

**No. 648,485.**

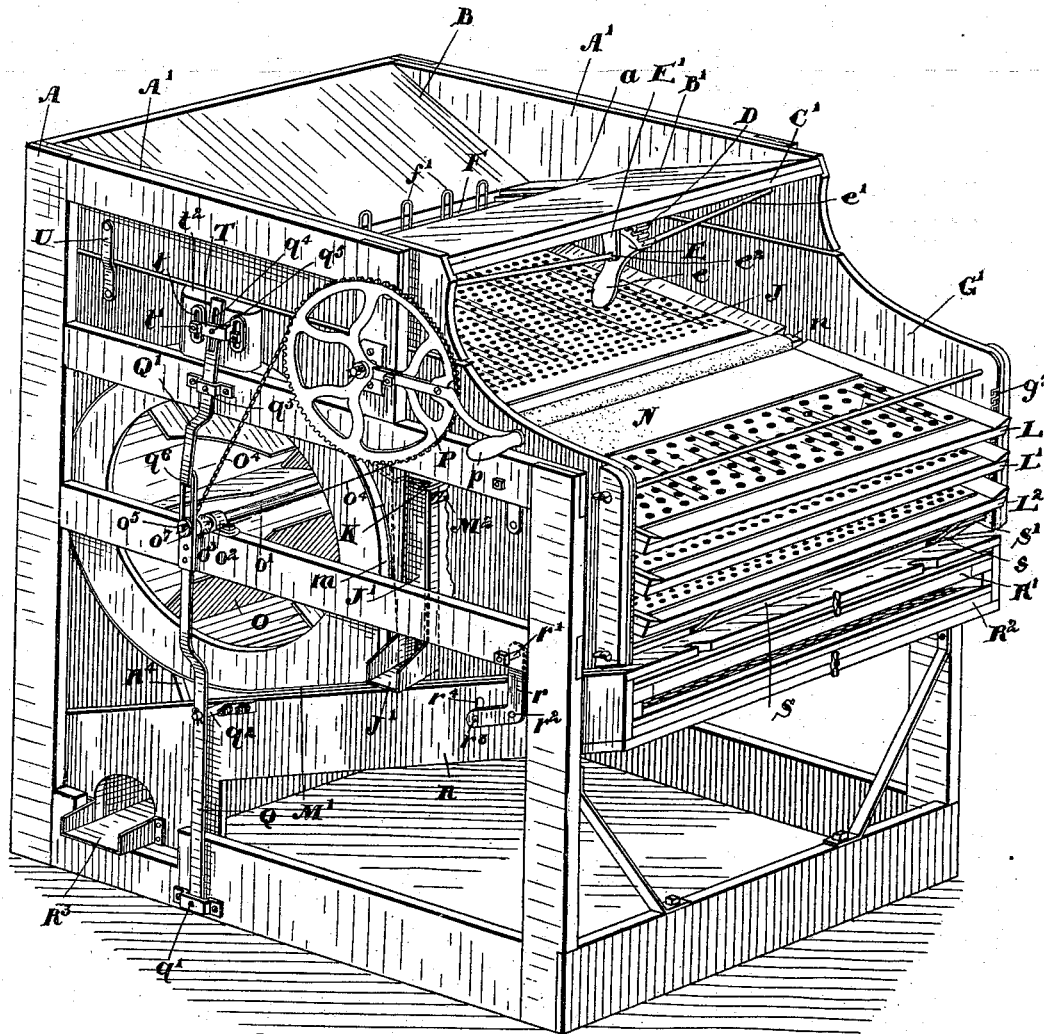
**Patented May 1, 1900.**

**T. H. COOPER.**  
**GRAIN CLEANER AND SEPARATOR.**

(Application filed Feb. 11, 1899.)

(No Model.)

