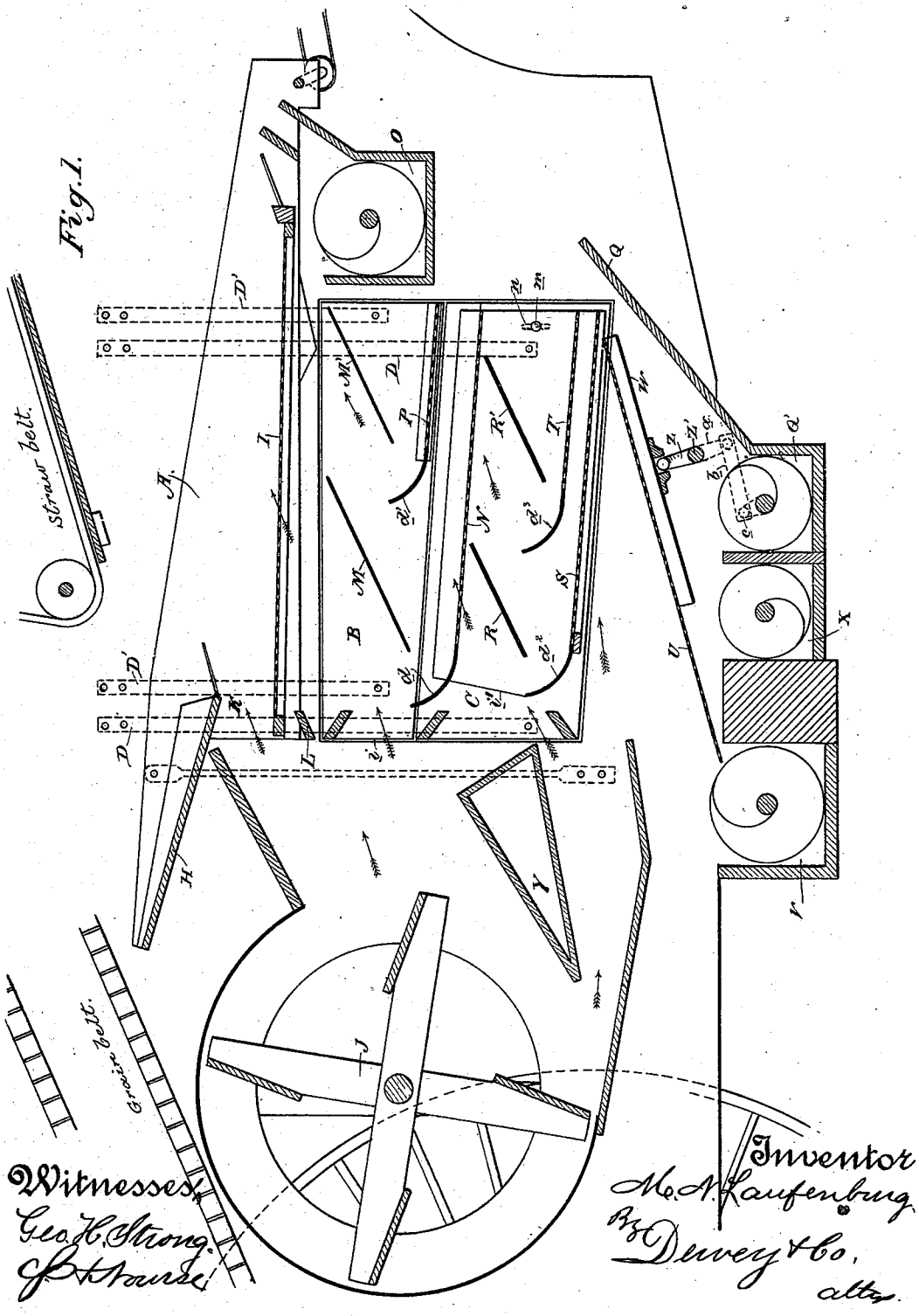
(No Model.) 2 Sheets—Sheet 1.

M. N. LAUFENBURG.

GRAIN SEPARATOR AND CLEANER.

No. 402,462. Patented Apr. 30, 1889.



Witnesses:
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(No Model.) 2 Sheets—Sheet 2.

M. N. LAUFENBURG.

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Fig. 2.

