

B. T. Trimmer. Grain Winnower

N^o 47,346.

Patented Apr. 18, 1865.
Fig. 1.

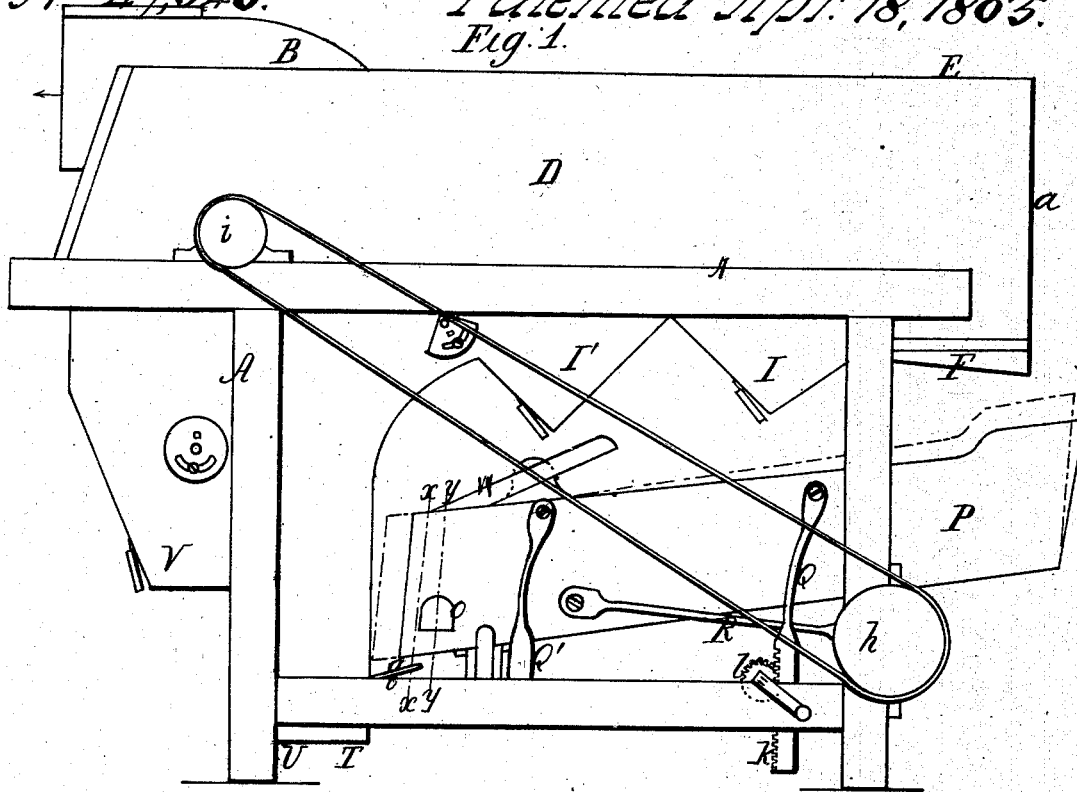
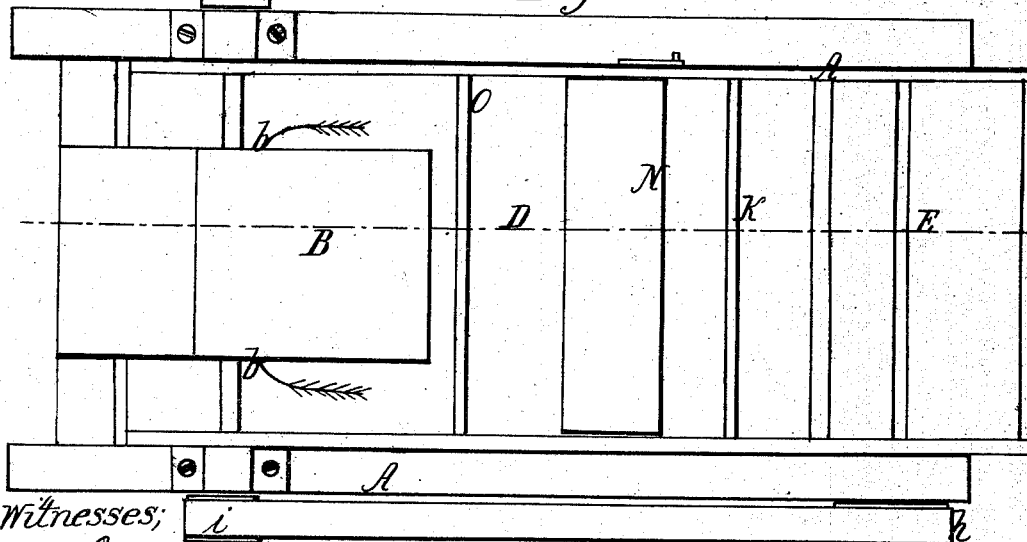