**2 Sheets—Sheet 1.**



*Fig.1.*

*Witnesses.*

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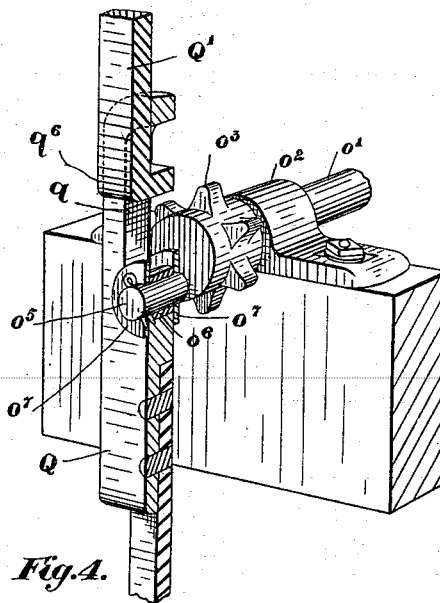
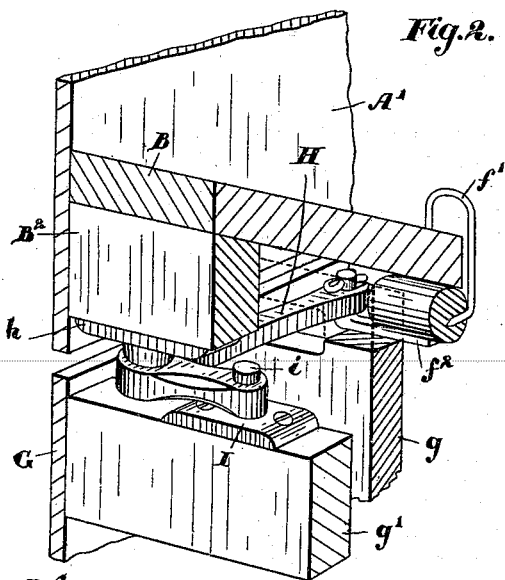
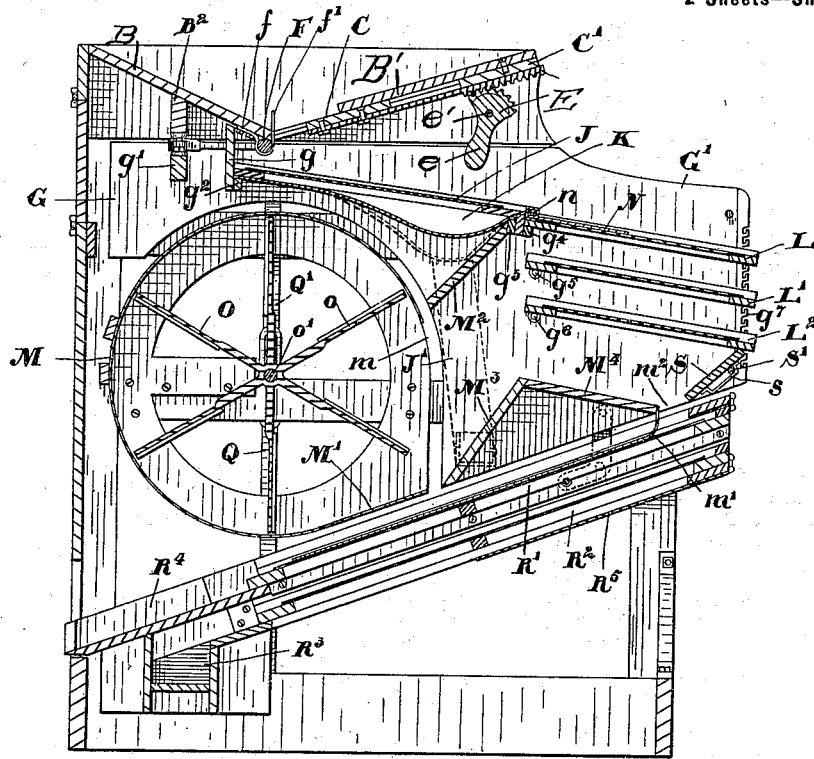
**Patented May 1, 1900.**

**T. H. COOPER.**  
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(Application filed Feb. 11, 1899.)

(No Model.)

**2 Sheets—Sheet 2.**



*Witnesses.*

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*Fig. 3.*

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# UNITED STATES PATENT OFFICE.