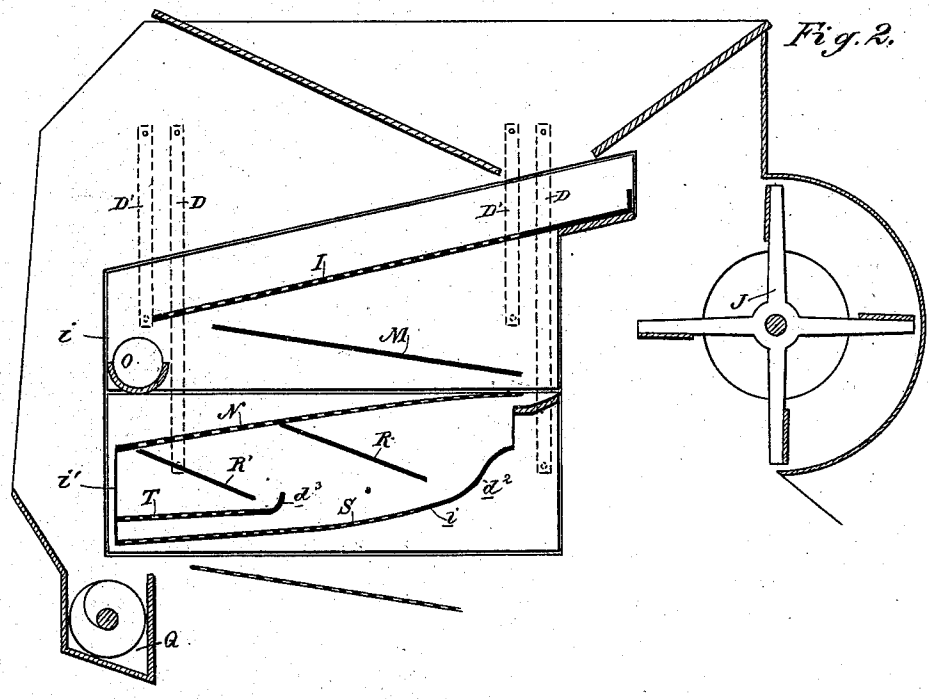


Fig. 3.

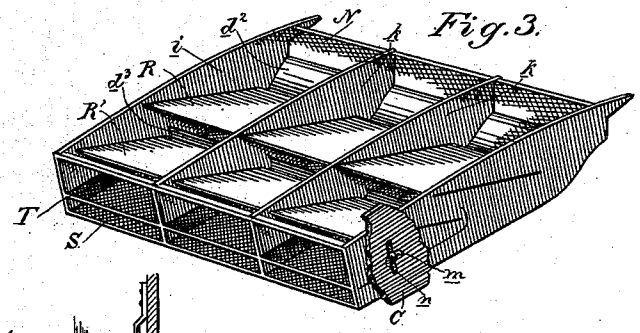
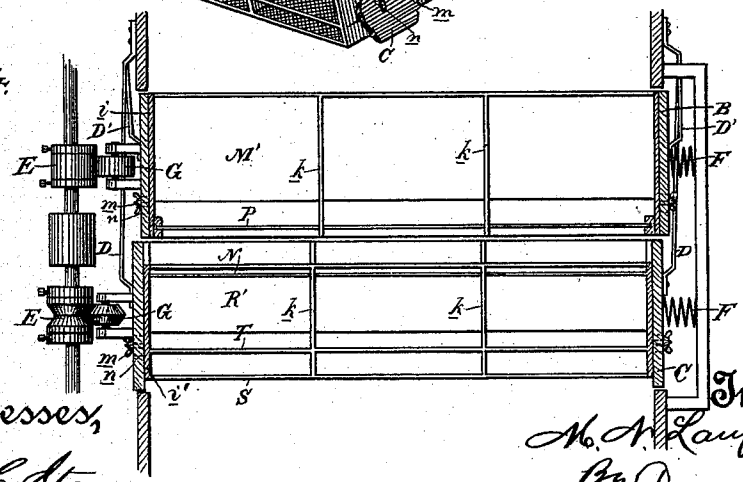


Fig. 4.



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UNITED STATES PATENT OFFICE.

MICHAEL N. LAUFENBURG, OF STOCKTON, CALIFORNIA, ASSIGNOR TO THE STOCKTON COMBINED HARVESTER AND AGRICULTURAL WORKS, OF SAME PLACE.

GRAIN SEPARATOR AND CLEANER.

SPECIFICATION forming part of Letters Patent No. 402,462, dated April 30, 1889.

Application filed March 15, 1888. Serial No. 267,275. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL N. LAUFENBURG, of Stockton, San Joaquin county, State of California, have invented an Improvement in a Grain Separator and Cleaner; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an improved apparatus for separating and cleaning grain after the same has been thrashed; and my invention consists in the constructions and combinations of devices, which I shall hereinafter fully describe and claim.

