

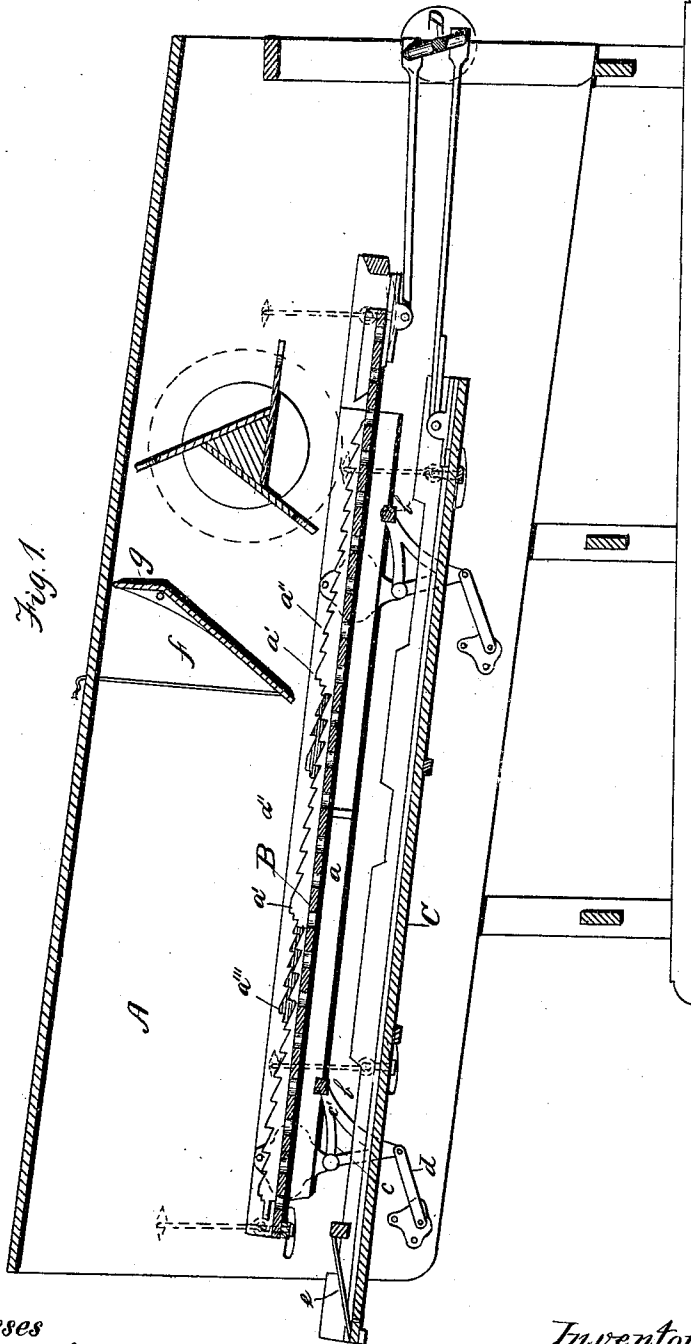
M. HARDER & D. ANTHONY.

ANNA ANTHONY & S. DIEFENDORF, Adm'rs of D. ANTHONY, dec'd.

GRAIN-SEPARATOR.

No. 178,436.

Patented June 6, 1876.



Witnesses
Granville Lewis
M. C. Church

Inventors:
Minard Harder, and
Anna Anthony, and
Sylvester Diefendorf, Adm'rs
of Estate of David Anthony dec'd.
By Hill, Ellsworth & Spear,
their Atty's

