2 Sheets—Sheet 1.

B. CARPENTER.

GRAIN THRASHING AND SEPARATING MACHINE.

No. 182,516. Patented Sept. 26, 1876.

Fig 1.

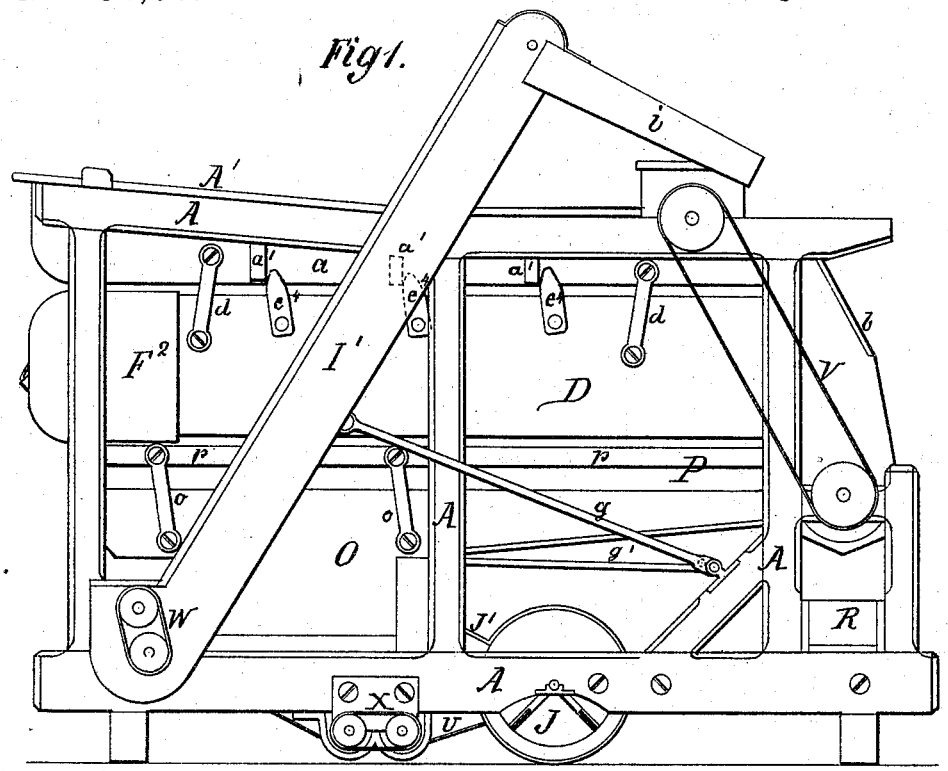
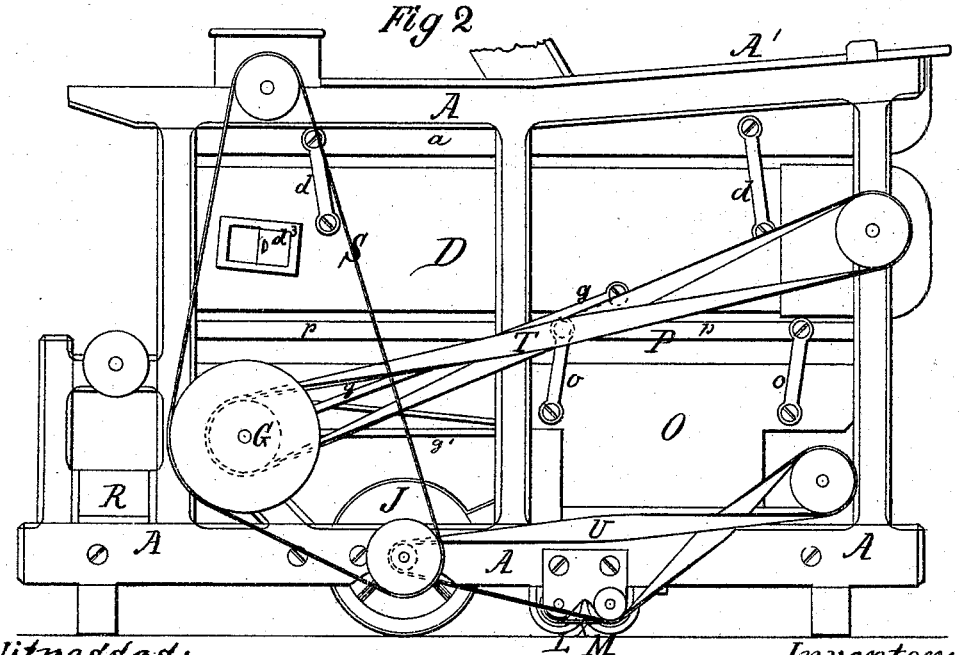


Fig 2



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2 Sheets—Sheet 2.