Fig. 3.



Witnesses;

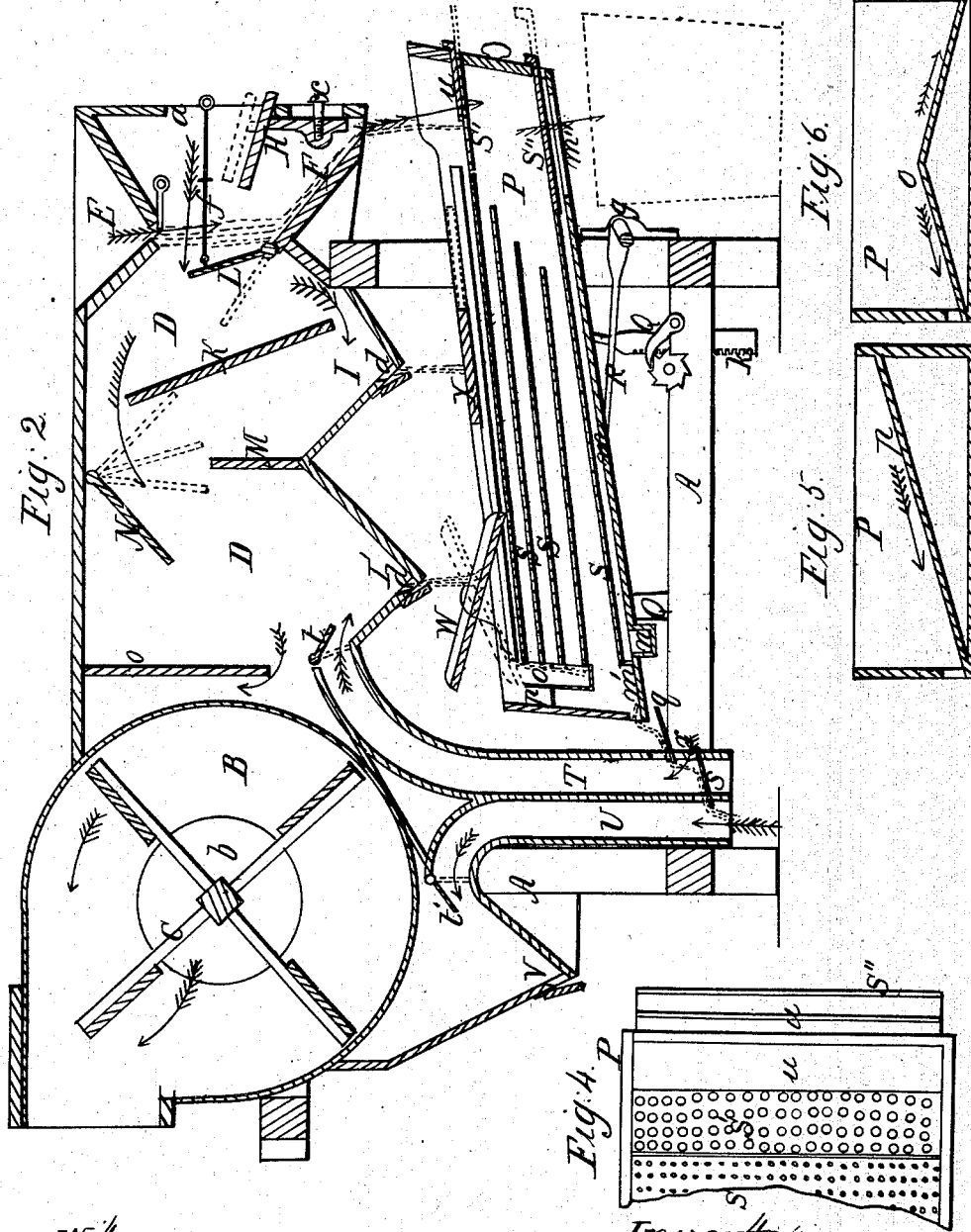
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Witnesses;
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UNITED STATES PATENT OFFICE.