M. HARDER & D. ANTHONY.

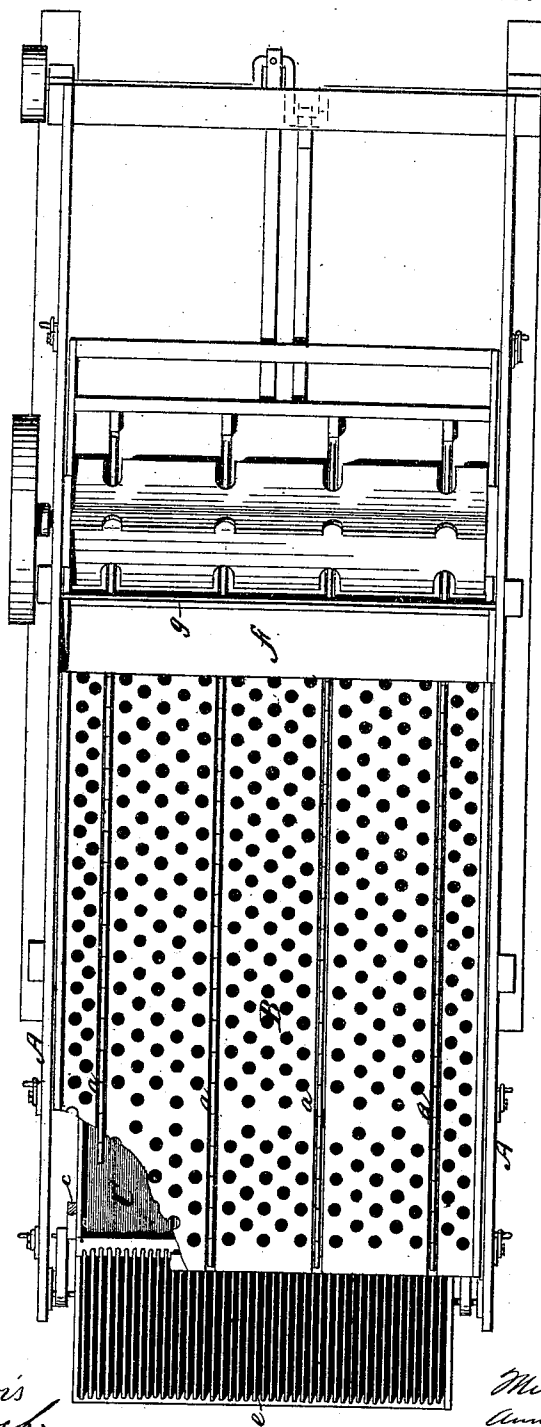
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Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

MINARD HARDER, OF COBLESKILL, FOR HIMSELF, AND ANNA ANTHONY, OF EAST WORCESTER, AND SYLVESTER DIEFENDORF, OF MILFORD, NEW YORK, ADMINISTRATORS OF DAVID ANTHONY, DECEASED; SAID ADMINISTRATORS ASSIGNORS TO SAID HARDER.

IMPROVEMENT IN GRAIN-SEPARATORS.

Specification forming part of Letters Patent No. **178,436**, dated June 6, 1876; application filed April 26, 1876.

To all whom it may concern:

Be it known that MINARD HARDER, of Cobleskill, in the county of Schoharie and State of New York, and DAVID ANTHONY, deceased, late of East Worcester, Otsego county, of said State, did invent certain new and useful Improvements in Grain-Separators, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, forming a part of this specification, in which—

Figure 1 of the drawing represents a top view of the machine. Fig. 2 is a vertical longitudinal section of the machine, showing the blades in position.

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

The invention relates to grain-separators which are to be used in immediate connection with thrashing-machines; and consists, more particularly, in improvements in the conveyer, by which the grain and chaff are separated from the straw.

The particular points in the invention are more fully set forth, and are particularly claimed in the following specification.

The machine is adapted, like others of its kind, to be used in close connection with the thrasher, which is located next the right-hand end of the machine, as represented in Fig. 1. In both the figures, A A are the sides of the machine. Within them are suspended, first, a separator, immediately over which the beaten straw passes, and directly under this separator a grain-carrier adapted to catch the grain as it falls through the separator, or over the end of it, and to convey it back to the winnowing-machine, which is to be located beneath the left-hand end of the carrier, as seen in Fig. 1. The separator is marked B and the carrier C. It will be further observed that both the separator and the carrier are suspended between the sides by means of arms on each side, and near the ends of the separator and carrier, which arms pass through curved slots in the sides, and are hooked into rods pivoted a suitable distance above, the

