2 Sheets—Sheet 1.

J. L. & J. T. METCALFE.

GRAIN-SEPARATOR.

No. 191,991. Patented June 12, 1877.

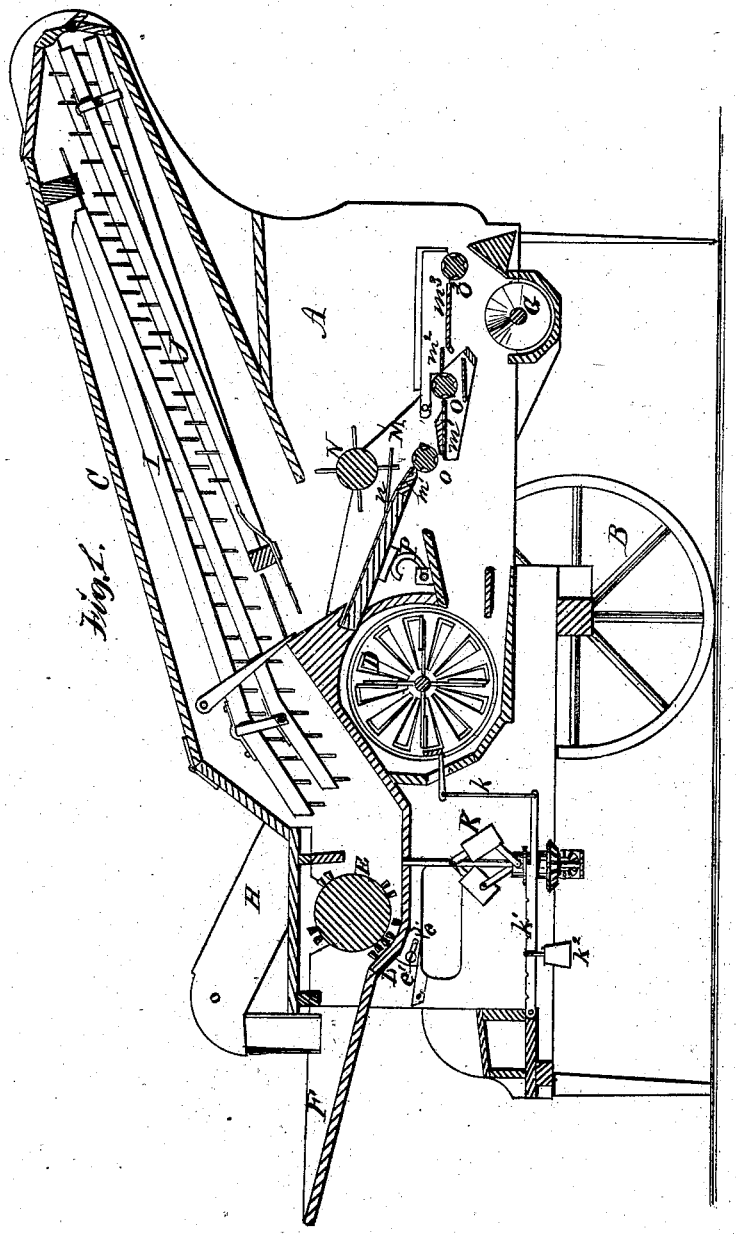

Fig. 1.

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2 Sheets—Sheet 2.

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Fig. 2.

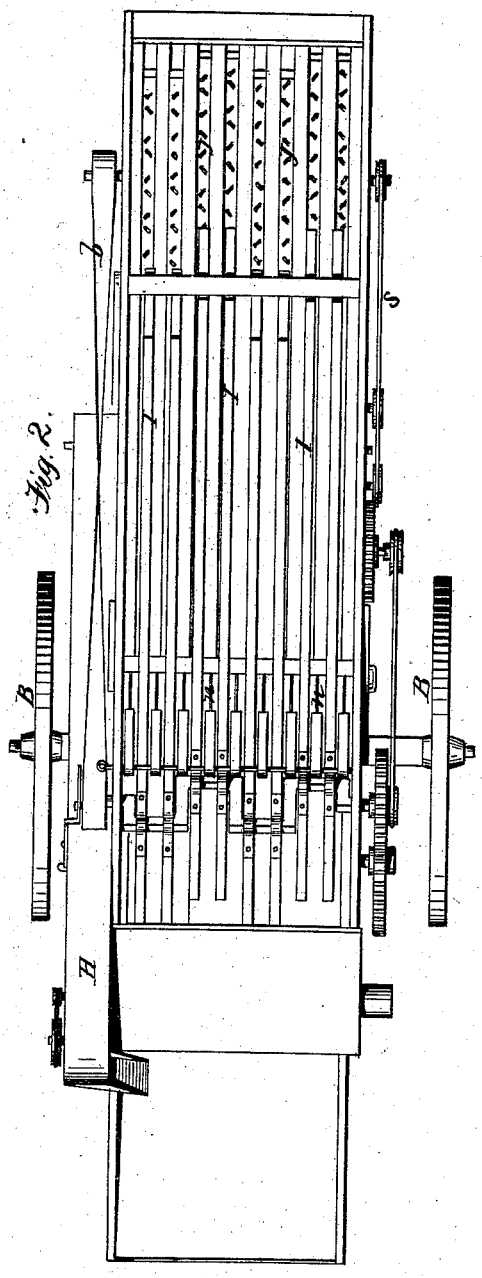


Fig. 5.

