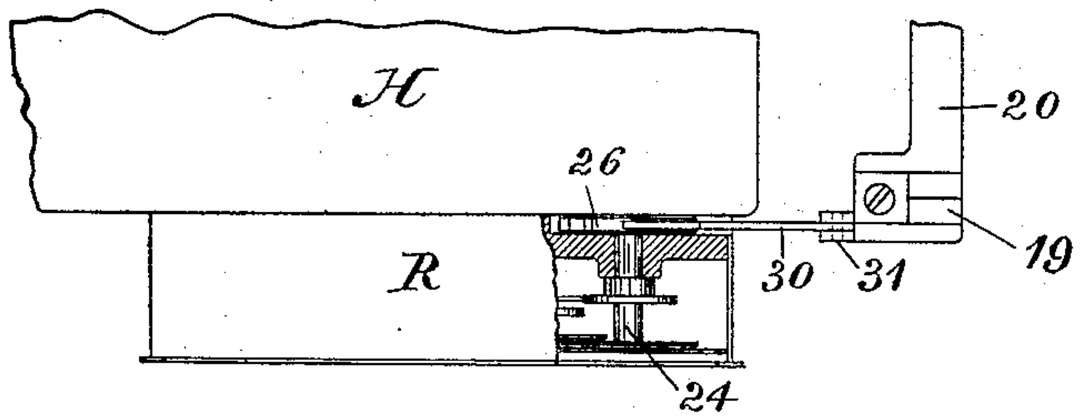


Fig. 9.

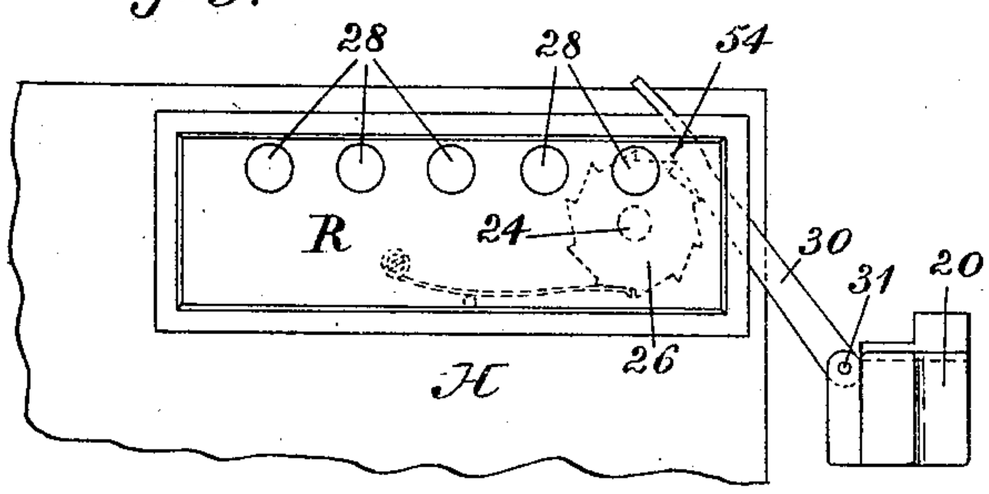
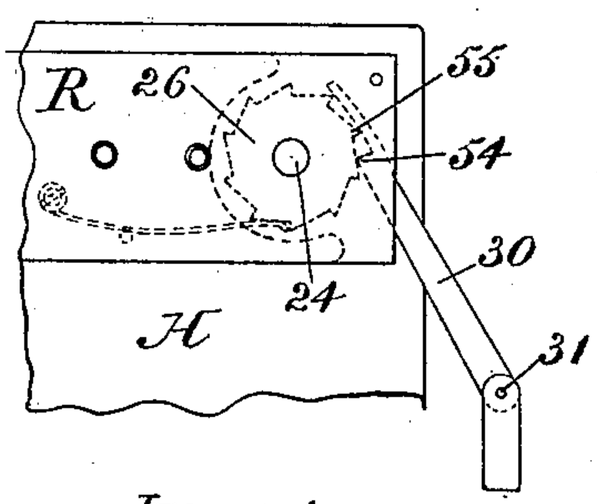


Fig. 10.



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(No Model.) 5 Sheets—Sheet 2.

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Fig. 2.