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Fig 3.

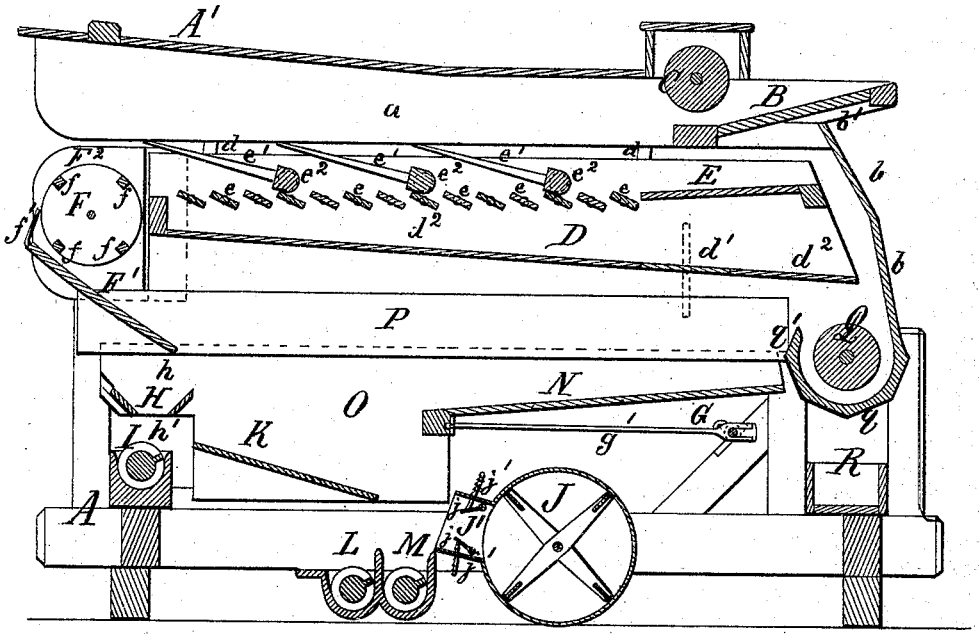
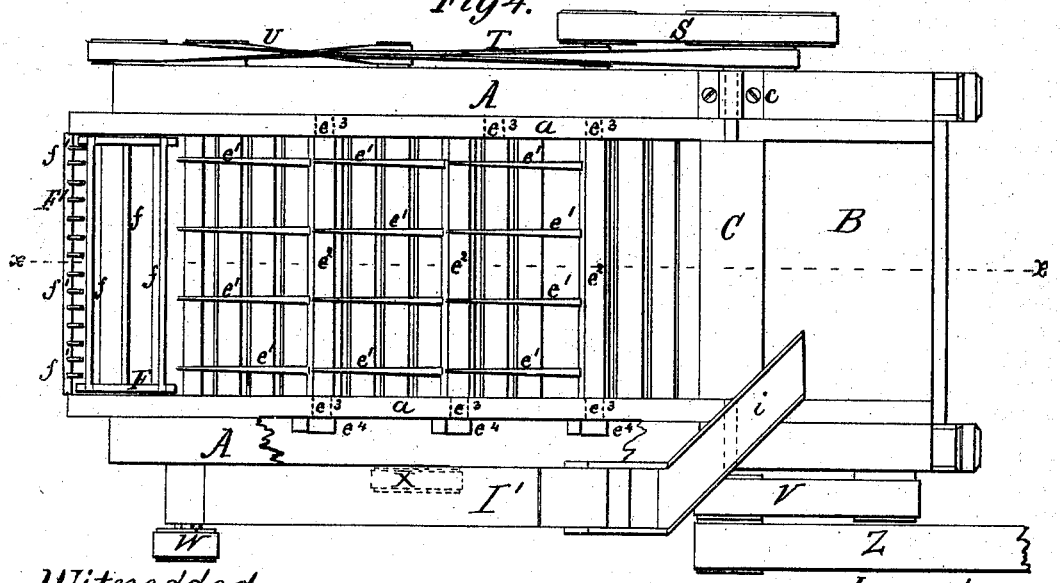


Fig 4.



