(No Model.)

A. SPRINGER & W. KENT.

GRAIN METER.

No. 365,874. Patented July 5, 1887.

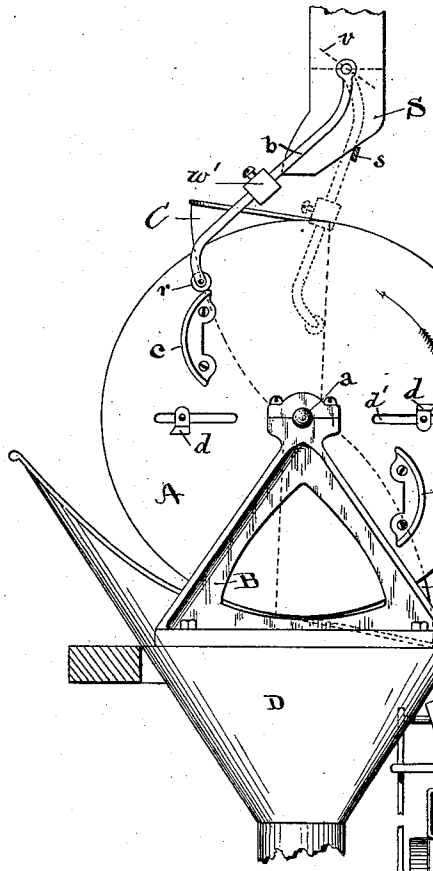

Fig. 1.

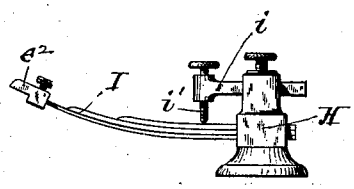

Fig. 5.

Fig. 2.

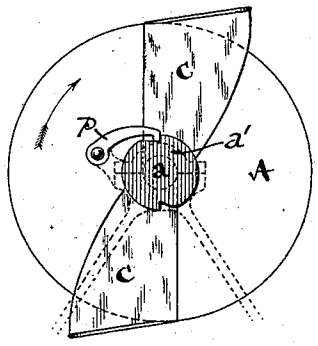

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

ALFRED SPRINGER, OF CINCINNATI, OHIO, AND WILLIAM KENT, OF JERSEY CITY, NEW JERSEY.

GRAIN-METER.

SPECIFICATION forming part of Letters Patent No. 365,874, dated July 5, 1887.

Application filed November 16, 1886. Serial No. 218,992. (No model.)

To all whom it may concern:

Be it known that we, ALFRED SPRINGER and WILLIAM KENT, citizens of the United States, residing at Cincinnati, Ohio, and Jersey City, New Jersey, respectively, have invented new and useful Improvements in Grain-Meters, of which the following is a specification.

Our invention relates to grain-meters, its object being to provide a simple, durable, and efficient apparatus for automatically and accurately weighing grain delivered by gravity through a spout or conduit by a succession of registrable movements constituting a substantially continuous operation.

To this end it consists in the apparatus hereinafter fully described, embodying as a leading principle of construction and operation a series of rotating buckets, rotated by an overbalancing weight of grain delivered to a bucket at one side of the vertical plane of the common axis, resisted in rotation by an adjustable force acting only in a very limited arc of the rotation; also, embracing constructive features whereby the durability, adjustability, and accuracy of the apparatus are secured, while preserving great simplicity.

In the drawings herewith, illustrating our invention, Figure 1 is a side elevation of a preferred form of the apparatus complete; Fig. 2, an end elevation; Fig. 3, a view of the reverse or "bucket" side of the revolving disk; Fig. 4, a detail of the radially-adjustable detent, and Fig. 5 a view of a modified form of spring-arm.

Referring now to the drawings, A designates a circular plate or disk secured upon an axle, *a;* B B, journal-bearings supporting the disk and axle from a base-frame, B′, and C C grain-buckets secured at one side of the disk A in opposite radial positions. These parts constitute a grain-receiving apparatus arranged beneath a supply-spout, S, and, in combination with the further mechanism to be described, acts to receive a predetermined quantity of grain from the spout in one of the grain-buckets C, the weight of which releases the holding mechanism and rotates the wheel A, discharging the filled bucket into a funnel, D, below, and bringing the alternate bucket into position to receive grain from the spout.