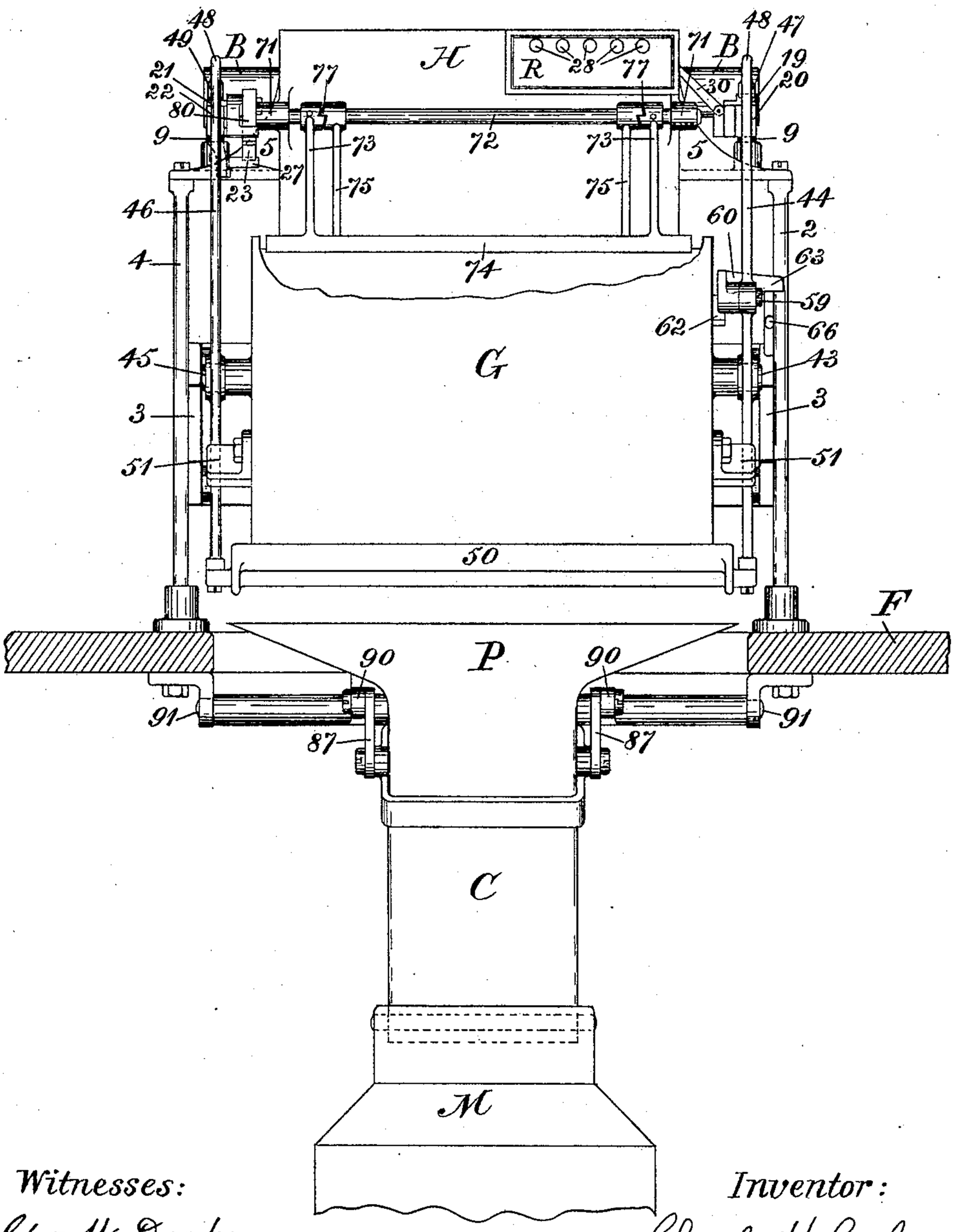

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Fig. 7.

