No. 706,565. Patented Aug. 12, 1902.

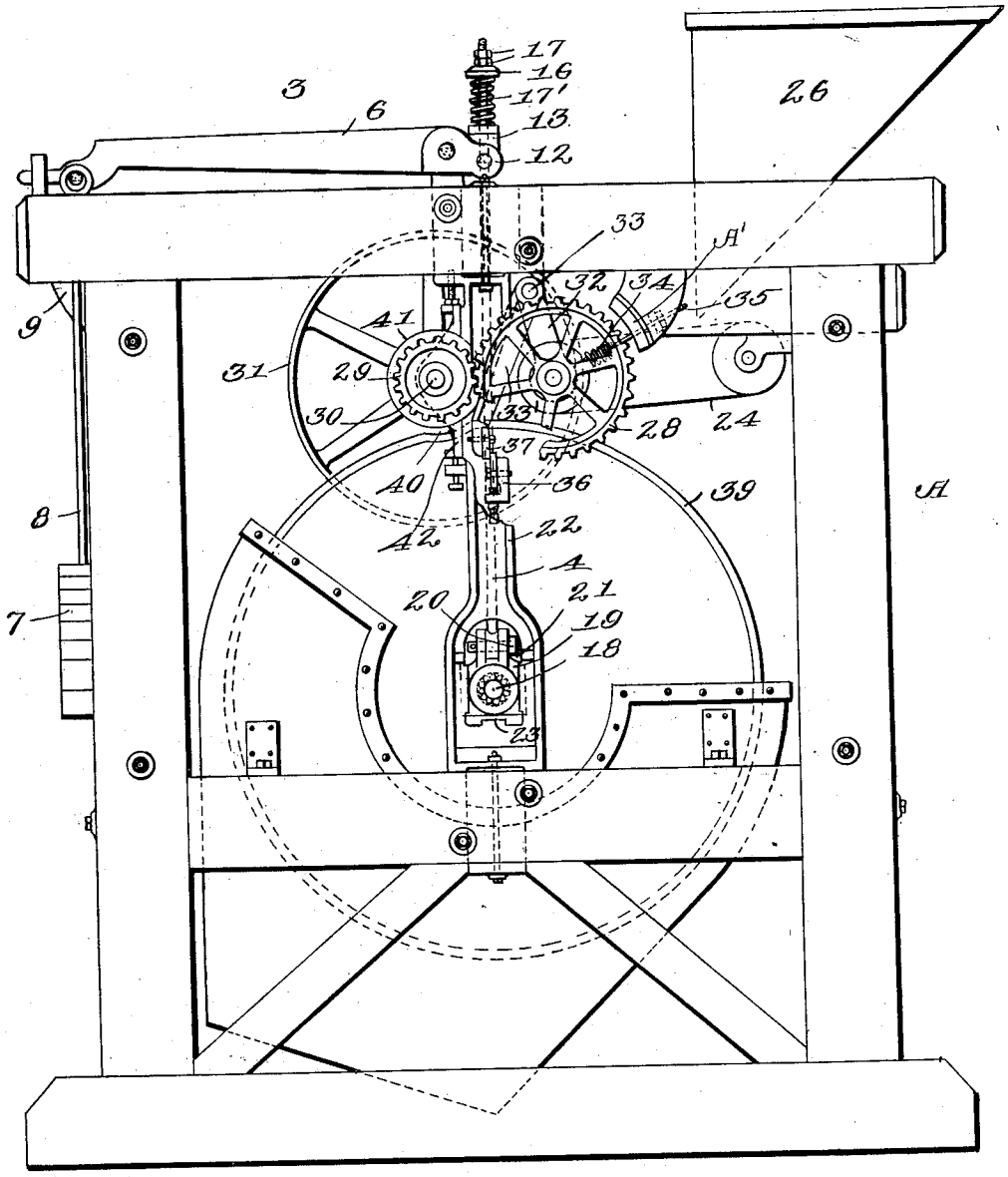
U. S. JAMES.

AUTOMATIC WEIGHING MACHINE.

(Application filed Oct. 24, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 2.