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Inventor:
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UNITED STATES PATENT OFFICE.

BURR CARPENTER, OF PLAIN CITY, OHIO.

IMPROVEMENT IN GRAIN THRASHING AND SEPARATING MACHINES.

Specification forming part of Letters Patent No. **182,516**, dated September 26, 1876; application filed April 26, 1876.

To all whom it may concern:

Be it known that I, BURR CARPENTER, of Plain City, in the county of Madison and State of Ohio, have invented a new and useful Improvement in Grain Thrashers and Separators, which improvement is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation of the left side. Fig. 2 is an elevation of the right side. Fig. 3 is a vertical longitudinal section in the line *x x* of Fig. 4; and Fig. 4 is a top view of my improved machine, the coverings of which being removed to expose the parts below to view.

The nature of my invention consists in certain constructions, combinations, and arrangements of parts as hereinafter described, and specifically claimed, whereby an improved machine for thrashing, hulling, and separating grain, clover, and other seeds is produced, which can be worked with small power and perform its work more thoroughly and quickly, and which may be manufactured at a less cost than other machines of the same class heretofore known.

To enable others skilled in the art to understand my invention, I will proceed to describe it.

In the accompanying drawings, a represents a frame with a strong upper and lateral casing, *a*, to which the feed-board is fastened. Above the lower end of the feed-board B the thrashing-cylinder C is placed in suitable journal-bearings *c* on the frame A. Below this feed-board a reciprocating shoe, D, is suspended by hangers *d* to the outside lining *a*. Near its lower end the said shoe has a trap-door, d^1, across the bottom d^2, which trap-door is flush with the bottom, when closed, and when opened prevents the seeds from sliding to the end of the shoe. Above the trap-door d^1 a board, E, is placed, so as to cause all grain, seeds or other substances to fall down in front of the trap-door. From the said board E an inclined raddle, formed of transverse adjustable slats *e*, is arranged, and provided with a number of longitudinal shaking-arms, e^1, on transverse rocking shafts e^2 extending to the rear end of shoe D, where it is joined by a grain-reel, F. Motion is given to the shoe D by means of a crank-shaft, G, and connecting-rods *g*. The rock-shafts e^2 rest in journal-bearings e^3 in the casing *a*, and the said rock-shafts at one side of the machine extend outside of the said casing, where they are provided with lever-arms e^4, which bear on the stationary bearing-blocks a^1, and by which the oscillating motion of the shoe D is caused to move the shaking-arms e^1 up and down.

The grain-reel F is provided with light cross-bars *f* placed upon its outer periphery, so as to leave intervals through which grain and broken heads of grain may fall and be conveyed by the inclined stationary board F′ below to a ventilated hopper, H, and thence down to a propeller or screw, I. The ventilation of the hopper H consists of the space *h* left between it and the board F′, and the space *h′* above the screw I, through which spaces a blast of air from a fan, J, may be directed, as seen desirable. The high end of the board F′ is provided with a row of teeth, *f′*, which are so inclined to the grain-reel F that they comb off or remove any straw that may adhere to the bars *f* in their descent.

The grain which, in its descent from the board F′ passes beyond the hopper H, is conducted by the inclined board K to the screws L and M, the lighter substances being blown by the fan J into the trough of the screw L. The said board K has a central direction toward the fan J and its spout J′, to permit the free passage of the grain into the spout, as shown in Fig. 3.

The grain or seed collected within the hopper H, being very unclean, is moved by the screw I to the elevator I′, from the top of which it is discharged on the feed-board B by means of a spout, *i*. The grain falling through the open trap-door *d′* is conducted by the inclined board N to the screws L and M, and in its descent is separated into light and heavy grain, in the same manner as the grain dropping from the board K.