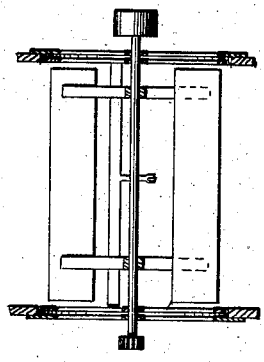


Fig. 4.

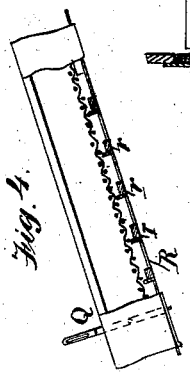
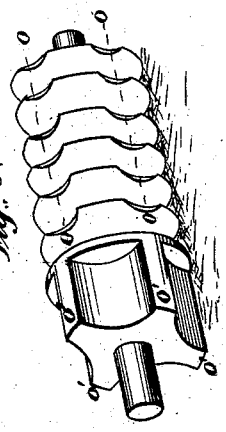


Fig. 3.



Witnesses;
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UNITED STATES PATENT OFFICE.

JOHN L. METCALFE AND JOHN T. METCALFE, OF QUINCY, PENNSYLVANIA.

IMPROVEMENT IN GRAIN-SEPARATORS.

Specification forming part of Letters Patent No. **191,991**, dated June 12, 1877; application filed February 5, 1877.

To all whom it may concern:

Be it known that we, JOHN L. METCALFE and JOHN T. METCALFE, of Quincy, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Grain-Separators; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a longitudinal vertical section; Fig. 2, a top plan view; Fig. 3, a perspective view of the carding-roller; Fig. 4, a longitudinal vertical section of the elevator-screen and clearing attachment, and Fig. 5 a longitudinal section of the fan, showing also the wind-registers of the fan-box.

Similar letters of reference in the accompanying drawings denote the same parts.

The object of this invention is to improve the construction and operation of grain-separators; and to this end the invention consists, first, in the combination of an adjustable governor with the wind-register of the fan-box, whereby the blast will be automatically regulated and equalized; secondly, in the combination and arrangement of two sets of rakes, one working beneath the other, and in the mode of operating the same; thirdly, in the construction of the rake-bars and mode of arranging the rake-teeth; fourthly, in the employment of a toothed feed-roller above the shoe, and a comb in connection therewith; fifthly, in the construction of the carding-rollers, and combination of combs therewith; and, sixthly, in the construction of the elevator and the apparatus for cleaning the elevator-screen.

In the drawings, A indicates the main frame, B the traction-wheels, and C the cover, of the machine, the fan being represented at D, the thrashing-cylinder at E, the feed-table at F, the tailing-worm at G, and elevator at H, and the two rakes at I J.

At one or both ends of the fan-box we employ a wind-register, controlled by a ball-governor, K, or the equivalent thereof. The connection between the governor and the register, shown by the rods or levers k, may be made in any suitable manner. The power to be overcome by the governor-balls is capable of being varied by means of an arm or lever, k^1, on which a weight, k^2, is suspended. The governor is driven, preferably, by power derived from the fan-wheel shaft and transmitted by a belt and pulley and cog-gearing, or in any other suitable way. This provision enables the operator to easily and readily control and vary the volume of air admitted to and thrown from the fan, without changing the speed of the fan-wheel or of other parts of the machine.

The toothed concave in which works the thrashing-cylinder, is at L separated from the other parts of the platform upon which the grain and straw travel, and made, with its teeth, capable of vertical adjustment toward and from the cylinder. This adjustment may be effected in various ways, but we prefer to use a wedge, e, beneath it, and a set-screw, e', operating in a slot in the wedge, to hold the latter in any required position. By this means the operation of the thrashing-cylinder may be controlled at will, and the parts may be readily adjusted to their greatest practical efficiency.

The register-plates which control the admission of air to the fan-box, are arranged on the inside of the fan-box, and journaled on the wind-wheel shaft. They are connected together by a rod or plate at their periphery, to which rod or plate the rod k is attached, so as to open or close both registers at once. The ends of the fan-box are of metal, having a central opening to answer as the bearing of the fan-wheel shaft. These heads or end plates are fastened to the sides of the machine in any suitable manner. This mode of mounting the shaft in the box-heads, and mounting the register-plates on the shaft inside of the box, we find to be advantageous in respect to durability, simplicity, and economy, and in affording better facilities for connecting the register-plates to the governor.