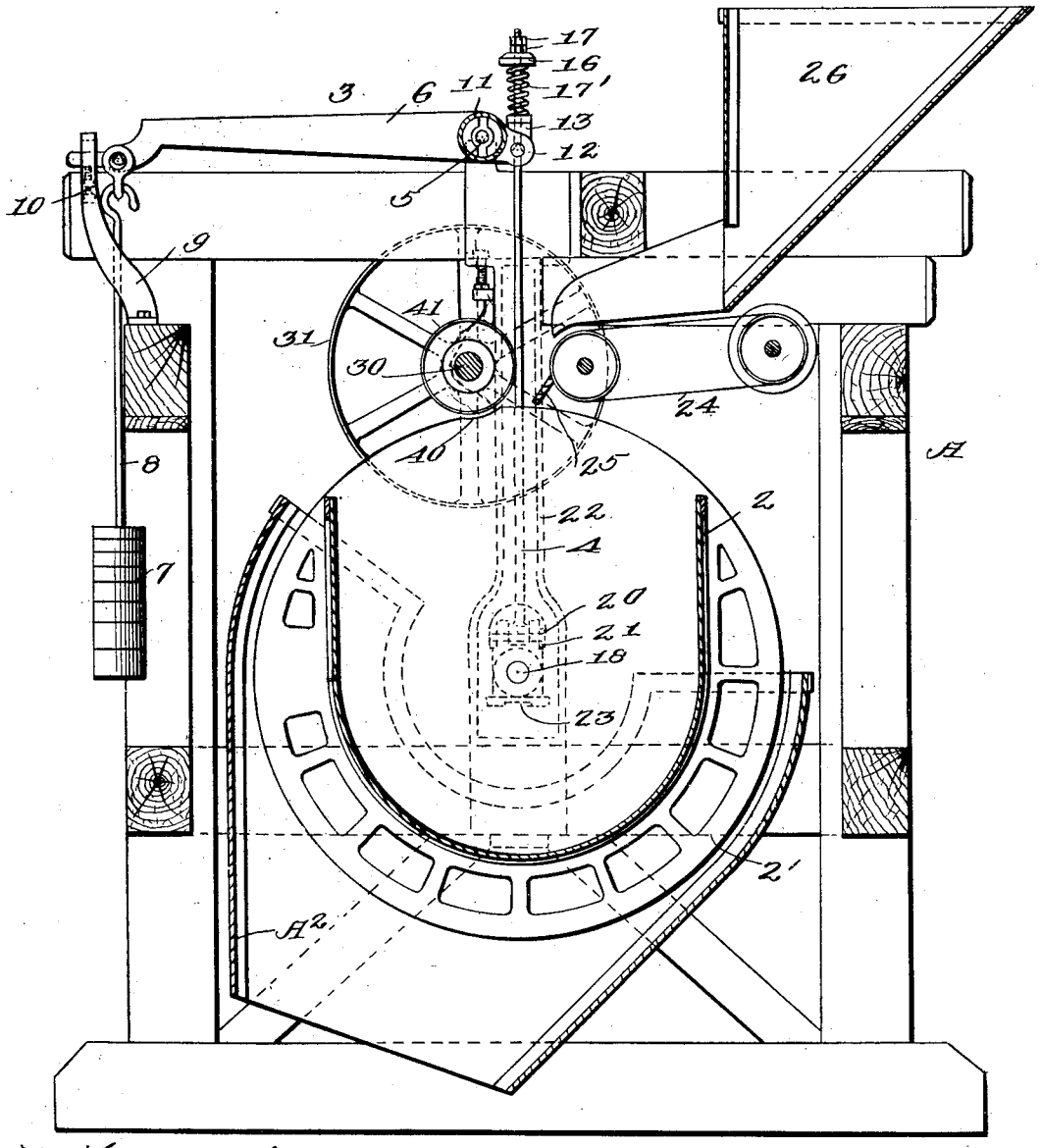

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Fig. 3.