construction being such as to allow both separator and carrier to have a limited endwise reciprocating movement. So far, however, the construction is not essentially new; but, in addition to this, and beside the ordinary perforations in the separator, longitudinal slots are provided, running nearly the entire length of the separator, the slots terminating only at sufficient distance from the ends to allow the subdivisions to be held firmly together by a transverse bar. The separator and conveyer receive alternate reciprocating movement by means of pitmen connected to the crank-shaft D at the right-hand end of the machine. Within the slots mentioned above, in the separator, are placed blades *a a*, these blades being made to move freely up and down in the slots of the separator. They are supported below on two transverse bars, *b b*, entirely independent of the separator proper. The ends of these bars have bearings in the ends of the horizontal arms *c'* of the bell-crank levers *c*. These bell-crank levers are pivoted at the corner to downwardly-projecting standards on the sides of the separator. The lower arm of these levers is pivoted to an arm, *d*, which has its bearing in the side of the machine. This pivot, on which the arm *d* rests, is placed lower down than the pivot of connection between the other end of the arm *d* and the lower end of the vertical arm of the bell-crank lever.

The parts are so constructed, proportioned, and arranged that when the separator is pushed backward away from the thrashing-cylinder by means of the crank-shaft on the end of the machine, it carries directly back the corner of the bell-crank lever, which is connected with the hanger aforesaid; but, since the lower end of the vertical arm of this bell-crank lever is pivoted to the arm *d*, so that it can have no considerable amount of longitudinal movement with the upper corner, but only a rotary movement around the pivot of *d*, it follows that the horizontal arm, which carries the transverse bars and the blades *a*, must be thrown upward. Manifestly, the re-

verse movement of the separator will throw the horizontal arms, and the transverse bars and blades which they carry, directly, or nearly directly, downward. By this construction it will be observed that while a reciprocating movement is given to the separator in nearly a horizontal plane, the blades are made to receive, in addition to this horizontal movement, simultaneously with the separator, a vertical movement (up and down) at nearly right angles in relation to the separator.

In respect to the blades it will be more particularly observed, referring to Fig. 1, that they have peculiar notches or serrations on the upper edge. These consist of two series, a' and a'' — a' being the larger, and a'' the smaller, of the series. These notches all have their steeper slopes toward the rear or discharge end of the machine, in order that the straw may be moved in that direction, and be held against slipping backward. These notches also serve another and analogous purpose. As the rear end of the machine is the higher, the straw might not move up the incline without some assistance. This is afforded by the slight rearward movement of the blades, as well as by the reciprocating movement of the separator. It will be noticed that the end of the arm carrying the blades does not rise in exactly vertical line, but moves in a slight curve around the lower pivot of the arm d ; but, since this pivot is to the rear and the curve in that direction, the motion of the blades is also slightly to the rear as they rise. Although this is but slight for each rise, yet, when they work at the ordinary speed, it is not only sufficient, in connection with the rearward movement of the separator, to work the straw up the incline of the separator, but also over the high portions of the blades. The alternate blades are arranged as shown in dotted lines at a''' —that is to say, the elevation of the larger series is opposite the depressions of the neighboring blades. This construction is for the purpose of separating or loosening the straw as it moves along; for, as the straw, in any part, moves up the incline of the larger projections, it necessarily moves in that part slower. But that part of the straw on each side of the incline aforesaid will be moving more rapidly at the same time on the more level portions of the blades on each side, for the reason that the projections on one blade are opposite the depressions on the next. The straw is, therefore, opened or loosened in numerous places at every movement of the blades, and thus the removal of the grain greatly facilitated. These larger elevations also prevent the straw from working off or passing over too rapidly, and detain it, so that by this means the grain can be cleanly separated from the straw with a shorter separator than if the straw passed over more rapidly.

