(No Model.)

S. B. HART.

GRAIN METER.

No. 413,322. Patented Oct. 22, 1889.

Fig. 1.

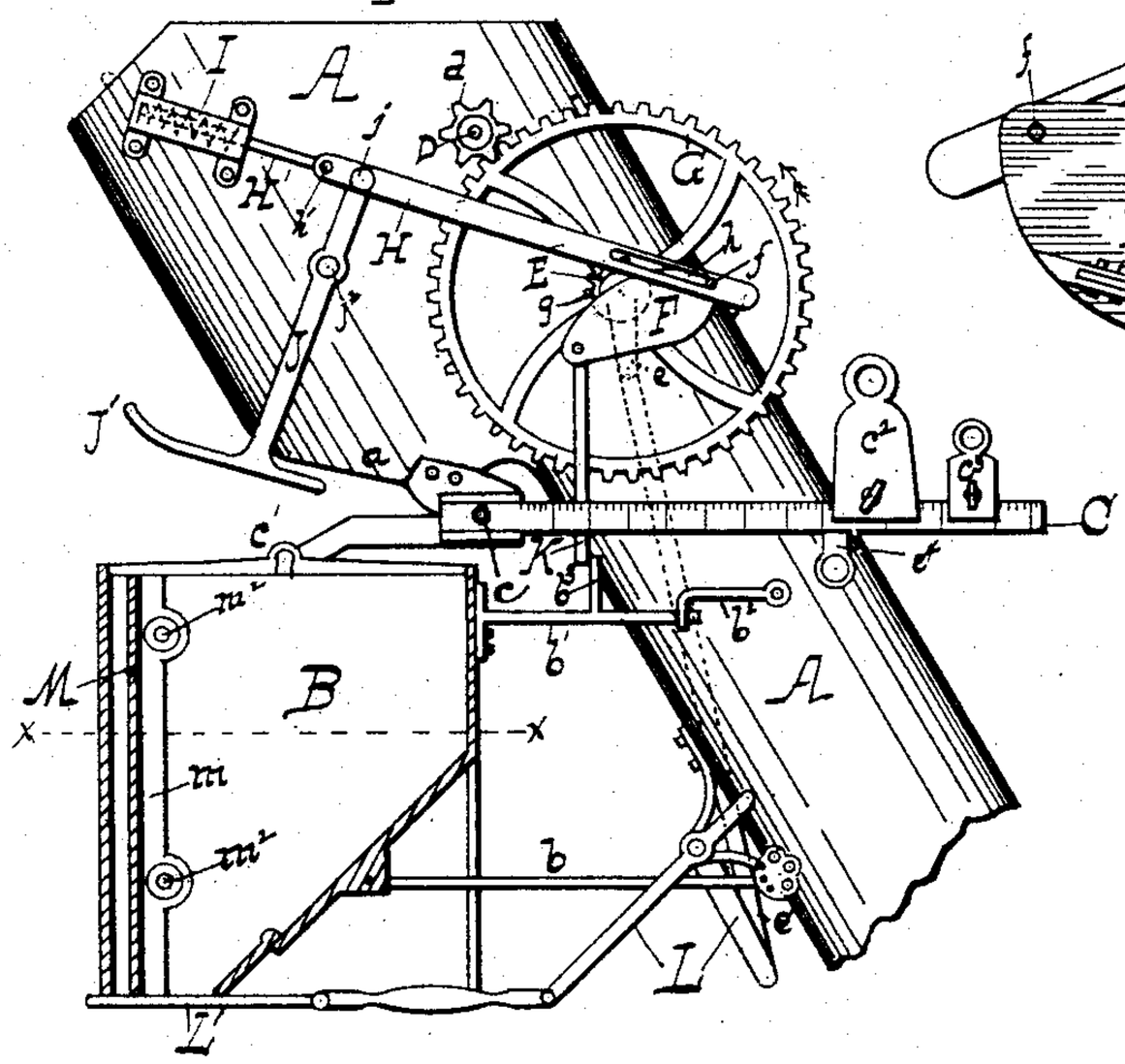


Fig. 2.

Fig. 3.

