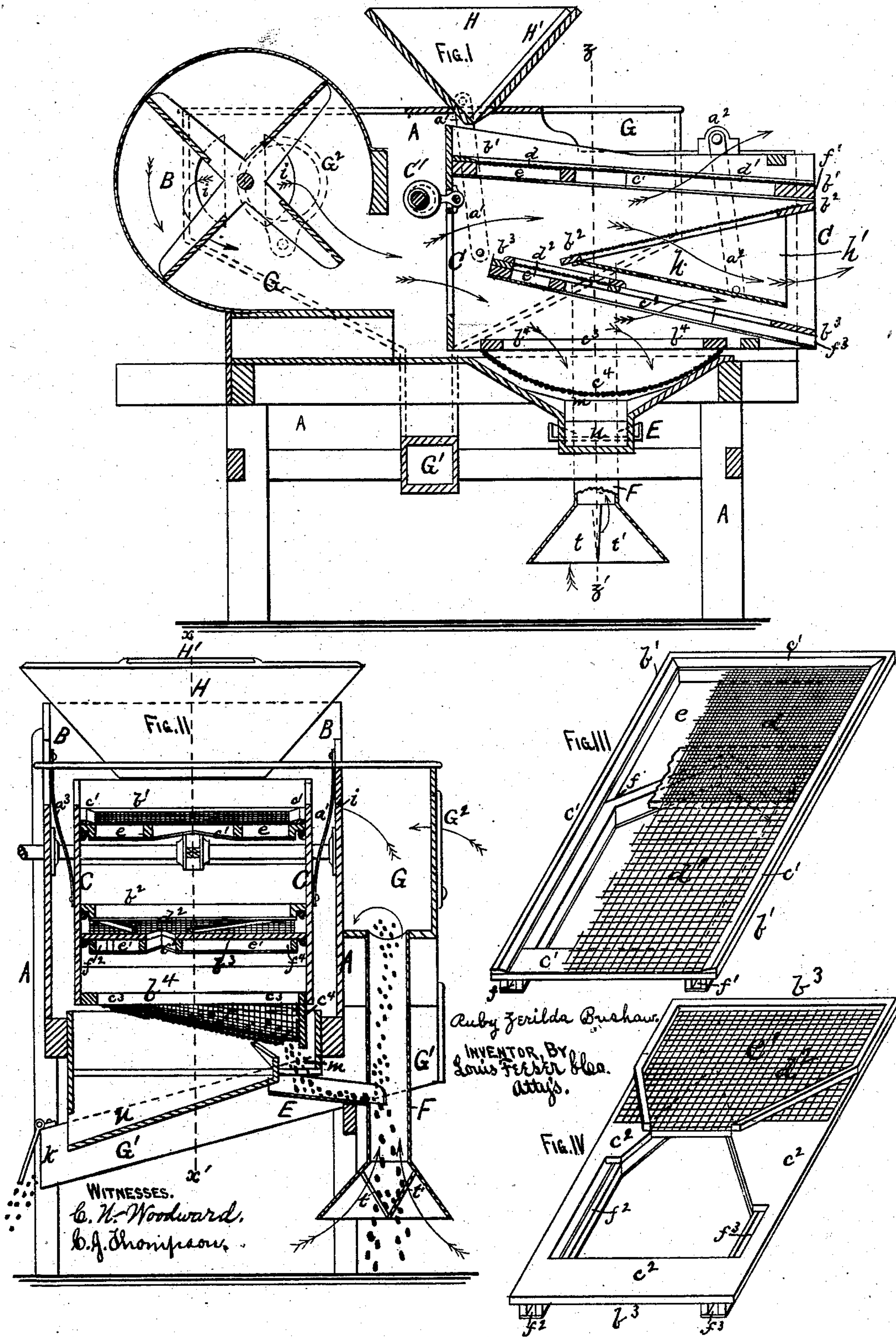


R. Z. BUSHAW.  
Grain Separator.

**No. 235,739.**

**Patented Dec. 21, 1880.**



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# UNITED STATES PATENT OFFICE.

RUBY Z. BUSHAW, OF MINNEAPOLIS, MINNESOTA.

## GRAIN-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 235,739, dated December 21, 1880.

Application filed June 27, 1878.

*To all whom it may concern:*

Be it known that I, RUBY ZERILDA BUSHAW, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain novel and useful Improvements in Grain-Separators, said improvements being more particularly adapted for that class of such machines known as "fanning-mills," which improvements are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure I is a longitudinal sectional elevation in the plane indicated by line  $x x'$  of Fig. II. Fig. II is a transverse section in the plane of line  $z z'$ , Fig. I; and Figs. III and IV are detail views of two of the sieves removed from the machine.

My invention will first be described, and then specifically pointed out in the claims.

A is the frame, properly encased. B is the fan, arranged in the upper part, at one end, of the mill, and arranged to deliver an under blast through the shoe, as shown. C is the shoe, supported upon vibrating straps or links  $a' a^2 a^3$ , &c., and may be operated by any suitable means—as, for example, the transverse shaft  $C'$ , provided with an eccentric and connected to the shoe C by a link having a yoke which embraces the eccentric—to receive a reciprocation lengthwise of the machine, or in the line of flow of the grain.