B. T. TRIMMER, OF ROCHESTER, NEW YORK.

IMPROVED GRAIN-SEPARATOR.

Specification forming part of Letters Patent No. 47,315, dated April 18, 1865.

To all whom it may concern:

Be it known that I, B. T. TRIMMER, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Grain-Separators; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

Figure 1 is a side elevation of my improved machine; Fig. 2, a central longitudinal vertical section thereof; Fig. 3, a plan of the same with the top board or covering of the case removed for the purpose of showing the interior arrangement; Fig. 4, a plan of the rear of the shoe, showing more particularly the removable section of the upper screen and the slides used in connection therewith; Figs. 5 and 6, vertical transverse sections of the shoe respectively in the planes of lines *x x* and *y y*, Fig. 1, and showing the arrangement of the lateral spouts for the discharge of the contents that pass onto the screens.

Like letters of reference indicate corresponding parts in all the figures.

My improved grain separator is of that class used by millers and others for cleaning large quantities of grain of dust and impurities after the same has received the preparatory winnowing. It differs from ordinary small fanning-mills or grain-separators generally in use among farmers, and worked by hand, by being of large size, requiring considerable power to operate it, and capable under ordinary circumstances of cleaving several hundred bushels per hour.

As represented in the drawings, A is the frame and casing of the machine; B, the fan-chamber at one end; C, an exhaust fan working therein; and D, the longitudinal space or passage for the draft or current of air which enters at the mouth *a*, runs the whole length of the machine, and passes around the sides of the fan-chamber and enters the latter at the openings *b b*, Figs. 2 and 3, which openings may be graduated so as to increase or lessen the draft by any suitable automatic register covering them. The bottom of the case is formed into a series of two or more pockets or depressions, I I', having outlets *d d* covered by suitable valves for discharging their contents.

At the opposite end of the machine from

the fan is situated the hopper E, over the passage D, from which hopper the grain to be cleaned falls directly across the draft at right angles, or nearly so, to it into a spout, F, that discharges it on the screens of the shoe P, which will presently be described.

The space or opening forming the mouth *a* for the entrance of the air is contracted or enlarged vertically by means of an adjusting-board, H, Fig. 2, that is raised or lowered by any suitable means, that represented in the drawings being a tightening-screw, *c*, passing through a vertical slot in the casing below, and fastening into the board. By this means it will be seen that the draft or current of air may be concentrated more or less upon the falling stream of grain at pleasure; or, in other words, by raising the board, as shown in red lines, the same amount of air which enters will be narrowed and directed upon a certain point of the falling stream of grain, while if it is lowered, as in black lines, the draft will be more diffused, owing to the greater space it occupies. This concentration and diffusion is essential to adapt the intensity of the blast to the kind or condition of grain to be cleaned. For instance, if the grains are of a very large and heavy nature, it is desirable to intensify the draft; but, if the grains are of a very light nature, it is necessary to diffuse and lessen the draft, otherwise a large portion of the grain will be carried inward with it.

At a suitable position within the passage D is situated a transverse board, K, or equivalent, Fig. 2, having either an inclined or vertical position, as may be desirable, and having a space both above and below for the passage of the draft, that below opening into the first pocket or depression I. In front of this board is hinged a transverse valve, L, extending across the space D and turned either forward or back by means of an operating-rod, *f*, and in its rear, between the two contiguous pockets or depressions at the bottom, an upright board, M, rising to a suitable height, and above the latter another valve, N, hinged at the top directly under the cover of the casing, and still in the rear of these, near the fan-chamber, a board, O, projecting downward such a distance as to prevent the draft from passing in a direct line to the fan-chamber, but to turn it downward in a circuitous course, and thus de-

posit such grains or seeds into the pocket I' as are carried past the other boards and valves.