The holding mechanism consists of an arm, E′, secured to and oscillating by means of a "torsion-pivot," e', arranged as follows: As illustrated, the torsion-pivot consists of an endless band, e', of elastic metal held in tension in an approximately-rectangular path around a frame, E, upheld from a sliding base-plate, F′, by a supporting-frame, F, the sliding base-plate F′ being held adjustably in a guide-frame, G, mounted upon the common base B′. The torsion-frame E is an approximately-rectangular plate with one or both sides partially recessed to admit the free attachment and oscillation of the arm E′. Separate end pieces, e^4, are interposed between the main frame E and the band-pivot e', which may be set out by wedges driven in to tension the metallic strip. At its free end the arm E′ engages upon a stud, *d*, projecting at the side of the disk A, adjustable to or from the center in a radial slot, *d′*.

The preferred construction and adjustable mounting of the stud *d* is indicated in Fig. 4, in which the slot is shown countersunk at the rear of the disk, and provided with a holding-block, d^2, in which is seated a screw, d^3, passed through a flange of the stud *d*, thus forming a clamp. By loosening the screw the parts may be moved in the slot, and secured by tightening the screw. We prefer, also, to place upon the end of the arm E′ a removable tip, e^2, which, with the stud *d*, may be formed of steel or gun-metal, in order to present accurate and durable surfaces and edges at the contacts, and admit of replacement when worn by use. The tip e^2 may also have a limited adjustment upon the arm E′, to provide for accuracy in the general adjustment of the apparatus. As thus constructed, the general rotation of the disk is in the direction indicated by the arrow, and the weight of grain in the upper bucket C causes an upward pressure of the stud *d* against the arm E′, opposed by the torsional resistance of the pivot e', which resistance increases in direct and regular proportion to the degree of oscillation of the arm E′. The stud *d* and tip e^2 are positioned to allow the former to pass by the latter only at or beyond a certain predetermined limit of oscillation of the arm E′, which involves a measurable resistance of the pivot e'. This measure determines the weight

of grain required in the overbalancing-bucket exclusive of friction, which latter element is in this case practically eliminated by the time and other conditions of the movement, or is so far reduced and rendered uniform as to make allowance therefor entirely practicable. The adjustability of the base F′, in its containing-frame G, is toward and from the axis of the wheel, and as the stud *d* is adjustable in the same line it will be seen that, by the ordinary principles of leverage, a wide range of adjustment is obtainable in dealing with measures of grain.

As already indicated, the general function of the apparatus is effected by the stream of grain from the spout S filling the upper bucket C, which, overbalancing the resistance at the stud *d* against the detaining-arm, oscillates the latter and allows the disk A to rotate. In the present illustration but two buckets C are shown, occupying opposite radial positions. A duplicate slot, *d*′, and adjustable stud *d* are provided, in position radially opposite the first, whereby, as the first bucket falls and the second bucket is correspondingly elevated, the rotation of the wheel is arrested at the proper point by engagement of the second stud *d* against the detaining-arm, while the grain is discharged from the filled bucket into the funnel D below; but upon the same principles of arrangement three, four, or more buckets may be arranged upon the disk.

To prevent waste of grain during the rotation of the disk, we pivot a wing-valve, *v*, in the spout above, controlled by a crank-arm, *b*, extending downward at the side of the disk A. We place a friction-roller, *r*, at the lower end of the arm *b*, and arrange at the side of the disk two cam-plates, *c*, suitably formed and positioned to engage and lift the arm *b* at the proper time to the required height. As the disk A rotates, the cam-plates *c* are carried beyond the limit of engagement and allow the arm to drop down against a stop, *s*, and close the valve. A weight, *w*′, may be adjustably arranged upon the arm *b* to regulate the force of the movement, as desired. By this arrangement the disk A is relieved of all friction from this source during the rotation in the intervals of engagement of the studs *d* with the arm E′.