THOMAS HENRY COOPER, OF TORONTO, CANADA, ASSIGNOR TO THE  
TORONTO GRAIN AND SEED CLEANER AND GRADER MANUFACTURING COMPANY, LIMITED, OF SAME PLACE.

## GRAIN CLEANER AND SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 648,485, dated May 1, 1900.

Application filed February 11, 1899. Serial No. 705,309. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS HENRY COOPER, manufacturer, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Grain Cleaners and Separators, of which the following is a specification.

My invention relates to improvements in grain cleaners and separators; and the objects of the invention are, first, to devise a simple means to adjust the size of the orifice at the bottom of the feed-hopper; secondly, to provide a simple means whereby the grain may be fed evenly through the orifice of the feed-hopper; thirdly, to devise an improved construction of hopper under the feed-hopper screen, whereby all seeds may be removed from the grain and carried out of the machine before such grain can reach the riddles, which are subjected to the action of the blast from the fan; fourthly, to provide a simple means whereby the oats, chaff, and other foreign matter may be expeditiously carried out to the outer end of the riddle, so as to enable the blast from the fan to act with the greatest effect to remove such matter from the grain; fifthly, to so construct the fan-chest that the blast may be directed and confined to the riddles only and at the same time provide for the conveyance of the grain to the outer ends of the screens and lower shoes, so that such grain may be screened to the best advantage; sixthly, to provide an improved adjustable form of tail-board by which the grain or refuse may be impeded in its course or directed into or out of the machine as required; seventhly, to provide an improved combined form of shake and agitator for the lower shoe and screen, so as to prevent such screen choking with small foreign matter or particles lodging in the mesh of the screen; eighthly, to provide an improved means whereby the shoes may be shaken and the upper shoe given any desired length of movement, and, ninthly, to provide a simple means whereby cockle, tares, and other foreign refuse matter that have not been removed by the wind-blast from the uppermost screen of the lower shoe may be effectually removed before

the grain passes out of the machine; and it consists in the arrangement and construction of my machine, as hereinafter more particularly explained, and pointed out in the detail.

Figure 1 is a perspective view of a grain cleaning and separating machine constructed in accordance with my invention. Fig. 2 is a longitudinal section through the machine. Fig. 3 is an enlarged detail showing the means for giving a longitudinal movement to the grain-distributing mechanism for the feed-hopper. Fig. 4 is a detail showing the means for imparting movement to the fan and shoes.

In the drawings like letters of reference indicate corresponding parts in each figure. A is the frame of the machine.

A' represents the side boards of the upper hopper, which are stationary.

B B' are the inclined bottom boards.

C is the adjustable bottom board, which is supported in suitable guideways. The inclined bottom boards B B' are separated in the center, so as to leave a longitudinal orifice *a*, and it is with the object of adjusting the size of this orifice in order to feed the grain more or less quickly that the adjustable board C is provided. In order to adjust this board, I provide a rack D, which is suitably secured to the end of the board C and has a quadrant E, which engages therewith. The quadrant E is provided with a handle *e*. A spring-rod *e'* extends through the quadrant and is suitably supported in the side boards A'. The spring-rod *e'* at the center fits into a notch *e<sup>2</sup>* in the bracket E', which is secured to the bottom of the end board C'. It will thus be seen that the normal tendency of the spring-rod *e'*, which forms the axle upon which the quadrant turns, is to keep such quadrant into close mesh with the rack D.

In order to adjust the size of the orifice *a*, it is merely necessary for the attendant of the machine to grasp the handle *e* and swing the quadrant E, whereupon the board C may be adjusted into any position desired and will remain in such position.

In order to feed the grain evenly through the orifice *a*, I provide a cross-bar F, supported in suitable brackets *f* and provided with upwardly-extending loops *f'*, which are

located in close proximity to the lower edge of the inclined end board B of the hopper. On one end of the bar F, I provide a bracket  $f^2$ .

$B^3$  is a cross-bar which extends across beneath the bottom board B.