It will be seen that the draft entering the mouth *a* and passing through D will strike the falling stream of grain from E crosswise, nearly or quite at right angles, as indicated by the red arrow under the hopper in Fig. 2; consequently the same strength of draft will have a tendency to remove the dust and extraneous matter much more thoroughly than if the draft passed lengthwise of the stream of grain, or at an acute angle thereto, as it does in a vertical tube, for in this case the resistance of the column of grain itself is a barrier to the free escape of the refuse through it.

In my device the grain, falling across a large, free, unobstructed, and open space D, and the draft merely passing crosswise through a thin stream of grain, every particle of refuse is easily separated and passes off without any obstruction whatever, while the broad space of passage D allows a much greater action of the air than could be attained by the employment of a mere tube. This advantage is manifest; but while this advantage is gained it is apparent that the draft must be a very intense one in order to clean several hundred bushels of grain per hour—much more intense than in ordinary hand-machines, where the intensity of the blast is proportioned exactly to the weight and condition of the mass to be separated. But while the draft is thus intensified the weight of the kernels of grain themselves remains the same, so that it is obvious that much of the sound and heavy grain is drawn out of its course in falling and follows the draft inward. In order to deposit this it is necessary to deflect or turn the course of the longitudinal or horizontal draft upward, so that while the light bodies and refuse rise the greater gravity of the wheat itself will cause it to fall and be caught in a suitable pocket in such a manner as to be conducted to the screens. I deflect the draft upward by means of the board K or its equivalent, as shown by the red arrow, Fig. 2, the refuse passing over its top, while the heavy grains of wheat (together with oats, barley, &c.) fall down into pocket I. By this means I am enabled to conduct such grain as is drawn over down onto the same screens that separate the main portion that passes through spout F, thereby saving the necessity of handling the grain over a second time by hand in order to screen it, as is generally the case.

I am not aware of any other than my own arrangement where the grain to be separated passes from the hopper through a broad, open, and unobstructed space, D, with the draft passing through it crosswise to remove the impurities, and having an upward turn or deflection at the proper position to carry the refuse over, while the sound grains are deposited in a pocket, I, which returns it to the screens. Such an arrangement I claim.

The amount of refuse and grain that passes over into the pocket I from the main stream

of falling grain may be modified by the valve L. When the latter is moved forward, as represented in black lines, Fig. 2, the space between it and the board K is increased, and consequently there is less strength of draft at that point, and a greater quantity of that which is carried over by the draft will fall therein; but where it is moved back, as indicated by red lines, the space between it and the board is lessened and a less quantity is deposited below in the pocket. This valve is necessary to adapt the device to different intensities of the draft, or different kinds or conditions of the grain to be separated, so that the plump and full kernels of wheat may be exactly separated from oats, barley, &c.

By setting the valve N at a backward angle, as indicated by the black lines in Fig. 2, I am enabled to deflect the draft that passes over the top of board K downward, and thus deposit such oats, blighted grains, &c., as accompany it into pocket I'. This is where the draft is not very intense; or, by setting it at the opposite angle, as indicated in red lines, so as to shut against the board K, I am enabled to entirely shut off the draft at the top and force the same to pass downward around the bottom of board K, as shown by the red half-arrow, Fig. 2, when in passing still farther onward it strikes board M and deposits the heavier grains, &c., in the pocket I. This arrangement is of the utmost importance in cleaning large quantities of grain rapidly and where a very intense draft is produced, for in such case, if the draft is allowed to pass over board K, the passage is so direct that large quantities of the grain will be drawn inward, whereas in being forced under board K the course of the draft is not only very irregular or indirect, but the grains are carried by the draft directly into the pocket itself. This desired effect is produced by making a draft-passage under, as well as over, board K, and using in connection therewith the valve N. I am aware of no such arrangement in other devices.