The hopper H and the boards K and N are fastened to the reciprocating shoe O, which is suspended in the frame A by the hangers *o*, and receives its motion by a connecting-rod, *g′*, from the crank-shaft G. A T-shaped board, P, is fastened to each side of the frame A, and placed with its rib *p* between the shoes D and

O, thereby breaking joints with the said shoes. This prevents the air-blasts within the frame from blowing any grain out sidewise. To the ribs *p* of the boards P the hangers *o* of the shoe O are attached. The grain-reel F is provided with lateral air-arresters, consisting of stepped side-boards F^2, whereby the space between the shoe D and the said grain-reel is effectually covered up, so that grain cannot be blown into said spaces. The space between the cover A′ and the vibrating shoe D is gradually increased toward the end of the machine, by making the said cover inclined, and by this means the shaken-up straw is prevented from jamming the passage. The front part of the machine is closed by boards, *b*, below the feed-board B, having a small space, *b′*, beneath the feed-board, which affords means for ventilation. Below the front end of the shoe D a fine thrasher or huller cylinder, Q, (which is used only for clover or grass seeds,) is placed in a trough, *q*, which is joined by the boards *b* in front, and has a high discharge-edge, *q′*, by which construction the lighter substances thrown up by the cylinder Q are either carried up by the draft and blown out at *b′*, or, if too heavy, fall back on the cylinder to be rehulled, while the heavier seeds are not affected by the said draft, and are thrown upon the board N. A box, R, is placed below the cylinder Q, for the purpose of collecting any seeds casually blown through the space between the board N, and the trough *q*. The blast of the fan J may be regulated in regard to intensity and direction by two valves, *j*, hinged at *j′*, near the top and bottom of the spout J′ of the fan, as seen in Fig. 3.

The thrashing-cylinder C is moved by a driving-belt, Z, and the motion of the different parts described is transmitted by belts from pulleys on the shaft of the thrashing-cylinder C. The belt S passes over the pulleys of the thrasher C, the crank-shaft G, and the fan J. The belt T passes over a small pulley of the crank-shaft G, and the pulley of the grain-reel F. The belt U passes over a small pulley on the shaft of the fan J and thence over the pulleys of the screws M and I. The belt V passes over the pulleys of the thrasher C and huller Q. The belt W passes over a pulley at the other end of the screw I, and the pulley of the elevator I′. The belt X runs over the pulleys of the screws L and M. One driving-belt is used for driving the thrashing-cylinder C. Access to the trap-door *d′* from outside is effected by an opening in the shoe D, which is closed by a sliding door, d^3.

Operation: The machine being arranged for thrashing wheat by opening the trap-door d^1, as shown in dotted lines, and set in motion, the sheaves are spread on the feed-board, and pushed under the thrashing-cylinder C. The thrashed material is blown by the said thrasher over the slats *e*, which are so inclined as to allow the separated grain to easily slide between and down upon the floor or bottom of the shoe D. In passing over the arms e^1 the straw is thrown up and loosened, permitting the back draft to take the lighter substances away and outside of the machine, and facilitate the descent of the free grain.

When the straw arrives at the end of the shoe D, the grain-reel F shakes it up once more with its cross-bars *f*, and throws it out of the machine, the teeth f^1 preventing its being drawn in again at the lower side of the wheel. The grain collected on the board d^2 is moved by the motions of the shoe D toward the trap-door d^1, and drops through it upon the board N. The motions of the shoe O cause the grain to slide back, and, finally, fall over and pass through the blast of the fan J down to the screws L M. The heavier grain falls upon the rear screw M, while the lighter grain is deflected in its line of descent by the blast, and falls upon the screw L. The said screws deliver their grain into separate vessels. The grain freed by the reel F drops upon the inclined board F^1, the heavy grain sliding down with greater velocity than the lighter substances, and consequently passing through the blast of the fan J with less deflection, and thereby falling upon the board K. From the board K the grain moves down toward the screws L M, and, on leaving the said board, the lighter grain is blown by the fan J upon the screw L, while the heavier grain drops upon the screw M. The grain falling through the grain-reel F upon the board F′ is mostly mixed with heads, or parts of heads, containing more or less grain, and these, being more buoyant than the free grain, are, on their descent from the board F^1, blown over into the hopper H, and thence upon the screw I, by which they are moved into an elevator, I′, to be conducted up and upon the feed-board B for rethrashing.

