

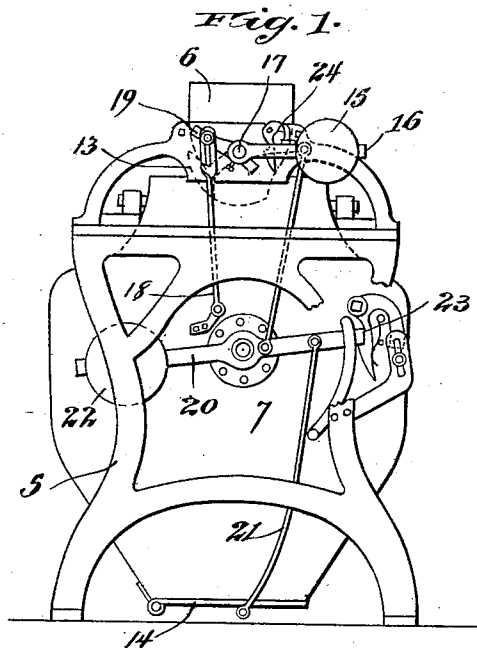
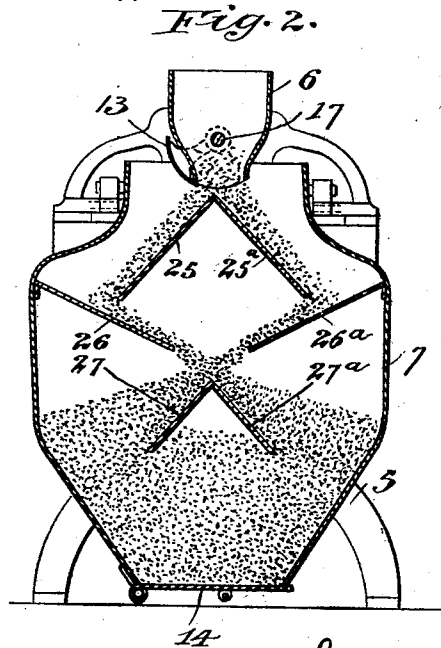
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Patented Dec. 30, 1902.

A. P. MACDONALD.
AUTOMATIC GRAIN SCALE.
(Application filed Jan. 13, 1902.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.
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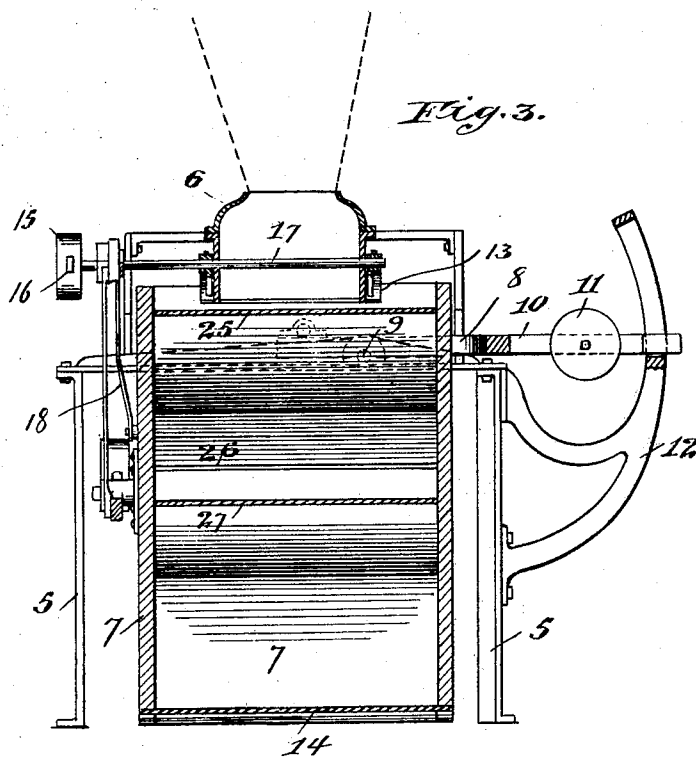
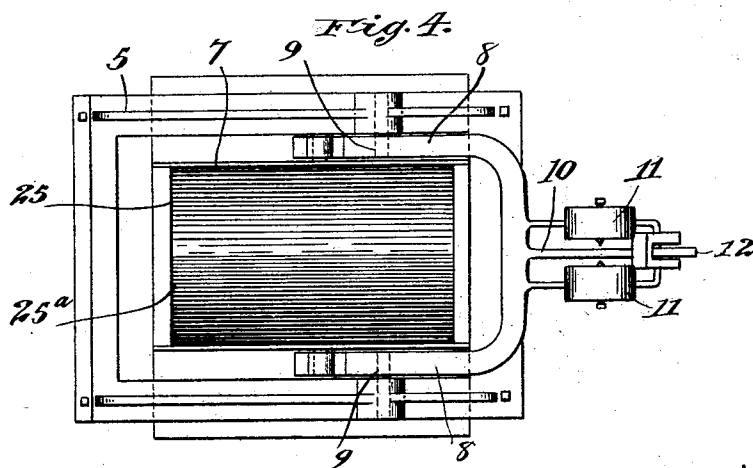
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AUTOMATIC GRAIN SCALE.