The rakes, operated in the usual manner by double cranks, are arranged as shown in Fig. 1.

We are aware that an upper and a lower rake have been heretofore used in the same machine, the front end of one rake coming about to the rear end of the other, but by our arrangement the upper rake overlaps the lower one, and operates in combination with it, the upper rake operating on the upper side of the

mass of straw and the lower one operating at the same time on the under side of the same mass. This arrangement greatly enhances the efficiency of the machine.

The rake-bars of the lower rake are made perfectly smooth on their upper side, instead of being notched as heretofore, and to take the place of the notches we stagger the teeth, as shown in Fig. 2. This insures the movement of the straw, and causes the rakes to operate much better than when constructed in the old way.

In connection with the upper part of the shoe (shown at M) we employ a feed-roller, N, having long teeth, and operating in connection with a comb, *n*, composed of long teeth, projecting nearly horizontally from the inclined shoe, as shown in Fig. 2. This device tends to separate the coarser from the finer materials, and promotes the progress of the materials through the machine.

The carding-rollers (shown at O O^1 O^2) are constructed with the usual peripheral grooves, and with additional longitudinal grooves. (Shown clearly at *o o*, along the dotted lines in Fig. 3.) The ends of these rollers are also provided with protuberances *o' o'*, which knock against the sides of the shoe-frame, and give the shoe the requisite vibration. In connection with each carding-roller, on one or both sides, as desired, are toothed combs *m* m^1 m^2 m^3, the teeth of which enter and clean the peripheral grooves of the rollers, besides assisting in the separation of the heavier from the lighter matters passing over them. The longitudinal grooves in the rollers prevent the space between the combs and rollers from becoming clogged, and also promote the separation of the materials and the cleaning of the combs.

The combs may be, one or all, adjustable with reference to the carding-rollers, either by the adjustment of the shoe-frame, or by a separate adjustment independently of the adjustment of the shoe-frame. They are all supported by the shoe-frame.

The rear comb is made with teeth longer and wider apart than the others, which teeth may or may not enter the grooves of the roller, as preferred by the constructer.

The shoe may be made in different sections, each of which is independently adjustable, and each of which is vibrated by the roller nearest to it. In this case the upper section M of the shoe may be adjusted up or down by an eccentric or crank, P, on which it rests, said crank having a handle outside of the frame for readily controlling it.

The elevator is made with a smooth floor, which, near its upper end, is superseded by a screen, as shown in Fig. 4. For the purpose of cleaning the screen we arrange beneath it a series of rubbers or brushes, *r r r*, of any suitable material, supported on a sliding-rod, R, which rod is longitudinally reciprocated by a slotted lever, Q, which engages with a wrist-pin on a pulley of the upper rake crank-shaft. The rubbers operate against the under side of the screen, and the offal falls through a suitable opening or into a suitable receptacle arranged beneath.

The various parts above described may be driven in any suitable manner. A convenient mode of arranging the driving mechanism is as follows: Apply the motive-power at the pulley of the thrashing-cylinder; drive the fan-wheel by a belt from the opposite end of the cylinder-shaft; drive the elevator-apron from a smaller pulley on the same end of the cylinder-shaft; connect the two crank-shafts that operate the rakes by means of a belt, *b*, on the elevator side of the machine; drive the crank-shaft of the upper rakes by cog-gearing, including an idle-wheel, from the end of the fan-wheel shaft on the side opposite to the elevator; drive carding-roller O by a crossed belt from the end of the first crank-shaft outside of the cog-wheel; drive the feed-roller N by cog-gearing from the end of the shaft of roller O; and drive the two carding-rollers O^1 O^2 by a single belt from the end of the second crank-shaft, as shown at *s*.

We claim as our invention—

1. The combination of the wind-register of the fan-wheel with the ball-governor and adjusting-weight, substantially as described.

2. The combination of the upper rakes I, actuated at their feed end by a multiple crank-shaft, and sliding in guides at their opposite end, with their lower rakes J actuated in a similar manner at their discharge end, and sliding in guides at their feed end, the two sets of rakes overlapping throughout nearly their entire length, and having teeth on their proximate faces, substantially as described.

3. The rake-bars, arranged with their upper surfaces horizontal, and each bar set throughout its entire length with staggered teeth, substantially as described.

4. The combination of the toothed feed-roller N with the smooth incline, and with the comb or teeth *n* extending horizontally from the incline, the roller being arranged over the lower end of the incline, and the comb projecting from a point above said lower end, substantially as described.

5. The combination of carding-rollers, having both peripheral and longitudinal grooves, with the combs, having teeth that enter the peripheral grooves, substantially as described.

6. The combination of the elevator, the screen arranged in the bottom thereof, the sliding buffers, operating against the under surface of the screen, and the lever Q, by which the buffer is operated from the pulley of the lower rake-shaft, substantially as described.

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