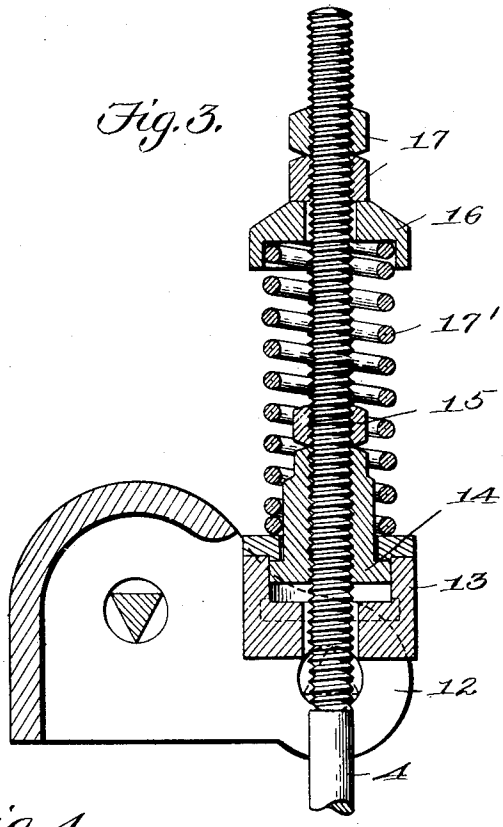
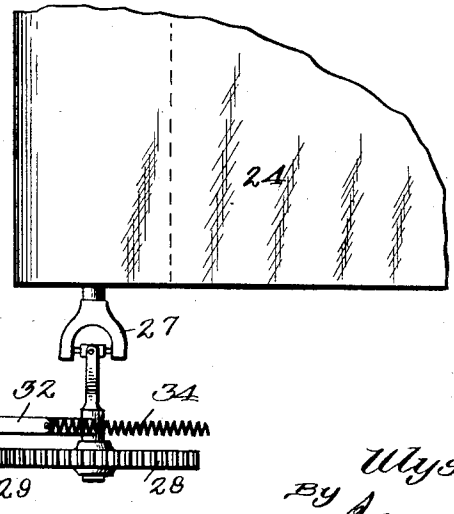


Fig. 4.



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UNITED STATES PATENT OFFICE.

ULYSSES S. JAMES, OF ANACONDA, MONTANA, ASSIGNOR OF TWO-THIRDS TO CHARLES M. SMITH AND MAURICE S. DEAN, OF ANACONDA, MONTANA.

AUTOMATIC WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 706,565, dated August 12, 1902.

Application filed October 24, 1901. Serial No. 79,851. (No model.)

To all whom it may concern:

Be it known that I, ULYSSES S. JAMES, a citizen of the United States, residing at Anaconda, in the county of Deerlodge and State of Montana, have invented new and useful Improvements in Automatic Weighing-Machines, of which the following is a specification.

This invention relates to automatic weighing-machines; and it is adapted for automatically weighing and delivering large quantities of different classes of materials, such as ore, wheat, coal, &c.

The improved machine includes in its construction weighing mechanism having a bucket the contents of which are positively discharged, and the bucket-discharging mechanism embodies frictional driving members, one of which is carried by the bucket and the other of which is supported independently of the weighing mechanism. The primary friction member is preferably continuously driven while the secondary member ascends with the bucket, and at a predetermined point the faces of these friction devices are brought into contact, so that as the primary one actuates the secondary one the bucket will be positively emptied of its contents, and the bucket is preferably rotary, it being given intermittently a full rotation, so as to secure the desired object. The secondary friction device has a notch in its periphery located normally opposite the periphery of the primary friction device. When the bucket reaches the limit of its descent, the bucket will tilt slightly, carrying the concentric face of the secondary member into driving contact with the primary friction member, so as to rapidly rotate the bucket. In the present case the material is delivered to the bucket by a feeder the motion of which is positively and promptly stopped automatically when said bucket has received its complete charge, and the operating mechanism for this feeder comprises, preferably, driving and driven members, the latter being conveniently connected to the feeder by means embodying a universal joint, so that when the driven member is moved out of operative relation with the driving member said driven member becomes ineffective as a power-transmitting factor, the result being to throw the feeder out of action. The driving and driven members consist, preferably, of intermeshing gears, and one of them is supported by a carrier, which is shiftably mounted and automatically operated by a spring or equivalent device. The carrier is normally held in a position to maintain the said members in operative relation by a detent on the bucket. When the detent passes below a certain point with its load, said carrier is released and is immediately shifted by the spring or like device to thereby arrest action of the feeder. Means are also provided for taking the shock off the bucket caused by the impact thereagainst of the supply-stream when it initially strikes the empty bucket, this construction preventing the descent of the bucket too great a distance.

The invention includes other advantageous features which, with the foregoing, will be set forth in detail in the following description, while the novelty of the invention will form the basis of the claims following such description.

I desire to state at this point that the invention is not limited to the employment of the specific parts nor to their arrangement in the manner hereinafter alluded to, for many variations may be adopted within the scope of the appended claims.