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(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC GRAIN-SCALE.

SPECIFICATION forming part of Letters Patent No. 717,426, dated December 30, 1902.

Application filed January 13, 1902. Serial No. 89,478. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER P. MACDONALD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Grain-Scales, of which the following is a specification.

This invention relates to certain new and useful improvements in that class of registering devices known as "automatic grain-scales;" and the principal object of my invention is to render such devices more reliable in operation and more accurate in results.

Grain-scales to which my improvements are applicable and for use in connection with which they are more particularly designed are commonly employed in grain-elevators and mills in the operation of transforming grain or cereal products from a condition in bulk or mass into a number of sacks, packages, or receptacles of predetermined and uniform weight. Such scales comprise as their principal and essential elements a stationary supporting-frame, a hopper superposed thereon, a weighing-receptacle pivotally suspended beneath the hopper on one end of a counterweighted scale-arm fulcrumed on the frame, and automatic cut-off valves at the discharge end of the hopper and the grain-receptacle, respectively, which are usually connected and provided with tripping mechanism operated by the rise and fall of the grain-receptacle in such a manner that the hopper-valve is closed and the receptacle-valve opened upon the descent of the receptacle, while the converse simultaneous movement of the valves occurs on the rise of the receptacle to loading position.

In practice the above-described type of automatic grain-scale has been found to be seriously objectionable in one particular, consisting in the fact that it makes no account of the weight of that part of the entering grain which is in suspension between the discharge-mouth of the hopper and the top surface of the grain already deposited in the holder at the time the scale-beam is tilted and the holder descends, indicating the reception thereby of the intended weight of grain. Where quantities or weights of grain considerably less than the full capacity of the holder are to be delivered by the latter, the

amount of grain thus existing in suspension when the beam is tipped is quite considerable. It is true that allowance can be made therefor in the adjustment of the weight on the scale-arm; but even this is unsatisfactory as an offset to the error thus incurred, by reason of the fact that the volume of any grain does not always bear a constant proportion to its weight, this difference resulting principally from the fact that some grain is in a much drier condition at times than other grains or the particles or kernels of different quantities of grain will vary in respect to physical structure and the degree of solidity existing therein. This causes the same grain to "run light" on some days and "run heavy" on others, the meaning of which is that the same weights of grain will differ slightly in volume, and since the volumes existing in the receptacle at the instant of cut-off differ it follows that the volumes existing in the grain held in suspension will also differ and inversely to the volumes already at rest in the receptacle.

The object of my invention, more specifically stated, is to eliminate in so far as possible and sufficiently for all practical purposes the error which has heretofore arisen through neglect to take into account these variations in the run of the grain, which render it impossible to provide with any near degree of accuracy by the adjustment of the weight on the scale-arm for the grain in suspension at the moment of cut-off; and this object I carry out by the provision within the receptacle itself of means designed to convey to the receptacle the gravity effect not alone of the grain which has come to rest therein, but likewise of all the grain which may have entered the mouth of the receptacle but not yet come to rest therein at the instant of cut-off.

A grain-scale illustrating the principle of my invention and embodying a preferred form thereof is illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation, certain parts of the frame being broken away to disclose the automatic tripping mechanism and the scale-beams being omitted for the sake of clearness. Figure 2 is a vertical transverse section through the hopper and the holder, the scale-beams being here omitted also for the sake of clear-

ness. Fig. 3 is a vertical longitudinal section through the same parts, and Fig. 4 is a top plan view with the hopper removed.

For convenience in illustrating the construction, location, and application of my invention I have shown the same applied to an automatic grain-scale such as is illustrated in United States Letters Patent to J. B. Dutton, No. 387,154, dated July 31, 1888, and I will therefore briefly describe the principal parts of this scale and its mode of operation, for a fuller description of which, if desired, reference may be had to the patent referred to.