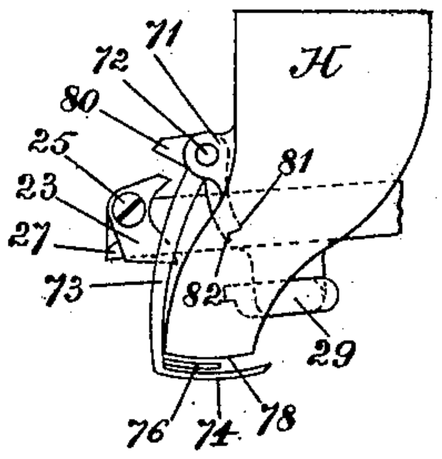
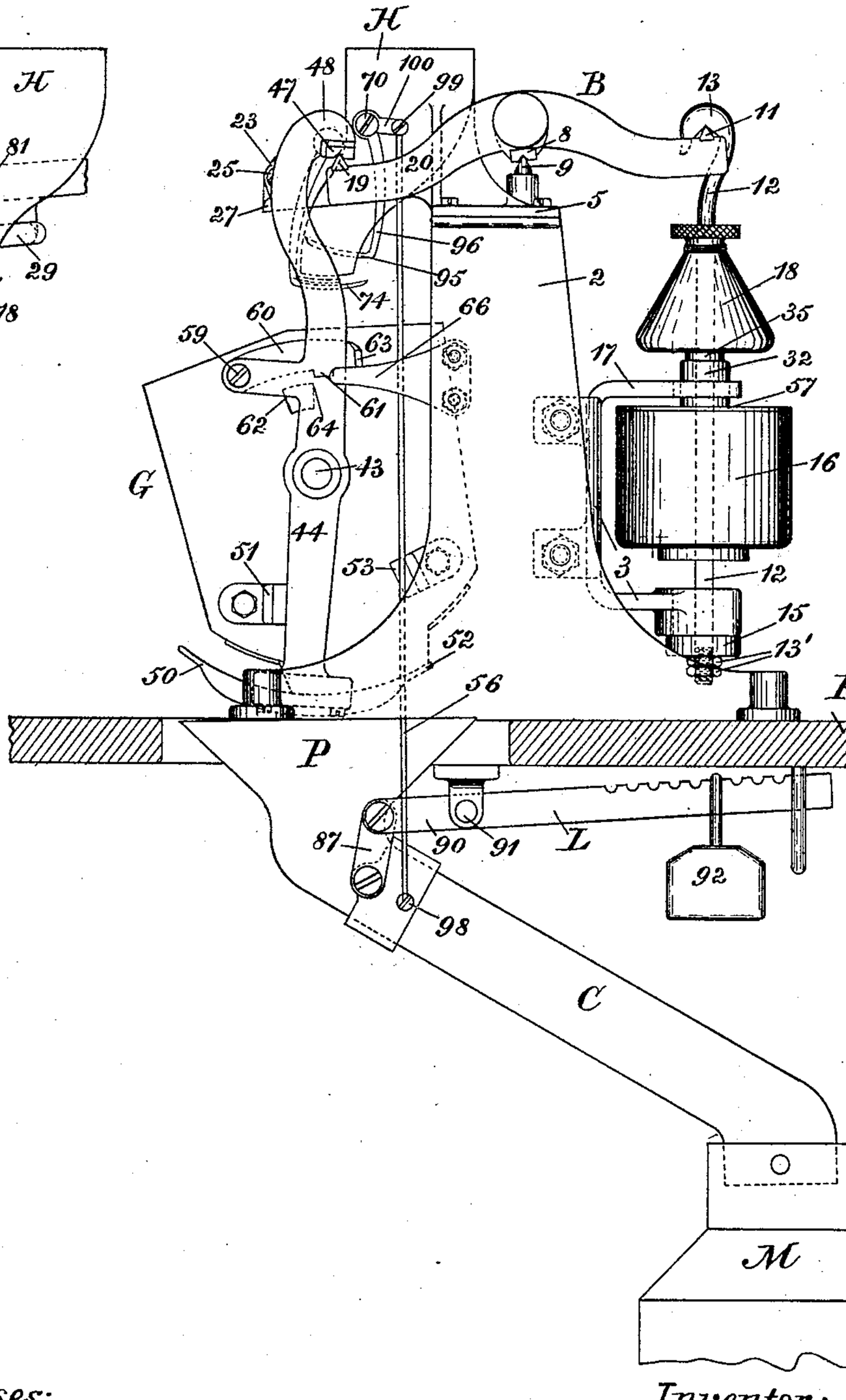


Fig. 3.



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(No Model.) 5 Sheets—Sheet 4.

C. H. COOLEY.

GRAIN SCALES.