Figure 1 is a vertical section through the cleaner in connection with a thrasher. Fig. 2 is a vertical section through an independent cleaner. Fig. 3 is a view of the lower shoe detached from its frame. Fig. 4 is an end view of the two lower shoes.

In the present drawings I have shown this cleaner as a part of an ordinary thrashing-machine; but it may also be employed as a supplemental cleaner attached to and working with a thrasher and separator, or it may be worked entirely independent, if desired, the grain being delivered to it in one case by an elevator and in the other directly from the carrying-belt, which supplies it from the thrashing-cylinder. When the wheat, which is mixed with barley, oats, cheat, or other foul matter, is deposited upon the shaking table or screen in any considerable depth—as one-half inch or more—the wheat and heavier grain will seek the bottom by reason of the shaking motion and the lighter impurities will rise to the top. Upon this action I have based the construction of my cleaner, in which the screens, while being continuous, are so constructed as to deposit the lower stratum of nearly clean grain upon an inclined plate, which returns it beneath the screen and grades and separates it at once from the grain which is only partly cleaned, this operation being repeated as many times as may be necessary, and by thus relieving the screens of a part of the work I am enabled to greatly increase the capacity and perfection of the work of cleaning.

In the present construction I have shown three shoes, A, B, and C, situated one above the other within the separator. The shoes B and C are supported by elastic arms or supports D and D′, and have a side shaking motion given to them by means of the eccentrics E and the returning-springs F. These eccentrics or cranks usually act directly against wooden blocks fixed to the sides of the shoes, and so much friction ensues from the amount of surface rubbing upon the blocks that the parts often become overheated. In order to reduce this friction, I employ vertical rollers G, standing parallel with the eccentrics E and having their pivot-pins journaled in boxes on the side of the shoe. The eccentrics E, rotating in contact with these rollers, produce the necessary oscillations of the shoes; but the friction becomes a rolling friction and is so slight that the parts work very much easier. These rollers have either a flat or crowning face, and, provided with a V-shaped surface, have a high center to fit a correspondingly-shaped groove in the eccentrics, and the whole friction between these parts is reduced to a rolling friction and the journals of the rollers are prevented from heating.

As the journals of the rollers are upon the sides of the shoes which swing from side to side about their points of suspension, it will be manifest that a slight rocking motion will be given to the periphery of the roller as it moves to and fro, and if the surface is flat it will jump from one corner to the other, whereas, if the surface is crowning or V-shaped, it will rock smoothly upon the periphery of the eccentric, and the noise otherwise produced will be avoided.

The grain is delivered either from the elevator or the carrier, as the case may be, upon the inclined table or surface H, which forms an extension of the upper shoe, A, and receives the same shaking motion. This is an end shake produced by a crank-shaft at the rear end, and the front end of the shoe is supported upon the upper ends of elastic bars. This motion settles the grain with the wheat at the bottom, and the lighter barley, oats, and other impurities are at the top. As the grain passes off the table H it falls upon the

screen I, and as it falls a blast of air from the fan J passes through the opening or space at K, as shown by the arrow, and its action causes the grain to fall in the same relative position which it held upon the table H, the barley and oats being thrown upward and onward, while the wheat falls directly upon the screen.

The screens in the shoes B and C are of the usual construction, being made of sheet metal, having holes punched in them, the holes being made of any suitable or required size, so that while the wheat will fall through readily the oats and barley will be carried across these holes and passed on toward the rear end of the screen. The upper screen, I, may be of the same material, but is preferably made of wire to allow the blast to pass through more freely.

A wind-board, L, just beneath the upper screen, I, partly divides the blast from the fan, and another portion of the wind passes beneath this wind-board, striking against the lower part of the screen I and passing toward the rear of the cleaner.

Beneath the screen I are two inclined plates, M and M′. The cleanest wheat which passes over the first portion of the screen I falls upon the inclined plate M, which stands at a sufficient angle to return the wheat by gravitation and the agitation of the shoe toward the front of the cleaner, where it falls upon the tight bottom or receiver *d*, from which it passes upon a second inclined screen, N, which extends to the rear of the shoe C. The oats and barley and less completely cleaned wheat pass along the screen I and beyond the upper edge of the plate M, while the principal part of the oats, barley, and chaff pass over the rear end and fall into an auger-trough, O, from which it is carried out to one side by the revolving screw or auger and deposited in the return-elevator in the usual manner.