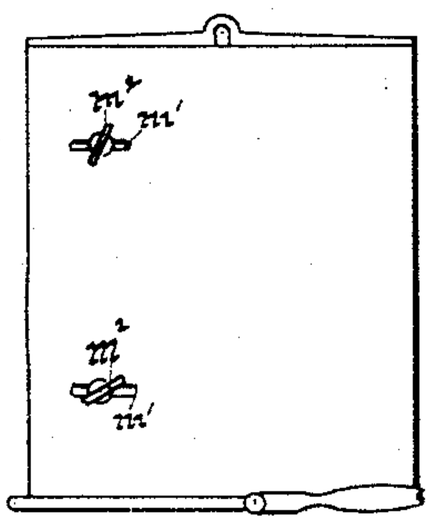
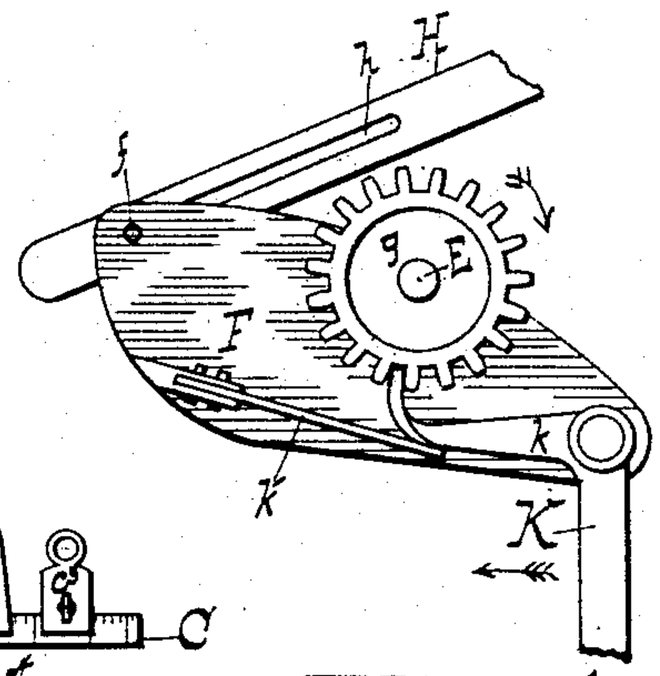


Fig. 4.



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GRAIN-METER.

SPECIFICATION forming part of Letters Patent No. 413,322, dated October 22, 1889.

Application filed September 10, 1888. Serial No. 284,999. (No model.)

To all whom it may concern:

Be it known that I, STACY B. HART, a citizen of the United States of America, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Weighing Attachments for Grain-Separators, of which the following is a specification.

In the drawings, wherein similar reference-letters indicate the same parts, Figure 1 is a side elevation of the upper part of the grain-elevator, showing the grain-weighing devices attached thereto, with the hopper represented in vertical section. Fig. 2 is a horizontal section of the hopper in line *x x* of Fig. 1. Fig. 3 is a side view of the hopper. Fig. 4 is a detached view of the tripping device as seen from the side opposite to that shown in Fig. 1.

The object of this invention is, first, to simplify the construction and improve the operation of the means for automatically weighing the grain raised by the elevator of a grain-separator, and, second, to provide means whereby variations in the bulk of a given quantity of grain, by weight, may be prevented from interfering with the accuracy of the work done by the machine.

In the drawings, A represents the elevator-tube, which discharges its grain at *a* into a weighing hopper or box B, attached to the elevator by a pivoted connection *b* at its lower end, and by a rigid arm *b'* and a pivoted link or hook b^2 at its upper end; and C is the usual scale-beam, pivoted to the elevator at *c* and to the hopper at *c'*, provided with adjustable weights c^2 c^3, and, when the hopper is up, resting upon a stop c^4. A shaft E, above the level of the top of the hopper, extends through the elevator-tube between the two lines of the drive chain or belt therein, with its end projecting outside of the tube. Affixed to one end of said shaft is a crank *e* (shown in dotted lines in Fig. 1) and to the other end a plate F. Between the plate F and the side of the elevator-tube a large pinion G is loosely mounted on the shaft E, and a small spur-wheel *g* is affixed to its outer side. The pinion G, carrying with it the spur-wheel *g*, is continuously driven in the direction indicated by the arrow by means of a spur-wheel *d*, affixed to the projecting outer end of the driving-shaft D.

A bar H is connected at one end to the plate F by means of a slot *h* in the bar and a pin *f*, projecting from the outer side of the plate, and at the other end to a drawing-spring I (indicated in dotted lines, Fig. 1) by means of a rod H', pivoted to the bar at *h'* and pivotally connected to the spring, whereby the compound structure H H' is enabled to flex slightly, in order to accommodate itself to the movements of a lever J, pivoted to it at *j*, and to the side of the elevator-tube at *j'*, and carrying at its lower end the grain-valve J' of the elevator-tube. To the inner side of the plate F, at the end most remote from the pin *f*, there is pivoted a pendent lever K, provided with a bent arm *k*, which is normally held in engagement with the teeth of the spur-wheel *g* by the action of a spring *k'*, but is thrown out of such engagement by the pull of the more powerful spring I whenever the pendent arm of the lever K strikes against a step b^3, projecting up from the arm *b'* of the hopper. The crank *e* is connected by a pitman *e'* to a bell-crank lever L, which operates the grain-valve L' of the hopper B.