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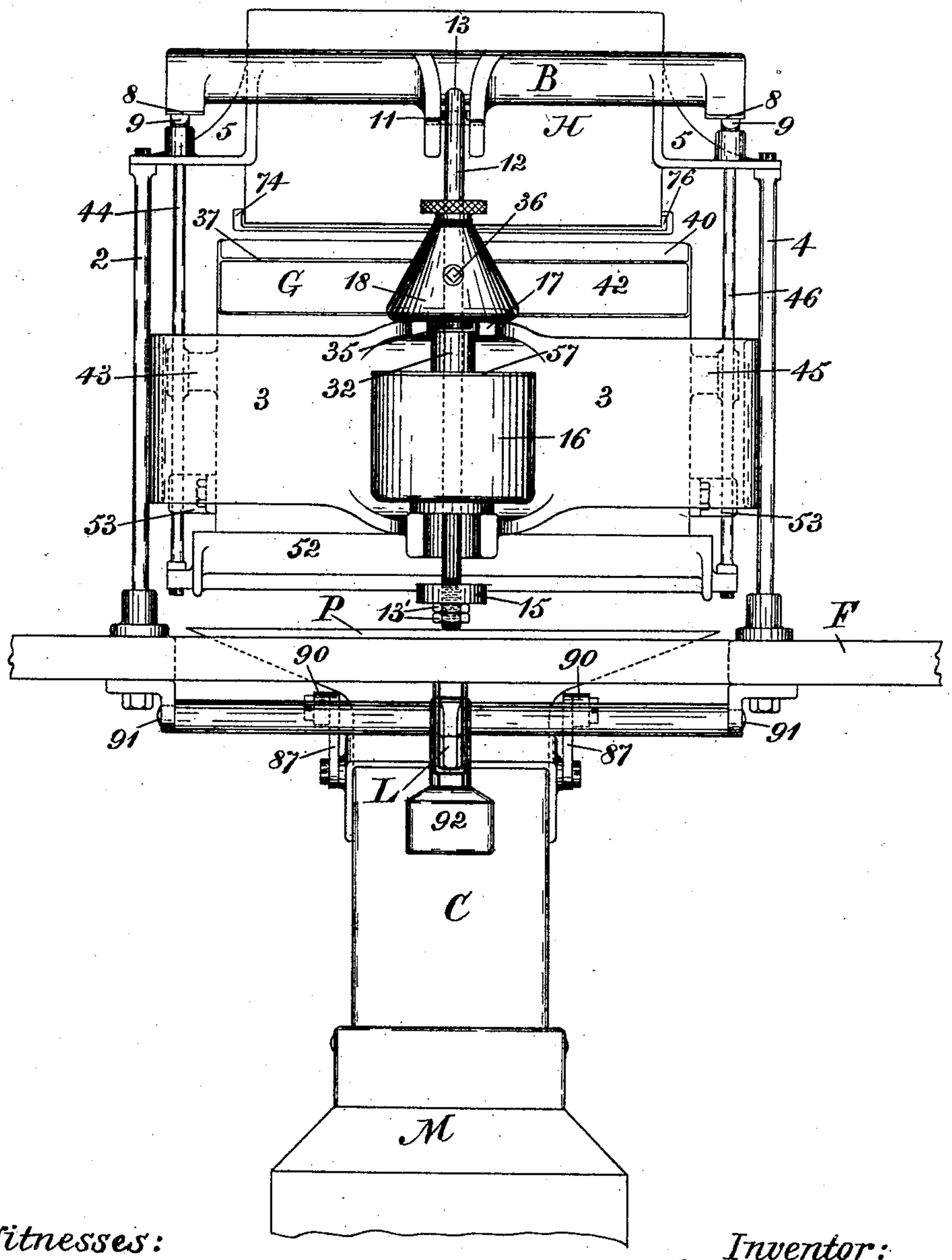
Fig. 4.



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(No Model.) 5 Sheets—Sheet 5.

C. H. COOLEY.

GRAIN SCALES.

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Fig. 5.