The screens  $b' b^2 b^3 b^4$  are supported upon ribs upon the interior sides of the shoe C. The upper screen,  $b'$ , Fig. III, consists of a frame,  $c'$ , provided at its upper or receiving end with fine-meshed wire-cloth  $d$ , covering about one-third of the length of the sieve-frame, and the remainder is covered with a wire-cloth,  $d'$ , of coarser mesh. Beneath the finer-meshed cloth  $d$  the frame  $c'$  is provided with a metallic bottom, which forms a chamber,  $e$ , from which spouts or conduits  $f f'$  run along the sides of the frame  $c'$  to the tail of the machine. The lower or rear side of the chamber  $e$  is made V formed, slanting in each direction to the spouts  $f f'$ . The second screen,  $b^2$ , is set slanting toward the fan—that is, in a direction opposite to that of screen  $b'$ —and is supplied with a chamber,  $h$ , beneath it, whose bottom inclines and discharges toward the tail

of the machine. This second screen terminates not far forward of the middle of the shoe, above the third screen,  $b^3$ , as shown, in such a manner as to deliver the grain, &c., upon said screen near its upper end. This third screen, Fig. IV, consists of a frame,  $c^2$ , fitting the interior of shoe C and provided with a chamber,  $e'$ , similar to that in the upper screen,  $c'$ , which is covered with a wire-cloth,  $d^2$ , and connected by means of conduits  $f^2 f^3$ , precisely similar to those of upper screen,  $c'$ . The grain passes from cloth  $d^2$  between two guiding-cleats secured thereon. The lower portion of this frame  $c^2$  is left uncovered, and opens directly upon fourth screen,  $b^4$ , which consists of a frame having one side,  $c^4$ , formed with a convex lower edge, while the screen is made in the form of a curved chute discharging transversely of the machine. By this arrangement relatively to the shoe the grain is, while being discharged, given a lateral rolling motion, which, while working it down, causes it to assume a position greatly facilitating its being freed from dirt, &c., by the mutual attrition of the berries and their rubbing on the wire-gauze, said impurities settling to the bottom and being discharged through the wire-gauze of the spout into spout  $n$ , and thence out at the side of the machine. The rolling motion also causes the smaller grains to settle to the bottom and be separated before reaching spout F.

It will be observed that I obtain this vigorous bodily movement (transversely to the flow of the grain) of the concave chute or screen by simply rigidly attaching the said chute transversely to the bottom of the shoe. The grain passes from the chute or screen into a hopper,  $m$ , and thence into a spout, E, discharging into an air-trunk or suction-spout, F, communicating at its upper end with a wind-chest or "cheat-box," G, arranged on the side of the machine, communicating with the fan through the eye  $i$ , and having a hopper or chute bottom delivering into an inclined passage,  $G'$ , which passes under the machine to the opposite side thereof, where its discharge-opening is closed by a drop-valve,  $k$ , serving to prevent the ingress of air at this point instead of through the wind-trunk F, and open-



ing only by the weight of light grain, &c., when accumulated in quantities sufficient to force its own way out.

$G^2$  is a valve fitting over a port in the side of the wind-chest to regulate the strength of the air-current in the spout F. The flaring bottom of this spout F is provided with retarding wings or plates  $t t'$ , to facilitate the separation of the best and the inferior grains, &c.

It is obvious that the corners of the wind-chest or cheat-box G may be rounded to prevent the formation of dead-air spaces or eddies and to deflect the current toward the fan from spout F.

The operation is as follows: The grain is fed into the hopper H, and passes thence through the opening regulated by the ordinary slide  $H'$  onto fine sieve  $d$ , and thence down over the coarse cloth  $d'$ , which suffers it to pass through, freed of its coarsest foreign matter, upon the reversely-inclined screen  $b^2$ , thence over screen  $b^3$  into the concave screen  $b^4$ , and finally is discharged into perpendicular air-trunk F.

When the grain first strikes screen  $b'$  it is not acted on by the air-blast, being shielded therefrom by the solid bottom of chamber  $e$ . This permits the settling through and escaping, by way of conduits  $f f'$ , of many of the finer impurities, lessening the amount of dust, &c., blown about usually by such machines.

The air-current, as shown, will pass through screens  $d' d^2$ , and when the grain reaches spout F it is freed of light and shrunken berries and of dirt dislodged by the action of screen  $e^4$  by the upward draft, which carries them into cheat-box G.

My machine is especially useful in cleaning seed-wheat, as the perfect purity of the first or best grade is assured.

The imperforate bottom  $e'$  of screen  $d^2$  permits the grain to be isolated from the blast and a free separation of fine particles to take place through the screen by the agitation of the shoe at this point, as in the case of the

upper screen. The open lower portion of screen-frame  $e^2$  permits the grain while falling to be exposed to a blast which is allowed by the same opening to escape upwardly and outwardly, while the imperforate bottom of the chamber  $h$ , which is located directly above the open lower portion of sieve-frame  $e^2$ , serves to discharge the impurities falling through screen  $b^2$ , and prevent them falling through the opening of sieve-frame  $e^2$  and being re-mingled with the grain. This is the specific relation of these parts.

I claim as my invention—

1. The combination of blast-fan B, screen  $b^2$ , inclined toward the fan, sieve-frame  $e^2$ , inclined oppositely thereto and provided at its upper portion with sieve  $d^2$  and imperforate bottom  $e'$ , and having its lower portion left open or clear for the passage of air and grain, and the chamber  $h$ , having imperforate bottom, arranged above the clear or open portion of sieve-frame  $e^2$ , substantially as and for the purpose hereinbefore set forth.

2. The combination, in a grain-separator, of a reciprocating shoe or frame and a concave wire-gauze cleaning and discharging conduit rigidly secured to said frame or shoe transversely of the line of reciprocation thereof, substantially as and for the purpose hereinbefore set forth.

3. The combination of a blast-fan, a longitudinally-reciprocating shoe provided with sieves and having a concave wire-gauze cleaning-conduit rigidly secured beneath and to said shoe transversely of the line of reciprocation thereof, and a suction air-trunk receiving the grain as it is discharged from said shoe, substantially as and for the purpose set forth.

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

RUBY ZERILDA BUSHAW.

Witnesses:

C. N. WOODWARD,  
LOUIS FEESER.