The less perfectly cleaned grain which has fallen upon the incline M′ is in turn discharged from its lower edge upon the receiver *d*′ of the screen P, which extends from a point just beneath the upper edge of the inclined plate M to the rear of the machine, and just above and parallel with the screen N. Upon this screen P another portion of the lighter impurities is carried backward and discharged from the rear end of the machine, falling upon an inclined board, Q, which conveys the barley, oats, &c., thus discharged into an auger-spout, Q′, while the grain separated by this supplemental screen falls upon the screen N beneath, and is there joined with the first portion of the clean grain which was delivered upon this screen by the incline M. By thus separating the cleanest wheat on the first part of the screen I and causing the less clean portion to pass through a supplemental screen before again uniting with the first part I do not compel all the grain to pass over the entire length of the main screen, and the latter does not become overloaded, and it is possible to greatly increase the quantity and quality of the work done. The receivers *d d*′, upon which the grain falls before passing upon their corresponding screens, act similarly to the preliminary table H and settle the heavy first-quality grain to the bottom, so that it will be the first to pass through the screens. That portion of the grain which passed through the first part of the screen I and was delivered by the incline M upon the first portion of the screen N is again passed through the screen N before it reaches the middle of its length, and, falling upon the inclined plate R, it is again brought to the front and delivered to the receiver d^2 of the lowermost screen, S, in the lower shoe. That portion of the grain which passes along the screen beyond the upper end of the incline R will fall through the screen N upon the incline R′, and will be directed by it upon the receiver d^3 of the supplemental screen T, which extends beneath the incline R′, occupying about one-half the length of the shoe at the rear parallel with and above the screen S, in the same manner as described for the screen P and the upper shoe. Another separation takes place upon this screen, and the wheat, which is thus finally cleaned of everything but the chess, cheat, and mustard, falls upon the sieve U, the meshes of which are fine enough to retain the wheat and carry it into the auger box or carrier V, by which the wheat is discharged at one side of the machine in the usual manner. Beneath the sieve U is an inclined surface or bottom, W, upon which the finer impurities fall and by which they are directed into the auger-spout X, to be in turn carried out in the usual manner.

The inclines M M′ and screen P are preferably fixed in a frame, *i*, which is removable from the shoe B, and the frame is adjustable in the shoe by means of bolts *m*, projecting from its sides through slots *n* in the sides of the shoe B, so that one end may be raised or depressed and the angle changed. Thumb-nuts upon the bolts serve to lock and hold the shoes. The lower inclines, R and R′, and screens S and T are similarly adjusted in the shoe C. Between the sides of the frame *i*′ are vertical partitions *k*, which support the inclines M and R, and also separate the width into channels, so that when working upon inclined ground the grain will be properly distributed over the screens and prevented from sliding to one side. This is important, as it prevents the screen from being overloaded upon one side and empty on the other.

The lower shoe receives a portion of the blast of air from the fan J, which air passes beneath the direction or wind board Y and is distributed beneath the screens of the lower shoe, as shown by the arrows. The lower or grain sieve, U, is given an end-shake oscillation by means of a rocker-arm, Z, fixed to the shaft Z′. This rocker-arm extends upwardly

and its upper end moves between two blocks fixed to the screen-frame. From the shaft Z′ a crank or rocker arm, *a*, extends, and by means of a pitman, *b*, it is connected with a short crank at *c*, by which the oscillation of the rocker-arms and screen is produced.

In section, Fig. 2, I have shown a modification of this device in which the upper shoe contains only the upper screen, I, and a single returning-board, M, by which all the grain falling through the screen I is brought back to the front of the shoe and is by it delivered upon the screen N in the second shoe, the two inclined separating-boards R and R′ and the screens S and T being used in this case in the same manner as shown in the second portion of the apparatus described above.

I prefer to employ this construction in supplemental cleaners, because the grain which is delivered to these machines has already been separated in the cleaner of the thrashing-machine from the chaff, heads, and straw-joints, so that the supplemental cleaner is relieved of this burden, which falls upon the machine when the whole of the work is performed in the thrashing-machine cleaner and in a continuous operation, as at first described.

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

1. The shoe or gang having the side walls, the screens by which the grain is separated from the barley and oats, the inclined plates whereby the grain is returned to the front of the succeeding screen, and the vertical partitions or diaphragms by which the shoe is separated into longitudinal channels, substantially as herein described.

2. The vertical rotary shaft journaled upon the frame of the machine and the eccentric fixed to the shaft, so as to rotate in a horizontal plane, in combination with the shoes suspended to oscillate from side to side about their points of suspension, rollers journaled upon the sides of the shoes and partaking of the pendulous movements of the shoes, the faces of said rollers turning in contact with those of the eccentrics and made crowning, so as to rock thereon without jar, substantially as described.

In witness whereof I have hereunto set my hand.

MICHAEL N. LAUFENBURG.

Witnesses:
GEO. H. STRONG,
S. H. NOURSE.