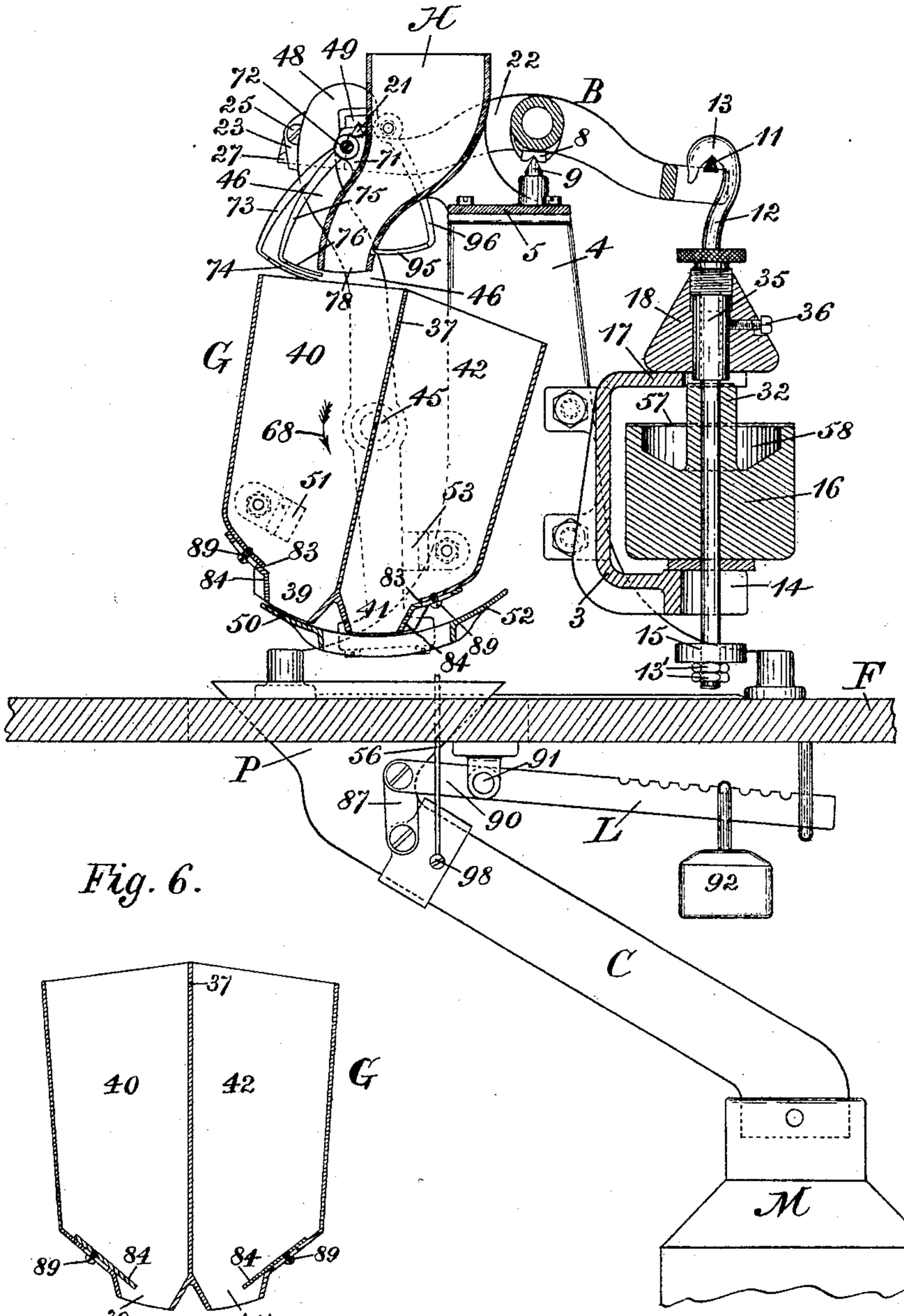

Fig. 6.

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UNITED STATES PATENT OFFICE.

CHARLES H. COOLEY, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE PRATT & WHITNEY COMPANY, OF SAME PLACE.

GRAIN-SCALES.

SPECIFICATION forming part of Letters Patent No. 416,714, dated December 10, 1889.

Application filed October 15, 1888. Serial No. 288,151. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. COOLEY, 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-Scales, of which the following is a specification.

This invention is in the nature of an improvement on the automatic grain-scale described in my application for Letters Patent of the United States, Serial No. 262,850, filed February 3, 1888, Patent No. 403,988, dated May 28, 1889.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan of an automatic grain-scale embodying my improvements. Fig. 2 is a front elevation of the machine. Fig. 3 is a side elevation of the machine, which side is at the right hand in Fig. 2. Fig. 4 is a rear elevation of the machine. Fig. 5 is a central vertical section in a plane from front to rear through the machine, showing the principal operative parts in reverse positions to their positions shown in Fig. 3. Fig. 6 shows a modified construction of the speed-regulator. Fig. 7 is a side elevation of and illustrating certain details of the valve-operating devices. Fig. 8 is a plan view, partially in section, of the register or counting apparatus. Fig. 9 is a front view of the same. Fig. 10 is a partial front view of said apparatus, illustrating the operation of the register-actuating pawl.

Similar characters designate like parts in all the figures.