These blades, it should be observed, fit snugly in the slots as is consistent with their free and unobstructed movement, and the

blades are not permitted in any part to fall through below the separator, so that in no event can the straw fall through the slots. The grain-carrier below has the usual inclination, so as to pass the grain and chaff which fall through the holes in the separator back to the sieves or cleaning attachment. The rear end of this carrier, or that next the discharge end of the machine, is made to project farther to the rear than the separator above it, so that at all times it shall extend beyond the separator, and be ready to catch any grain that may fall over the end of the said separator. It has flanges at the sides, and is further provided with a screen, e , to prevent the straw from falling into the carrier, while at the same time free passage is allowed for the grain. This is shown more clearly in Fig. 2, and near the end of it nearest the thrashing-cylinder.

Above the separator is the ordinary device which, in connection with our separator, serves the purpose of a feeder and equalizer. It is driven by a band from a pulley on the crank-shaft, carried over another pulley on its own shaft, or in any other convenient manner. Its office is to strike the mass of the straw and grain as it passes under it from the thrasher, and send it forward upon the separator in equal or nearly equal portions. For this purpose it is provided with three arms or beaters, which are notched upon the edge to fit down over the edges of the blades. Just in rear of this feeder and equalizer is hinged a light board, (marked in the drawings f .) It is hinged on or near its upper edge to the sides of the machine, and the motion of the free edge is limited by a cord or strap. Its office is to keep down the straw as it is thrown upward and backward by the feeder. It is so light as not to weigh down the straw, but only to press lightly upon it, just sufficiently to keep it from being thrown too far by the operation of the regulator. A small flange, g , is placed upon its upper edge, slightly turned up, and extending near the upper covering of the machine. This serves to keep back any straw or grain that may happen to fly over the top of the feeder or regulator, and thereby prevents any grain being thrown by the motion of the cylinder out of the discharge end of the machine.

All of the top of the machine may be covered, though it is not absolutely essential.

The machine is designed for field or barn work, and the intention is to have the winnowing-machine located beneath the mouth of the grain-conveyer, so that the grain runs from the separator and carrier to the sieves or cleaning attachment.

The operation of this improved machine may be readily understood from the description. The grain and straw from the thrasher pass beneath the regulator and upon the separator, where, by the rapid rising and falling motion of the blades, it is kept in continual agitation. The alternate arrangement of the larger points upon the blades serves, as before stated,

to separate the straw and loosen it, and thus facilitate the removal of all the grain therefrom. While the straw is thus lifted and dropped the vibrations of the separator shake the grain down through its perforations in the usual manner.

We are aware that it is not new to use a feeding device in connection with a separator, and we make no broad claim to this feature. This feeder and regulator may be varied in form, and of less or greater diameter than we have represented, and the whole machine may, if desired, be made lower.

We do not wish to be understood as confining ourselves to the precise proportions herein shown; but variations in this respect may be made, according to circumstances, by any skilled workman.

We have not deemed it necessary to show the thrasher or the winnowing-machine, but simply to indicate their positions in relation to this apparatus.

When these machines are adapted to each other, that part of the passage for the straw and grain, between the separator and thrasher, just over the winnower, may be covered by sheet metal.

The number of blades may be varied at pleasure.

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

1. The slotted separator, in combination with the lifting-blades, when the said blades are made to have a horizontal motion with the separator, and a vertical motion through the slots, substantially at right angles to the surface of the separator, as and for the purposes set forth.

2. The blades *a*, made with the larger and smaller notches, the smaller being on the inclines of the larger, as set forth.

3. The separator, perforated to admit the passage of the grain, and provided with lifting-blades, moving in slots through its surface, said separator operating in its longitudinal movement through the bell-crank levers to move the lifting-blades, as and for the purpose described.

4. The bell-crank levers, pivoted at the corner to the standard upon the separator, their horizontal arms *c'* supporting the transverse bar of the blades, and the vertical arms pivoted to the bar *d*, the bearing of which in the side is made lower than its points of connection with the bell-crank levers, all as and for the purpose set forth.

5. The conveyer, having its elongated end made to project beyond the separator in all their relative positions, and provided with a screen, as and for the purposes set forth.

6. The pivoted board *f*, arranged in the described relation to the feeder and separator, as and for the purpose set forth.

7. The upwardly-bent flange upon the upper edge of the board *f*, in combination therewith and with the feeder, as and for the purpose set forth.

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