The invention is clearly illustrated in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation of an automatic weighing-machine including my invention. Fig. 2 is a vertical central sectional elevation of said machine. Fig. 3 is a vertical central sectional elevation of a part of the beam mechanism and a bucket-hanger, and Fig. 4 is a top plan view of a portion of the feeder and the stopping and starting means therefor.

Like characters refer to like parts in all the figures of the drawings.

The framework for sustaining the different parts of the machine may be made of any suitable size, shape, and material. That shown is denoted in a general way by A.

The machine includes in its organization weighing mechanism, consisting in the present case of a bucket 2, counterbalanced, as at

2′, and a beam 3, the bucket, as will hereinafter appear, being yieldingly suspended from the beam through the intervention of hangers, as 4. The beam is supported, as at 5, for oscillation by means of the usual knife-edge bearings, the arm 6 of said beam having a counterweight of suitable kind. In the present case the counterweight consists of a plurality of superposed weights, as 7, carried at the lower end of the rod 8, supported by means of knife-edge bearings from the beam-arm 6. The framing A carries near its left upper corner a bracket, as 9, the upper end of which overhangs the extreme left end of the beam-arm 6, said bracket having a screw, as 10, tapped in a suitable lug on said bracket and constituting an adjustable support for the free end of said arm. The overhanging portion of the bracket prevents the ascent of said arm too far during the descent of the bucket. The beam has a body portion or hub, as 11, provided with bucket-supporting and parallel arms, as 12, which project toward the right from said body portion. Said arms 12 support the boxes 13 by means of the usual knife-edge bearings, through which the hangers 4 vertically extend, the hangers being threaded from the tops to points just below the boxes 13. It will be understood that there are two hangers, one at each side of the bucket, and I will hereinafter describe the manner of mounting the bucket on said hangers. The caps of the boxes 13 are suitably held in place, and they have central openings to receive the shanks or bodies of nuts, as 14, the heads of which are inclosed by the boxes, and said nuts are held in their adjusted positions by means of the check-nuts 15 engaging the upper ends of the shanks of said nuts. At points above the nuts 14 the hangers are surrounded by the collars 16, above which are arranged check and holding nuts, as 17, serving their usual functions. The collars 16 are countersunk on their under sides to receive the upper ends of coiled springs, as 17′, which rest upon the boxes 13, said coiled springs encircling a part of the threaded portions of the hangers. When the supply-stream is forced or fed into the bucket, the latter will descend a short distance, this action resulting in pulling down the hangers 4, and hence through the nuts 17 and collar 16 compressing the springs 17′ and simultaneously forcing the nuts 14 against the bottoms of the boxes 13; but the beam 3 during this action is not lifted. Subsequently, however, when a greater amount of material is supplied to said bucket it will descend farther, and the nuts 14 being in engagement with the boxes 13 the beam will be elevated. When the beam after the discharge of its load has returned to its primary position, the springs 17′ by relaxing thrust the nuts 17, collars 16, and hence nuts 14, upward, or until the heads of the nuts 14 abut against the caps of the boxes 13.

The bucket 2, which is rotary, has trunnions or journals, as 18, projecting outward from its opposite sides and supported by bearings or blocks, as 19, pivotally connected, as at 20, with the lower ends of the hangers 4, the blocks or bearings 19 having vertically-reciprocative movements in slots, as 21, formed near the lower ends of the guides 22, which may consist of upright bars suitably secured to the framework and which prevent oscillation of the hangers and bucket. The bearings proper for the trunnions are preferably of the ball kind, so as to reduce friction to the least possible extent at these points. The upright bars or guides 22 are provided with thrusts, as 23, for the bearings or blocks 19.