It will be seen that the valve N may also be set in the positions indicated by dotted lines, Fig. 2, so as to almost close the draft-passage relatively with board M. By this simple arrangement alone the intensity of the draft may be perfectly regulated or entirely cut off, at pleasure.

Beneath the spout F and pockets I I' is situated the shoe P, supported on opposite sides, at front and rear, by spring standards or supports Q Q', which allow a longitudinal reciprocating motion, produced by spring-pistons R R, on opposite sides, connecting with cranks *g g*, whose shaft is driven by a pulley, *h*, having a band connecting with a pulley, *i*, on the fan-shaft, or some equivalent means. The rear spring standards, Q Q', supporting the shoe, are respectively made to slide freely up and down, and are provided with a cog or rack bar, *k*, into which gears a pinion, *l*, Fig. 1, having a winch on its shaft, by which means

the standard is turned up or down, so as to give a greater or less inclination to the shoe, as indicated by the red lines in Fig. 1. The pinion is held stationary, supporting the standard at any desired height by means of a ratchet-wheel and pawl, or in any convenient manner. By this means I am enabled to adjust the screens of the shoe to any desired angle to suit the kind and condition of grain to be separated, at the same time retaining the perfect spring or elasticity of the apparatus by which the shoe is operated. In this shoe are situated a series of screens, S S S, preferably made of perforated metallic plates. The lower screen is made with fine perforations, so as only to allow fine seeds and impurities to pass through onto the floor *m*, whence they escape into a lateral spout, *n*, Fig. 2, while the pure and sound wheat that sifts through the screens above it falls on the bottom and is discharged on the lower end *m'*, of the floor *m*, below the spout *n*. Oats, barley, &c., pass down over the upper screens and escape at the lower end into a double inclined lateral spout, *o*, Figs. 2 and 6. Beside this spout, at the end of the shoe, is another spout, *p*, Figs. 2 and 5, inclining in one direction, whose use will presently be explained.

From the end *m'* of the floor of the shoe the wheat drops on an inclined chute, *q*, having an induction air-opening, *r*, under it; thence into an upright tube, *T*, onto another chute, *s*, which conveys it into another upright tube, *U*, through whose lower end it is discharged perfectly cleaned. Thus, in addition to the cleaning which the grain receives in passing through the main draft at *D*, and from sifting through the screens S S S, it will be seen that it has the benefit of an auxiliary draft through *r*, up the tube *T*, and also through the tube *U*, so that it cannot fail of being perfectly cleaned. The refuse that passes up tube *T* is deposited in pocket *I*, while that carried up *U* is discharged at the final outlet *V*. At the upper end of tubes *T* and *U* are situated valves *t* and *t'*, by closing either or both of which the draft through one or both of said tubes may be shut off or lessened, which effect may be sometimes necessary in cleaning grain of a light nature, which will not bear a strong current of air. In addition to this the valve *t*, by being set at the position indicated by black lines in Fig. 2, will deflect or turn the refuse that is carried up *T* downward into the pocket *I'*, to be either resubjected to the screens S S or to be finally discharged by the following means: Secured to the shoe beneath the pocket *I'* is a pivoted tilting board, *W*, which, when inclined in the position indicated by the black lines in Fig. 2, will throw the contents that fall thereon back on the screens, or, when inclined, in the opposite position, indicated by red lines, will throw them into the lateral spout *p*, whence they will be discharged outside the shoe. Thus it will be seen that if the refuse passing up the tube *T* is not perfectly separated from oats, blighted grains, &c.,

which is frequently the case, I can pass it through the screens a second or third time, or more, if desired, producing a constant circuit through S, T, and *I'*; or if the refuse is perfectly free of all grains that are valuable, it is run off at once through the spout *p*. This is a very convenient and effective arrangement, and saves much labor by avoiding handling the mass over a second time to clean it.