The operation of the parts thus far described is as follows: Normally, while grain is flowing through the grain-spout *a* into the hopper, they occupy the relative positions shown in Fig. 1, the pendent lever K being in contact with the stop b^3, and therefore held out of engagement with pinion *g* by the draft of spring I; but when the grain filling the hopper to the weight required for delivery overbalances the weight upon the long arm of the scale-beam the hopper swings down upon its pivoted connections and disengages the stop b^3 from the lever K. The spring I instantly draws the bar H H' toward itself, thereby closing the valve J' under the end of the grain-spout *a* and stopping the flow of the grain, while at the same moment the spring *k'* swings the lever K on its pivot, bringing its bent arm *k* into engagement with the slowly and continuously revolving spur-wheel *g*. Thereupon the plate F is rotated around with the wheel, carrying with it in its rotation the shaft E and crank *e*. This move-

ment of the crank *e* immediately operates the bell-crank lever L and causes the opening of the hopper-valve L′, and the consequent discharge of the grain from the hopper B, whereupon the hopper rises to its normal position. The further rotation of the plate F and shaft E brings the crank *e* around again nearly to the position shown in Fig. 1, so as to close the valve L′, and also draws the bar H H′ longitudinally against the resistance of spring I, so as to open the valve J′. The lever K then strikes the stop b^3 and disengages from the pinion *g*, thereby releasing the shaft E from the driving-wheels, and all the parts are again in their normal position. It will be seen that, considering the complex effects necessary to be produced, the device is of great simplicity, and that the construction and combination of its parts are such that they act positively, accurately, and reliably, and are not liable to get out of working order. Particularly the arrangement of the automatically-shifting clutch mechanism above the line of the top of the hopper enables me to avoid the use of a sprocket or bolt for operating it and to substitute the more reliable gear-train; also, to avoid a lever-trip by substituting the rigidly-fastened trip b^3, and to employ a more direct and simple connection to the grain-valve J′.

In all apparatus of this class a peculiar defect has heretofore been found to exist and to interfere more or less with the accurate performance of the work under the varying condition of the grain. When, having received its full charge of grain, the hopper drops and effects the closing of the grain-spout *a*, a certain portion of grain is still *in transitu* between the grain-spout and the top of the mass in the hopper and is added to the contents of the latter without being weighed. If the grain itself were always of uniform weight in proportion to its bulk, the quantity thus left falling through the air upon the closing of the valve J′ would be substantially invariable, and could be provided for by the proper adjustment of the weights c^2 c^3, so as to insure an accurate measurement and weight of the whole charge; but the grain varies in condition and weight, with the result that when it is comparatively heavy the hopper is not filled so full as when it is lighter, and thus the length of the unweighed column *in transitu* and the consequent quantity of the falling grain therein are varied, such quantity being greater in proportion as the grain is well filled out and in good condition. To obviate this difficulty and insure perfect accuracy of result, I provide the hopper with means by which its capacity may be so adjusted that a given weight of grain will always fill to the same height, whether the grain itself be specifically heavier or lighter, and thus the length of the column which is falling when the valve J′ closes will be substantially invariable. The best way in which I have contemplated the application of this principle consists in providing the hopper with a vertical horizontally-movable portion M, provided with flanges *m* at its lateral edges, which closely fit the inner walls of the hopper, and with adjusting-slots *m′* and set-screws m^2, by which it may be fastened in any position in the hopper that may be necessary to vary the capacity of the latter within the limits required. In weighing heavy grain this partition is to be set inward, and in weighing lighter grain outward, so that the mass of grain in either case will rise to the same height before the hopper will depress the scale-beam, the proper height being readily ascertained by observation or experiment and easily fixed by adjustment of the partition.

The machine should be so proportioned that the hopper B, when in its normal grain-receiving position, will stand as close to the end of the grain-spout *a* as is practical.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an automatic grain-weighing device, the combination of the vertically-movable hopper B, provided with the rigidly-attached stop b^3, the driven wheel G, arranged above said stop, the plate F, connected to and operated by said wheel, substantially as described, and provided with the arm K to engage with the stop b^3, and the valves L′ J′, controlled by the movements of said plate F, substantially as herein set forth.

2. The combination of the swinging hopper B, the stop b^3, rigidly attached thereto, the pendent lever K and its spring *k′*, the plate F, attached to the shaft E, the gear-wheels *g* G, fastened together, loosely mounted on the shaft E, and driven by the wheel *d* on the end of driving-shaft D, the bar H H′, the spring I, the lever J, and the grain-valve J′, substantially as described.

3. The combination of the swinging hopper B, the stop b^3, rigidly attached thereto, the pendent lever K and its spring *k′*, the plate F, attached to the shaft E, the gear-wheels *g* G, fastened together, loosely mounted on the shaft E, and driven by the gear-wheel *d* on the end of the driving-shaft D, and the crank *e*, pitman *e′*, bell-crank lever L, and hopper-valve L′, substantially as described.

4. The combination of the swinging hopper B, the stop b^3, rigidly attached thereto, the pendent lever K and its spring *k′*, the plate F, attached to the shaft E, the gear-wheels *g* G, fastened together, loosely mounted on the shaft E, and driven by the gear-wheel *d* on the end of the driving-shaft D, the crank *e* on the end of the shaft E opposite to the plate F, and means for operating the two valves J′ L′ from the plate F and crank *e*, substantially as described.

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