The frame-work for supporting the several operative details of my improved grain-weighing machine may be substantially the same as shown in the aforesaid application; but I prefer the modified construction herein shown and described. This frame-work (shown standing on floor F) consists in two suitable side frames 2 and 4 and a cross-frame 3, holding said frames together by joining the rear sides of the plates or frames 2 and 4, and supports at proper times the weights suspended from the scale-beam. Another plate or top frame 5 joins the upper part of the side frames or uprights and serves to carry certain details, hereinafter described. Other cross-wise tie-rods are sometimes provided in the larger sizes of the machines.

My improved machine comprises as principal elements thereof a scale-beam, a double-chambered oscillating bucket suspended from one end of said beam, a counterpoise or main weight supported from or on the opposite end of said beam, a supplemental weight, a discharging-hopper or supply-chute above said bucket, a counterbalanced vertically-movable receiving-conduit below said bucket, a pair of cut-off valves and devices actuating the same from the scale-beam, and a regulator-valve operatively connected with the said movable conduit. Not all of these elements, however, are necessarily employed in a single machine.

The regulator apparatus is not claimed herein, being described and claimed in a separate application.

The scale-beam B is a frame composed of a suitable shaft and arms, and is preferably cast in a single piece. On its under side, at the sides thereof, the beam B has V-shaped bearings 8, which rest on the usual knife-edges 9, duly supported on the frame-work. The usual side stops (not shown) are or may be provided to resist lateral movement of the scale-beam on its supporting knife-edges. At its rear end the scale-beam has thereon a knife-edge 11, from and on which the weight-rod 12 is suspended by a hook 13, having therein the usual V-shaped bearing. The lower end of rod 12 passes freely through a hole or slot 14, Fig. 5, in beam 3. A buffer 15 is ordinarily affixed (by nuts 13′) to the lower end of rod 12, to limit the upward movement of said rod and lessen the shock due to the stoppage of the descending loaded bucket. The large or main weight 16, suitably fixed on rod 12, is designed to approximately balance the grain-bucket, together with the major part of one charge or load of grain therein, and to furnish the force required to work the cut-off valves. The said main weight 16 and the supplemental weight 18 together correspond to the weight of grain to be weighed at a single charge or load. In practice I usually make the weight 16 with a space 58 under the removable cover 57, in

which to deposit shot or other small weights to accurately adjust the weight or mass of said main weight in a well-known manner. Said supplemental weight rests (when the main weight is down) on the shelf 17 on the plate 3, and is provided with an adjusting-screw 35. The main weight 16 (or the hub 32 thereof) when it rises strikes the lower end of said screw 35, and thereby lifts the weight 18, and the stop-screw 35, being adjustable in weight 18, the stroke of weight 16, relative thereto, may be readily and properly regulated. One important utility of this arrangement is that while the "drip" is completing the final load both weights (together with the beam) are entirely supported on the knife-edge 9, so that the adjustment of the said stop-screw can in no way vitiate or affect the accuracy of the weighing. It will be understood, of course, that the supplemental weight is free to move on the rod 12, being itself adjustably fixed by set-screw 36 or otherwise on the hollow stop-screw or stem 35.

The usual extent of the movement of the main scale-beam is shown by Figs. 3 and 5. In Fig. 3 the position of the main beam is such that the hub 32 of weight 16 bears against stop 35, thereby lifting weight 18 from its seat on frame 3, so that both weights are now supported on the knife-edges 9; but in Fig. 5 the descending movement of the rear end of beam B has deposited the weight 18 on the shelf 17. At its forward end the scale-beam consists of two arms 20 22, provided respectively, with the knife-edges 19 and 21, from and on which edges the grain-bucket is suspended. The arm 22 has at its extreme front end a weighted pawl 23, pivoted to said arm at 25 and normally lying against stop 27; also, a valve-stop 29, whose particular purpose and operation will be hereinafter explained.