Beneath the pocket *I* is also situated an adjustable board, *X*, Fig. 2, which when in the position indicated by black lines receives the contents that fall from said pocket, and conducts the same lower down before they reach the screens, so that they will not receive so much action; but when moved back in the position indicated by red lines, allow the contents to fall directly on the screens. This is for the purpose of making longer or shorter screenings, at pleasure.

The employment of the series of pockets *I* instead of a single pocket in connection with the screens enables me to more perfectly separate the grain, and at the same time to return all that is drawn with the draft into the space *D* to the screens for separation. It will at once be apparent that whatever sound grain is carried into the extreme back pockets *I'*, will be mixed with a greater amount of refuse than those nearer the induction end. Therefore it is desirable that such be fed on the screens nearer their lower instead of their upper ends, otherwise much of the refuse will pass through the screens with the wheat.

In cleaning grain rapidly, where an intense draft is employed, and where the grain is not mixed with other grains, it is frequently desirable that it should not pass through the screens, but merely fall from the spout *F* into a suitable receptacle for the purpose. To accomplish this without removing the heavy shoe, I make a section, *S'*, of the upper screen, under spout *F*, removable by sliding back, as clearly shown in Figs. 2 and 4, and also make a removable slide, *S''*, beneath it, abutting with the lower screen, while the floor *m* of the shoe is provided with an opening, *m''*, under the same, as shown. By removing section *S'* and slide *S''* it is manifest that a clear passage is made for the grain downward through the shoe into a suitable bin beneath. (Represented by red lines.) I also make the perforations in the section *S'* larger than those of the main upper screen, in order to produce, when desired, two qualities of grain, a portion passing through section *S'*, while the rest passes through the main screens S S. When it is desirable that not so much of the grain shall pass through the section *S'*, I employ a cover or slide, *u*, that shuts over a portion of the same, as represented most clearly in Fig. 4.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A draft-passage, *D*, of sufficient transverse dimensions to enable a draft proportioned in amount to the quantity of grain pass-

ing through it to be employed and arranged, so as to diffuse or concentrate the draft uniformly upon the falling grain, according to the kind, quality, or condition thereof, and at right angles, or nearly so, thereto, and in combination therewith, a valve, L, and board K, or its equivalent, arranged so as to properly separate the sound grain from the refuse, as the intensity of the draft or the kind or condition of the grain varies, substantially as herein specified.

2. In combination with the board K, having a passage for the draft both above and below and with the pocket I, the valve N so arranged as to cut the passage off entirely at the top and force it to pass downward through the pocket, or to allow the passage at the top, substantially as described.

3. The adjustable board H, arranged in combination with the mouth *a* of the space D in such a manner as to contract or concentrate the draft upon a particular portion of the falling stream of grain, or to diffuse it through said space, substantially as described.

4. A series of two or more pockets I I' in combination with the screen S S S beneath in such a manner that the contents of said pockets will fall on said screens and mix with the main portion of grain through spout F, and so that the pockets I', that contain the greatest amount of refuse with the smallest amount of sound grain, shall pass over a shorter space of the screens, substantially as described.

5. The combination and arrangement of the titling board W with the pocket I', screens S

S, tube T, and discharge-spout P in such a manner as either to discharge the contents on said screens or into said spout, substantially as herein set forth.

6. The combined construction and arrangement of the tubes T U, provided with the valves *t t'* at their upper ends, and having the grain crossing their lower ends from the screens by means of the chutes *q s*, as and for the purposes herein described.

7. In combination with the shoe P, the spring-standards Q Q', those in the rear being raised or lowered by means of the rock-bar *k* and pinion *l*, in such a manner as to adjust the angle of the shoe, said shoe being operated by the spring-pitmen R R, the whole arranged and operating, substantially as and for the purpose herein set forth.

8. The removable section S' and the slide S'' of the screens S S, arranged in relation to said screen and the shoe P in such a manner that the end of the shoe may be opened to allow the clean grain to fall directly through, substantially as described.

9. In combination with the section S' of the screen, provided with enlarged perforations, the slide *u*, substantially as and for the purpose herein set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

B. T. TRIMMER.

Witnesses:

R. F. OSGOOD,
JAY HYATT.