The bucket 2, as will hereinafter appear, is positively discharged of its contents by being caused to rotate, and material is supplied thereto by a feeder, which is illustrated as consisting of an endless conveyer, as 24, the delivery end of which is shown as located over the upper open end of the bucket, the material as it passes from the discharge end of the feeder or conveyer 24 being directed into the bucket by the angularly-disposed deflector or plate 25, suitably connected to the framework A. Said framework A carries a suitable supply-hopper 26, which may be furnished with the substance to be weighed in any convenient manner. The forward shaft of the conveyer is connected, by means of a universal joint 27, with the driven member 28, shown as a gear, adapted to mesh with the driving-gear 29, suitably fixed to the main or power shaft 30, continuously operated in some convenient manner. Said shaft carries a pulley 31, adapted to be connected by a belt with a suitable motor. (Not shown.) The gear is supported by a carrier 32, shown as a rock-arm, fixed to and depending from the suitably-mounted rock-shaft 33, a second rock-arm 33′ being also carried by said shaft and said arms being disposed at an acute angle to each other. A coiled spring, as 34, is connected to the rock-arm 32, said spring being also connected with the screw 35, tapped into the framework, and by which the tension of the spring can be regulated. The rock-arm 33′ is in the nature of a pawl, it being engaged by a detent, as 36, on the bucket 2, the engaging portion of the rock-arm and detent having adjustable portions, as 37, to vary the length of engagement between said parts. With the gears 29 and 28 in mesh the feeder or conveyer 24 will be driven so as to force a stream of material from the hopper 26 into the bucket. At the point that the bucket receives its full charge the detent 36 on the bucket will have passed out of engagement with the rock-arm 33′, thereby permitting the spring to shift the arms 32 and 33′, thereby carrying the gear 28 out of mesh with the gear 29, thereby arresting the action of the conveyer, and hence stopping the supply of material to said bucket. The gear 28 as it is shifted out of mesh with its companion is adapted to engage the buffer A′ on the framing, which limits the motion of

said gear and prevents injury to the same. The bucket 2, as will hereinafter appear, is rotary, and when it has nearly made a complete rotation the detent 36 thereon will engage the arm 33′, and as the bucket continues to rotate the arms 33′ and 32 are carried therewith, so as to place the gear 28 again in mesh with the gear 29 to start the conveyer. The bucket, which is substantially U-shaped in cross-section, carries a disk, as 39, suitably connected therewith, the peripheral face of which is defined by arcs struck from different radii from the center of said disk, whereby a proper contact between the same and a companion disk, hereinafter described, is assured during the rise and fall of the bucket. The periphery of said disk has a notch or depression 40, located in proximity to a disk 41, fixed in suitable manner to the continuously-operable shaft 30. When the bucket 2 is in its normal position, the notch or depression 40 receives a portion of the continuously-rotative disk. The center of gravity of the loader-bucket is slightly to the left and above the center of motion of the loaded bucket, so that when the detent 36 passes off the pawl or arm 33′ said bucket will at once tilt. This will carry the effective portion of the periphery of the disk 39 into engagement with the periphery of the live disk 31 to thereby rotate the bucket, the latter making one full turn, or until the notch or depression 40 is again in a position to receive disk 31, it being understood that the bucket is discharged by frictional driving devices 41. Although I have only described one wheel or disk 39, two are shown, the shaft 30 carrying corresponding live disks or wheels 41, and this construction is preferable, for an even rotary motion of the bucket is assured; but of course the invention is not limited to the duplication of these coacting frictional driving devices. The contents of the bucket is emptied into a discharge-hopper, as A^2, surrounding said bucket and adapted to deliver the successively-weighed charges at a suitable place.

The shaft 30 is carried by adjustable brackets or bearings, as 42, by reason of which the time of frictional contact of the primary and secondary frictional elements 31 and 39 can be changed.

Briefly stated, the operation of the machine is as follows: Referring to Fig. 1, wherein the parts are shown as occupying their normal position, the bucket 2 is empty, and the conveyer 24 being in motion will carry a supply of material from the hopper 26 and deliver it into said bucket. As soon as the material strikes the bucket the latter descends for a short distance without raising the beam 3. Subsequently, however, the bucket descends farther and raises said beam, and when the predetermined charge is in the bucket the same gravitates sufficiently to carry the lower detent off the arm 33′, whereby the movement of the conveyer 24 will be stopped, as hereinbefore specified. The bucket is then caused to rotate in the manner previously indicated, and when it has nearly resumed its initial position it engages the arm 33′, so as to throw the gear 28 into mesh with the gear 29 to again start the conveyer for repeating the operation.

Having described the invention, what I claim is—

1. In an automatic weighing-machine, the combination of weighing mechanism including a rotary bucket, a frictional driving device supported independently of the weighing mechanism, a device carried by the bucket arranged for engagement with and operation by said frictional driving device to effect the discharge of said bucket, a feeder for supplying material to said bucket, a driving member, a driven member actuated by said driving member, a universal connection between said driven member and feeder, a shiftable carrier for said driven member, and means controlled by the weighing mechanism for normally maintaining said driving and driven members in operative relation.