In the drawings, 5 indicates an upright frame, in the upper portion of which is supported a hopper 6, into which the grain-spout (not shown) leads. Below the hopper and within the frame is mounted the grain holder or receptacle 7, this latter being pivotally hung between the forked arms 8 of a scale-beam pivoted on the frame 5 at fulcrums 9 and having a rearwardly-extending scale-arm 10, on which is mounted an adjustable weight 11, slidable thereover. The outer extremity of the scale-arm 10 is guided and limited in its vertical movements by a bracket 12. The weight 11 being set to any predetermined weight indicated on the scale-arm, it is obvious that the grain will fall through the hopper into the receptacle until a weight of grain sufficient to counterbalance the weight 11 has been received therein, whereupon the receptacle will drop, at the same time elevating the scale-arm carrying the weight, thus indicating that the desired weight of grain has been received.

13 designates an oscillating cut-off valve controlling the discharge-throat of the hopper, and 14 designates a hinged valve applied to the bottom of the holder and performing the same function for the latter. The valve 13 is normally maintained in open position by a counterweight 15, carried on an arm 16, fixed upon a shaft 17, on the opposite side of which latter the cut-off valve 13 is suspended. This latter valve is positively drawn to its closed position in opposition to the normal effect of the weight 15 by means of a link 18, fast at its lower end to one side of the holder and pivotally connected at its upper end with a short arm 19, also fast on the shaft 17 and on the opposite side thereof from the counterweighted arm 16. The valve 14 is normally maintained closed by means of a counterweighted arm 20, pivoted on the same side of the holder, which arm is connected with the valve 14 by a pivoted link or connecting-rod 21. The counterweight 22 of the arm 20 being on the opposite side of the fulcrum or pivotal point from the upper end of the link 21 obviously tends to maintain the valve 14 in its closed position. This tendency is overcome by the weight of the grain within the holder when the latter drops to effect its automatic discharge, in which latter operation a tripping mechanism (indicated at 23) is released to allow the arm 20 to oscillate in a di-

rection to drop the door 14. A similar tripping mechanism (indicated at 24) catches the short end of arm 19 when the cut-off valve 13 is swung to closed position and maintains said valve closed while the holder is discharging its previously-acquired load. These tripping devices form no part of the present invention, and for a further description thereof reference may be had to the patent hereinabove referred to.

Coming now to those features of construction in which my present invention resides, it will be observed by reference to Figs. 2 and 3 that I provide the interior of the grain holder or receptacle with a series of transverse baffles, so disposed as to lie in the path of and intercept the stream of incoming grain and constitute a support to take up the gravity effect thereof from the point at which it leaves the discharge-throat of the hopper to the point at which it comes to rest upon the grain already received in the lower portion of the holder. As shown in Figs. 2 and 3, I preferably dispose these baffle-plates as follows: In the upper portion of the holder and below the discharge of the hopper is located the top pair of plates 25 25^a, which meet along their adjoining upper edges in a ridge or apex and are downwardly divergent, being arranged approximately at a right angle. The ridge or apex of these plates is disposed immediately adjacent to the discharge-opening of the hopper, by which is meant that there is only sufficient space between them for the play of the cut-off valve, as clearly shown in Fig. 2. Below and closely adjacent the lower margins of the plates 25 and 25^a are disposed a pair of counter baffle-plates 26 and 26^a, respectively, which plates are secured along their upper margins to the side walls of the receptacle and extend inwardly at a comparatively slight angle from the horizontal toward the center of the receptacle. Below and closely adjacent the delivery margins of these plates and substantially centrally between them is located a second pair of baffles 27 and 27^a, possessing the same downwardly-divergent relation as but somewhat smaller in extent than the plates 25 25^a.

In operation as the stream of grain is delivered from the discharge of the hopper it immediately meets the upper ridge or apex of the top baffle, being split and divided thereby, the grain rolling down over the outer surfaces of the plates 25 and 25^a and falling therefrom directly upon and substantially normal to the intermediate baffles 26 and 26^a, respectively, by which its direction of flow is turned at substantially right angles, the stream rolling down over the latter plates toward the center of the receptacle and again merging at the point of discharge from these plates, only to be again split and divided upon the apex or ridge of the second baffle 27 27^a. The grain falling down the inclined sides of this baffle comes to rest in the bottom of the receptacle or on top of the grain already re-

ceived. As the receptacle fills with grain the entering grain of course undergoes a shorter descent; but it will be observed, as involving the vital principle of my invention, that the grain throughout its entire period of descent in the holder is not in suspension, as has been the case heretofore in scales of this type, but is supported at practically every point of its downward travel upon the baffle-plates, its gravity effect being thereby taken up by the holder and imparted therefrom to the scale-beam.