All particles of straw or hull which become detached in descending upon the boards F^1, K, and N are blown out of the machine through the openings *h h′*, and the space below the board K, as soon as they leave the said boards.

The separation of the heavy and light grain is done entirely by exposing it in its free descent to a blast of air, and thereby deflecting the lighter and more buoyant grain more from its natural course than the heavier grain, and depositing it in a remote place from the latter.

When clover is to be hulled the slats are turned down to a vertical position, so as to leave large spaces between them for the clover-heads to pass through, and the clover is placed upon the feed-board B, and subjected to the action of the thrashing-cylinder, which causes the stems and heads to be parted and blown upon the shaking or lifting arms, slatted raddle of the shoe, and grain-reel F.

The clover-heads in their passage along the slats *e* are freed from their stems, timothy, and other like substances, and fall through the spaces between the slats upon the inclined imperforate bottom board d^2 of the shoe; and, the trap-door d^1 being closed, they move to

the end of said board, and drop upon the huller Q, where they are so finely broken up as to free the clover-seeds from their hulls.

The clover-seed are thrown out of the trough *q* unaffected by the draft created by the quickly-revolving huller Q, and are conducted down the board N toward the screws L and M. The blast of the fan J separates the falling seeds in the same manner as it does the grain. The parts dropping through the reel F are received by the board F′, and in leaving it the seed drop upon the board K, while the lighter substances fall into the hopper H, and thence upon the screw I, to be therefrom conducted by the elevator I′ onto the seed-board B for rethrashing. The seed on the board K are moved toward the screws L and M, and in their descent are separated into light and heavy in the same manner as before described.

If it is desirable to have a full blast from the fan J the valves *j* are both thrown back. If the blast above the board K is to be diminished, when, for instance, the grain is very light, the upper valve *j* is swung partly down, as seen in Fig. 3. If the draft below is to be diminished the lower valve *j* is swung up, and so on, the draft being under the control of the operator during the operation of the machine.

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

1. In a combined thrashing, separating, and hulling machine, the combination of a raddle composed of the adjustable slats e^1 and shaking-arms e^2, and a reciprocating shoe, D, having an imperforate bottom, with a trap-door in it, substantially as and for the purpose set forth.

2. In a combined thrashing, hulling, and separating machine, the combination of the agitating grain-reel F, the inclined board F^1, and the rake-teeth *f′*, substantially as and for the purpose set forth.

3. In a combined thrashing, hulling, and separating machine, the combination of the reel F, its board F^1, the hopper H, and the screw I, substantially as and for the purpose set forth.

4. In a combined thrashing, hulling, and separating machine, the combination of the grain-reel F, the board F^1, the openings *h h′*, the board K, and the screws L M, substantially as and for the purpose set forth.

5. In a combined thrashing, hulling, and separating machine, the combination of the imperforate reciprocating boards N d^2 and the screws L and M, substantially as and for the purpose set forth.

6. In a combined thrashing, hulling, and separating machine, the combination of the reciprocating board K, the fan J, and the screws L and M, substantially as and for the purpose set forth.

7. In a combined thrashing, hulling, and separating machine, the stationary air-arresters, consisting of the rabbeted boards F^2, and T-shaped board P, located as described, substantially as hereinbefore set forth.

8. In combination with the thrashing mechanism and the separating mechanism, the huller Q, beneath the lower end of the inclined imperforated shoe D, and the trap in said shoe, substantially as described.

9. The combination of the thrashing-cylinder, vibrating shoe D, having a trap-door, d^1, in its imperforate bottom, the hulling-cylinder and its concave, the vibrating shoe O, and the fan J, substantially as described.

10. The combination of the thrasher C, the huller Q, the vibrating shoe D, the vibrating shoe P, and the fan J, constructed and operating substantially as and for the purpose set forth.

11. In a combined thrasher, huller, and separator, the combination, with the thrashing mechanism and its raddle and with the hulling mechanism, of inclined imperforate boards K and N, common to each, and a blast-fan and grain and seed conveyers, located essentially in the described relation to such boards, whereby the separating and sorting operations are performed, substantially as set forth.

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