The grain-bucket, designated in a general way by G, has two similar oppositely-disposed chambers 40 42, divided by the partition or wall 37. At their lower ends said chambers are contracted in cross-sectional area, and terminate in spouts 39 and 41, respectively, whose lower edges are concentric to the axis of the pivots or journals on which the bucket is supported and oscillates. These journals, which are designated by 43 and 45, respectively, and are rigidly fixed on the bucket, have their bearings in the hangers 44 46, that are suspended by means of inverted-V-shaped bearings 47 49 from the aforesaid knife-edges 19 and 21. Said bearings 47 49, I form on the under side of the hook-shaped upper ends 48 of said hangers, so that the bucket may be readily removed from the machine, together with the said hangers attached thereto. Below the journals or trunnions 43 45 the hangers are shaped to carry the bucket-closing valves or bottoms 50 52, for the respective bucket-chambers 40 42 in their proper positions relative to each other and to the spouts 39 and 41. On either side of the hanger and on one or both ends of the bucket are placed fixed stops 51 53, respectively, which serve as stops for properly limiting the oscillating movement of the bucket on its trunnions. In practice I face each of said abutments with a rubber or other yielding piece (not fully shown) to lessen the noise and shock otherwise resulting from the blows of the bucket on said stops or abutments. The oscillation of the bucket on its journals is effected by the weight of the grain therein contained, and said movement is restrained or delayed until the proper moment by means of a latch arranged to engage with suitable catches on said bucket. The bucket-latch 60 is pivoted to the hanger at about the point 59, and has a lug or projection 61 for engaging with the bucket-catches 62 64, fixed on the bucket. A projecting end 63 on the latch on the downward movement of the bucket strikes the tripping-arm 66, (which is connected to the frame in any convenient manner,) and thus serves to unlock the bucket. The bucket is shown tipped backward in Fig. 3 and forward in Fig. 5, in which cases the latch engages with catches 62 and 64, respectively. The bucket standing, as in Fig. 5, receives its load in chamber 40, and thereby acquires a tendency to turn in the direction of arrow 68, which tendency is for time being resisted by catch 62; but when the increasing load carries down the bucket, as in Fig. 3, the arm 66 raises latch 60, and thus releases the bucket, which is then carried over to its position in this figure. The load being now discharged, the bucket rises and brings catch 64 into engagement with latch 60, thereby locking the bucket in position for the loading of chamber 42. Thus the latch operates on said catches alternately so long as the machine is in use.

Immediately above the grain-bucket the discharging hopper or spout H is held in place by some suitable connection with the main frame, and grain is supplied to said hopper by some suitable trough or chute. (Not shown.) A valve-shaft 72 is mounted in bearings 71 71 on the hopper H, and carries fixed thereon the arms 73 of the supplemental cut-off valve 74. Loosely mounted on said valve-shaft are other arms 75, carrying the main cut-off valve 76. The hubs of arms 73 are formed to engage (after the manner of clutches) with those of arms 75, as at 77, Fig. 2, whereby the forward movement of said valve 74 carries with it the main cut-off valve 76 to the position shown in Fig. 5, thereby permitting a full stream of grain to flow down into the bucket G. In Figs. 3 and 7 both of said valves are shown closed. When the main valve closes, it leaves only a narrow opening 78, through which the grain may slowly flow or "drip" into the bucket to complete the charge or load to be weighed. This done the supplemental valve also closes, thus entirely cutting off the stream of grain. For thus operating said cut-off valves I employ the same

devices as described for that purpose in Letters Patent of the United States No. 302,136, granted to J. W. Hill, July 15, 1884. Upon one or both ends of shaft 72 is secured a toe 80, the upper ends of which form lifting-toes and the lower ends holding-toes or cam-stops. These two parts may be and are usually formed of one piece. Evidently these toes and valve 74 have the same angular movement, since all of these parts are secured on the same shaft 72. The pawl 23 operates to open the cut-off valves on the upward movement of the front end of beam B, as and for the purpose fully explained in said Letters Patent and in my said application. On receiving the major part of its load of grain the bucket descends until the supplemental weight 18 rests on the main weight 16. Meanwhile the stop 29 has descended with the beam until passing off from notch 81, thereby letting the valves swing under hopper H until stopped by the second notch 82 coming in contact with the said stop 29, at which time said cut-off valves stand, as above explained, with the main valve closed and the supplemental valve open. The grain now continues to flow, but much more slowly, into the bucket, until the final load is received therein, when the bucket overbalances the combined weights 16 and 18 and descends, carrying stop 29 down below notch 82, and thus permitting valve 74 to close, as in Fig. 7. During said descent pawl 23 is drawn down over the toe 80 and stands ready to again open the cut-off valves on the ascent of the main beam. This is the mode of operation described substantially as in the aforesaid patent, No. 302,136, but with the aid of different reference-characters.