The precise relative arrangement of the baffle-plates, their extent and relative inclination to the walls of the receptacle and to each other are details to be determined by experiment and differing somewhat with the particular grain handled, but all within the spirit of my invention. I do not limit myself, therefore, to any particular arrangement or relative disposition or form of these supporting-baffles beyond the fact that the top pair must have their apex or ridge located directly below and immediately adjacent the discharge-opening of the hopper and its controlling cut-off valve. While I have termed these devices "baffle-plates" and "baffles," it will be evident that in serving as such they necessarily perform the office of supports to take up and transfer to the scale-beam the gravity effect of the grain before it has come to a position of rest within the receptacle.

I am aware that in a scale of this general character it has been proposed to introduce into the holder steam-brakes located a considerable distance apart and below the discharge-mouth of the hopper, which are designed to be impinged by the descending stream of grain and check the momentum of the latter in order to prevent a disturbance of the equipoise of the holder as a result of such momentum effect. My present invention, however, has an entirely different object in view and, furthermore, differs in construction from such steam-brakes in that by placing the baffles or deflectors closely together and immediately below and adjacent the discharge-mouth of the hopper they are adapted to afford a practically continuous and unbroken frictional support for the descending grain throughout its entire extent of travel within the holder. It will thus be seen that by the use of my present invention I do away with the existence of a body of unsupported grain or, as it is commonly termed, grain "in suspension" below the discharge of the hopper, the gravity effect of the grain beginning at its very entrance to the holder and the gravity effect of all the grain within the holder being transferred to the scale-beam at the instant of cut-off.

It will be evident that the application of my invention is by no means limited to the particular scale herein illustrated and forming the subject-matter of the Letters Patent above referred to. It is equally capable of application with the advantageous results de-

scribed to any other grain-scale having an automatic cut-off for the grain which is operated upon the reception of a predetermined weight of grain within the holder.

I claim—

1. In an automatic grain-scale, the combination with a counterbalanced holder, of a delivery-hopper, a cut-off valve controlling the discharge-opening of the hopper, and a pair of angularly-disposed inclined baffle-plates located within and transversely of the holder and directly below and adjacent said cut-off valve, said baffle-plates serving to take up and impart to the holder the gravity effect of the incoming grain at the instant of its discharge from the hopper, substantially as described.

2. In an automatic grain-scale, the combination with a supporting-frame, of a scale-beam fulcrumed on said scale, a grain-holder pivotally hung from one end of said scale-beam, a counterweight slidable on the opposite end of said scale-beam, a stationary hopper located above and delivering to the mouth of the holder, a cut-off valve controlling the discharge-opening of the hopper, and a pair of downwardly-divergent deflector-plates located directly below and adjacent said cut-off valve and serving to divide and support in sliding contact the incoming stream of grain and transfer its gravity effect through the holder to the scale-beam, substantially as described.

3. In an automatic grain-scale, the combination with a supporting-frame and a scale-beam fulcrumed thereon, of a weighing-receptacle pivotally suspended from one arm of the scale-beam, a counterbalance slidable on the opposite arm of the scale-beam, a hopper supported on the frame directly above the receptacle, a cut-off valve movable across the discharge-opening of the hopper, a pair of downwardly-divergent deflector-plates located in the receptacle directly beneath and immediately adjacent the cut-off valve and serving to divide the descending stream of grain at the instant of its entrance to the receptacle, and a pair of downwardly-convergent deflectors located beneath and closely adjacent the lower margins of the aforesaid deflectors and adapted to continue the supporting effect of the aforesaid deflectors, substantially as described.

4. In an automatic grain-scale, the combination with a supporting-frame and a scale-beam fulcrumed thereupon, of a weighing-receptacle pivotally suspended from one arm of said scale-beam, a counterbalance slidable upon the opposite arm, a hopper supported upon said frame above the receptacle, a cut-off valve having a sliding movement across the discharge-opening of the hopper, a pair of V-shaped baffles located within said receptacle and transversely of the path of the incoming grain, said baffles being located one above the other with their ridges uppermost, and the top baffle being directly beneath and

immediately adjacent the cut-off valve, and a pair of downwardly-convergent baffle-plates secured to the sides of the receptacle and extending inwardly beneath the lower margins of the upper V-shaped baffle and above the slanting sides of the lower V-shaped baffle, said baffles affording a continuous sliding support for the incoming stream of grain from its point of discharge from the hopper and serving to transmit the gravity effect of said stream to the scale-beam.

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Witnesses:

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