In order to prevent the "backlash" of the wheel through its momentum in first encountering the resistance of the arm E′ in the successive impulses of rotation, we place upon the axle *a* a ratchet-wheel, *a*′, and provide a pivoted engaging-pawl, *p*, upon the journal-bearing support. We also attach to the arm E′ in the axial plane of the torsion-pivot a vertical standard, e^3, at right angles to the arm and rigid therewith, and upon the same attach a weight, *w*, adjustable vertically, for the purpose of regulating and controlling the resisting force of the torsion-pivot *e*′, as desired, by the overbalancing effect of its statical moment when deflected from a vertical position.

Any suitable form of registering apparatus may be employed, by which the number of complete rotations or half-rotations of the disk may be recorded, and an indication thus afforded of the quantity of grain received and discharged by the apparatus. This we have omitted in the drawings, as it forms no part of our invention.

In Fig. 5 we have shown a flexion-spring, I, as a substitute for the rigid arm E′ and its torsion-pivot *e*′. Where such is used, a horizontal arm, *i*, secured adjustably in the holding-abutment H of the flexion-spring and carrying a screw-stop, *i*′, bearing adjustably against the upper surface of the flexion-spring, may be added to regulate the resisting force, and the abutment H may be mounted upon the sliding base F′, all other adjustments remaining the same. In either case the base F′ may be provided with set-screws *f*, to retain it in ultimate positions.

In the present invention we do not limit ourselves to the use of a spring, whether torsion or flexion, constituting or in connection with the arm E′, since a pivoted arm provided with a weight or other element resisting its oscillation will attain the same result in degree. We believe the rigid arm with torsion-pivot to be preferable, however, because of the more uniform continuance and accurate measurability of the resisting force thus produced, this being essential to the accurate results desired in apparatus of this character.

We claim as our invention and desire to secure by Letters Patent of the United States—

1. The combination, in an automatic grain-meter, of a pivoted disk or frame carrying receiving-buckets and rotated by the grain delivered successively to said buckets, a projecting stud radially adjustable upon said disk or frame, and an engaging resisting-arm oscillating from an independent center or holding-axis adjustable toward and from the axis of the rotating disk or frame, substantially as set forth.

2. In an automatic grain-meter, the combination of a rotating disk or frame carrying grain-buckets, a radially-adjustable stop or detent upon said disk or frame, a torsion-pivot mounted upon an independent supporting-frame adjustable toward and from the disk-axis, a rigid arm attached at one end to said torsion-pivot and at the other engaging said stop or detent by contact, and a regulating-weight carried in the vertical plane of said arm above its torsion-pivot and oscillating therewith, substantially as set forth.

3. The improved grain-meter embodying, in combination, a rotating disk or frame, A, radially-disposed buckets C, adjustable stops *d*, oscillating arm E′, torsion-pivot *e*′, and adjustable supporting-frame E F, substantially as set forth.

4. In an automatic grain-meter having a rotating disk or frame carrying buckets, an engaging-stop, and an oscillating resisting-arm engaging said stop, and a torsion strip or pivot, *e*, for said arm, in combination with a contain-

ing-frame, E, arranged to carry the pivot in tension equalized around said frame, substantially as set forth.

5. In an automatic grain-meter of the character described, having a radially-adjustable engaging-stop, *d*, the arm E′, torsion-pivot *e*′, and frame E F F′, in combination with the fixed guide-frame G, substantially as set forth.

6. In an automatic grain-meter of the character described, the combination of the rotating disk or frame A, carrying buckets, the spring resisting-arm E′, and detent *d*, with the ratchet *a*′ and pawl *p*, arranged to arrest the recoil of the disk or frame, substantially as set forth.

7. In a grain-meter of the character described, in combination with the revolving disk A, detent *d*, and spring resisting-arm E′, the removable tip e^2, substantially as set forth.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

ALFRED SPRINGER.
WILLIAM KENT.

Witnesses for Alfred Springer:
L. M. HOSEA,
C. D. KERR.
Witnesses for William Kent:
LEONARD J. LANGBEIN,
GEORGE F. LANGBEIN.