G is the upper shoe, which is provided with side boards  $G'$ .

$g$  is a cross-board forming part of the shoe G and extending between the side boards  $G'$ .

$g'$  is a cross-bar, also extending between the side boards  $G'$ .

H is a bell-crank which is pivotally connected to the pin-shaped end of the bracket  $f^2$  at one end and is pivoted on the bracket  $h$ , attached to the bottom of the cross-bar  $B^3$ .

The opposite end of the bell-crank is pivotally connected to the pin  $i$ , forming part of the bracket I, secured to the top of the cross-bar  $g'$ . It will be seen that as the shoe G derives a longitudinal movement in the manner hereinafter described a corresponding crosswise movement will be imparted by the crank H to the bar F and consequently the loops  $f'$ , thereby serving to distribute the grain as it passes through the orifice of the hopper.

J is the uppermost screen, which is supported on the cross-bars  $g^2$  and  $g^3$ , extending between the side boards of the shoe G. K is a curvulate metal hopper, also supported upon the cross-bars  $g^2$  and  $g^3$  and inclined from one side to the other, as indicated by the full and dotted lines in Fig. 2. At one side of the shoe, and necessarily at the lower side of the incline, is formed a spout  $J'$ , which extends downwardly and outwardly, as indicated, thereby serving to convey all seeds from the grain before such grain reaches the riddles L,  $L'$ , and  $L^2$ , where it is subjected to the action of the wind-blast.

M is the fan-casing, which is for the most part cylindrical in form and is suitably supported on the frame of the machine. The bottom, however, of the casing is inclined at  $M'$ . The casing M is so constructed as to leave an orifice  $m$  at the forward end of the machine, which is bounded at its upper and lower ends by the inclined boards  $M^2$  and  $M^3$ , which necessarily direct the course of the blast upwardly toward the riddles L,  $L'$ , and  $L^2$ .  $M^4$  is an inclined board extending from the upper end of the board  $M^3$  forwardly to the bottom edge of the side board  $G'$  of the shoe. All these boards extend from side board to side board of the shoe G. The riddles L,  $L'$ , and  $L^2$  are supported at the inner end upon the cross-bars  $g^4$  and pins  $g^5$  and  $g^6$ , respectively, and at the outer end by suitable pins extending into the side racks  $g^7$ , which it is not necessary here to describe, as it forms no part of my invention.

N is an apron, which is secured at the inner end on a bar  $n$ , which is placed to abut the outer end of the screen J. The apron N extends outwardly over the upper riddle L and may be made of canvas, oil-cloth, or any other suitable material, its object being to

carry the oats, chaff, and foreign matter far out onto the riddle, so as to enable the blast from the fan, hereinafter described, to remove such foreign matter from the grain.

O is the fan, which is formed in any usual manner with blades  $o$  and supported on a central shaft  $o'$ , which is journaled at the ends in suitable bearings  $o^2$ . On the end of the shaft  $o'$  is secured a sprocket-pinion  $o^3$ , which is connected by a sprocket-chain  $o^4$  to a sprocket-wheel P, journaled on a suitable stud on the frame and provided with a crank-handle  $p$ . By this crank-handle it will therefore be seen that the necessary movement is imparted to the fan O and to the shoes, as will hereinafter appear.

$o^5$  is a pin extending eccentrically from the sprocket-pinion  $o^3$  and provided with a friction-roller  $o^6$ . The friction-roller is located in the slot  $q$  of the bar Q and has washers  $o^7$  at each side to prevent it being longitudinally displaced. The lower end of the bar Q is pivoted at  $q'$  on the frame and is pivotally connected intermediate of its length to the pin-shaped end of the bracket  $q^2$ , which is secured to the side of the lower shoe R. The opposite side of the machine is provided with a similar bar Q, and consequently this end of the shoe R is supported upon the bar Q by means of the brackets  $q^2$ . The opposite end of the shoe is supported by the bell-crank-shaped hangers  $r$ , which are pivotally connected to the frame by the bolt  $r'$  and to the shoe by the bolt  $r^2$ . A rod  $r^3$  extends through the free end of the bell-crank-shaped hangers and through a slot  $r^4$  in the side of the shoe. The rod  $r^3$  extends directly across underneath the upper screen  $R'$  of the shoe.