One part of my present invention relates to the construction of the lower end or spouts of said grain-bucket and to the construction and the combination, with said spouts, of the adjustable speed-regulating plates. On the outer side of each spout I cut away the wall thereof, as at 83, Fig. 5, Plate 84, held in place by screws 89, by which the opening 39 or 41 above the closed valve 50 or 52 may be adjusted, as required, for adapting the machine to weigh different kinds and quantities of grain in a given time. This result is owing to the regulation of the velocity of discharge of the grain from the chambers 40 and 42 by varying the width of the spout 39 or 41, for the time required to discharge enough of the load to permit the bucket to rise determines the time and velocity of the opening of the cut-off valves to obtain the next load, and by retarding said discharge by closing more or less the said spout the normal speed of the machine and the velocity of the upstroke of the beam are correspondingly reduced. By this means the velocity of said beam movement may be regulated to produce a smooth and steady action of the machine with different kinds of grain, so that a machine properly constructed for weighing a light and slow-flowing material, as oats or malt, may be adjusted to operate properly in weighing the heavier and more rapidly-flowing grains, as wheat and corn.

In Fig. 6 is shown an obvious modification of the speed-regulating apparatus, in which the adjustable plate 84 is placed within the bucket and extends into the spout 39 or 41, thus narrowing the width thereof.

One of the uses of automatic grain-weighers is to weigh and deliver grain to grinding-mills, which must not be oversupplied. For such uses I provide my improved machine with an automatic regulator substantially as follows: Underneath the bucket and for receiving the grain discharged therefrom I arrange a vertically-movable inclined conduit C, having a hopper P, of arrangement to receive the grain discharged from the bucket. This conduit is supported at its upper end by counterbalancing the same on links 87 between the two arms 90 of the lever L, which lever is pivotally supported at 91 and has on the rear end thereof a regulator-weight 92, of sufficient weight to raise said conduit, together with a small quantity of grain therein. When the conduit C, being heavily loaded, descends by the weight of the grain therein, it acts, through a connecting-rod 56, to close a regulator-valve 95 in the hopper or chute H, and thus stop the flow of grain to, and consequently the operation of, the grain-scale. The valve 95 remains closed until the gradual discharge of the grain from the pipe C into the grain-receiving machine or chamber M, as indicated in Fig. 5, permits the counter-balance to lift the said pipe and again open the regulator-valve.

The register for counting and registering the number of loads of grain discharged by the machine is illustrated in Figs. 8, 9, and 10, in which R is supposed to be any suitable and well-known registering apparatus, having, as usual, a series of figured wheels, seen through the openings 28. The first of said wheels is on a shaft 24, that carries a ten-toothed ratchet-wheel 26. The freely-pivoted pawl 30, connected at 31 to the scale-beam arm 20, is constructed and arranged substantially as shown, so that during the downward stroke of said beam the pawl-point 54 will rest lightly against the ratchet-wheel 26, and so that before said stroke is completed said point 54 will drop under the tooth 55 of said ratchet-wheel, as shown in Fig. 10. On the upward stroke of the beam the said pawl then turns the ratchet, and acting through this turns the register-wheels to register the same load of grain which just previously carried down the beam.

The several features of my invention and the particular operation of the same having now been described, the operation of the whole machine will be understood without further description, especially since such operation of the old parts thereof is fully de-

scribed in the aforesaid patent to Hill and in the patents therein by him referred to, or in my said prior application.

Having thus described my invention, I claim—

1. In a grain-scale, the combination of the vertically-movable grain-bucket, one or more cut-off valves constructed and arranged to be opened by the upwardly-moving scale-beam and a beam-movement regulator in said bucket, the same consisting in a plate adjustably fixed in said bucket and arranged to be moved laterally of the spout thereof to regulate the velocity of discharge of the outgoing grain and thereby time the movements of the scale-beam, all substantially as described.

2. In a grain-scale, the combination, with the hangers and the bucket-closers fixed thereto, of the grain-bucket carried in the hangers and arranged to be swung to bring the discharge-spout thereof over said closer contiguous thereto, one side of said spout being formed of the laterally-adjustable plate 84, whereby the velocity of discharge of the outgoing grain may be regulated in order to time the movements of the scale-beam, all substantially as described.

3. In a grain-scale, the combination, with a frame-work and the scale-beam mounted thereon, of the main weight suspended from said beam by rod 12, the supplemental weight having the tubular adjusting-screw 35, fitting loosely on said rod, one support or shelf on the frame-work for the main weight, and another support thereon for the supplemental weight, all substantially as shown and described.

4. In a grain-scale, the combination, with the side frames and the top plate and the scale-beam mounted thereon, of the cross-frame 3, having the lower support for the main weight and the upper support for the supplemental weight, of the rod 12, suspended from said beam and having the main weight fixed thereon, and the supplemental weight having an adjusting-screw, substantially as described, and carried freely on said rod above said upper support, all constructed and arranged substantially as shown and described.

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