2. In an automatic weighing-machine the combination of weighing mechanism including a bucket, a feeder for supplying material to said bucket, a driving member, a driven member actuated by said driving member, a universal connection between said driven member and the feeder, a shiftable spring-actuated carrier for said driven member, and detent means operative with the weighing mechanism for normally holding the carrier in position to maintain the driving and driven members in operative relation.

3. In an automatic weighing-machine, the combination of weighing mechanism including a rotary bucket having a disk, a shaft provided with a disk for coöperating with the disk on the bucket to rotate the latter, a toothed gear carried by said shaft, a second toothed gear meshing with the other one, a feeder for supplying material to the bucket, a universal connection between said second toothed gear and the feeder, a spring-actuated carrier for said second toothed gear, and detent means carried by the bucket for engaging said carrier and normally holding the said toothed gears in mesh.

4. In an automatic weighing-machine, the combination of weighing mechanism including a bucket, a feeder for supplying material to said bucket, a driving member, a driven member actuated by said driving member, a universal connection between said driven member and the feeder, a shiftable carrier for said driven member, and means controlled by the weighing mechanism for normally maintaining said driving and driven members in operative relation.

5. In an automatic weighing-machine, the combination of weighing mechanism including a bucket, a feeder for supplying material to said bucket, a driving member, a driven member actuated by said driving member, and operatively connected with the feeder, a rock-shaft having an arm carrying said driv-

ing member, means connected with said rock-shaft and tending normally to shift the same, a second arm on the rock-shaft, and a detent operative with the weighing mechanism for engaging said arm.

6. In an automatic weighing-machine, the combination of weighing mechanism including a bucket, a feeder for supplying material to said bucket, coöperating power-transmitting members, a rock-shaft having an arm carrying one of said power-transmitting members, a spring connected with said arm, a second arm on said rock-shaft, and a detent adjustably engaging said second rock-arm.

7. In an automatic weighing-machine, the combination of weighing mechanism including a bucket, a feeder for supplying material to said bucket, coöperating power-transmitting members one of the latter being operatively connected with the feeder, a shiftable spring-actuated carrier for the driven member, and detent means operative with the weighing mechanism for holding said carrier.

8. In an automatic weighing-machine, the combination of weighing mechanism including a bucket, a feeder for supplying material to said bucket, intermeshing gears, a shiftable carrier for one of the gears, the gear that is supported by said carrier being operatively connected with the feeder, a spring connected with said carrier, and a detent on the weighing mechanism for holding the carrier.

9. In an automatic weighing-machine, the combination of weighing mechanism including a bucket, an endless conveyer, a hopper over said conveyer, intermeshing gears, a shiftable carrier for one of the gears, the gear on said carrier being operatively connected with said conveyer, a spring connected with said carrier, a detent controlled by the weighing mechanism for holding said carrier, and a discharge-hopper to receive the material from said bucket.

10. In an automatic weighing-machine, the combination of weighing mechanism having a bucket, a continuously-operable shaft, a feeder for delivering material to said bucket, coöperating driving and driven elements connected respectively with the shaft and the feeder, a spring-actuated carrier for the driven element, means controlled by the weighing mechanism for holding said carrier in position to maintain said elements in working relation, and means actuated by said shaft for positively discharging the bucket.

11. In an automatic weighing-machine, the combination of weighing mechanism having a bucket, a continuously-operable shaft, a feeder for delivering material to said bucket, coöperating driving and driven elements connected respectively with the shaft and the feeder, a spring-actuated carrier for the driven element, means controlled by the weighing mechanism for holding said carrier in position to maintain said elements in working relation, a pair of driving-wheels carried by said shaft, and driven wheels upon opposite sides of the bucket adapted for engagement by the driving-wheels and having notches in proximity to the respective driving-wheels.

12. In an automatic weighing-machine, the combination of a beam, a bucket, hangers connected to the bucket, boxes on the beam through which said hangers project such portions of the hangers being threaded, nuts on the threaded portions of the hangers having heads inclosed by said boxes, coiled springs on the threaded portions of the hangers resting on the boxes, and relatively fixed means on the hangers engaging the upper ends of the springs.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ULYSSES S. JAMES.

Witnesses:
CHAS. P. HOUGH,
GEO. B. WINSTON.