$R^2$  is the lower screen of the shoe, and  $R^3$  is the exit-spout for the lower screen, which is inclined and extends outwardly from the side of the machine, and  $R^4$  is the exit-spout for the upper screen, which extends out from the end of the machine on the same incline as the screen. The shoe R, it will be seen from the description hereinbefore referred to, derives, by means of the eccentric roller extending into the slotted end of the bar Q at each side of the machine, a longitudinal vibratory movement, being supported by the bar Q and hangers  $r$ . As this movement is imparted it will be seen that the rod  $r^3$  will be tilted upwardly underneath the screen  $R'$ , so as to strike it continuously, and thereby thoroughly agitate it at the same time that the shoe is getting its vibratory movement, and thus effectually prevent such screen from choking with foreign matter or particles lodging in the mesh.

At the front end of the board  $M^4$ , I attach an apron  $m'$ , made of canvas or other suitable light material, which lies upon the screen  $R'$  of the lower shoe for the major portion of its length. This light apron has the effect of retarding the passage of the grain to the spout  $R^4$  until all cockle, tares, and other foreign matter are completely removed therefrom.

The bottom of the screen is provided with a suitable plate R<sup>5</sup>.

It will be noticed from the construction of my fan-chest that the blast is directed upwardly underneath the riddles, thereby operating with the greatest efficiency upon the grain and screening it thoroughly.

Primarily it is necessary to confine the grain so as to direct it to the upper screen of the lower shoe, and for this purpose I provide a tail-board S, having confining metal straps s, forming slots at the bottom thereof and through which extends the cross-rod S'. In the position shown in the drawings the tail-board is shown inclined, so as to leave an orifice m<sup>2</sup> above the screen and between it and the board M<sup>4</sup>, through which the grain is directed upon the screen. This tail-board, on account of its peculiar connection by the metal straps s to the rod, which serve to limit the movement thereof without detaching from the machine, can readily be swung around into different positions, this of course depending upon the class of grain that is being passed through the riddles and as to whether it is desired to blow it out from the machine or impede its progress.

Q is the upper shaker-bar, which is bent intermediate of its length and pivotally connected at q<sup>3</sup> intermediate of its length to the frame of the machine. The upper end is provided with a slot q<sup>4</sup>, through which extends a pin q<sup>5</sup>, which is held in a metal strap T, having the elongated slotted ends t, through which pass the bolts t' into the block t<sup>2</sup>, which is fastened to the shoe. The upper shoe is supported at each side by the hangers U, pivotally connected to the frame and the shoe, as indicated.

It will be seen that by adjusting the metal strap T and pin q<sup>5</sup> therein in relation to the slot in the bar Q', the length of movement of the upper shoe may be varied as may be required for different sorts of grain, which is an important desideratum. The lower end of the bar Q' is bent at q<sup>6</sup> and extends through a slot in the upper end of the bar Q, and consequently the movement that is imparted to the bar throws the lower shoe R in one direction and serves, on account of the peculiar pivoting of the bars Q and Q', to throw the upper shoe G in the opposite direction simultaneously.

It will thus be seen from this description that I have provided various improvements in the construction of grain cleaners and sepa-

arators, which I find from practice has effectually overcome all defects of construction heretofore experienced in this class of machines.

Although I show the vibratory bars at one side of the machine with their accompanying mechanism and hangers for supporting and vibrating the shoes, it will of course be understood that duplicates of these parts are provided on the opposite side of the machine for the support of the shoes on that side.

What I claim as my invention is—

1. In combination in a grain-cleaning machine, the hopper having a synclinal bottom formed of two parts with a space between the adjacent edges thereof, a closing-board for said space guided in the sides of the hopper, a rack carried by said board, a spring-rod extending across the machine-frame beneath said rack and a quadrant journaled centrally on said rod and adapted to be held thereby in close contact with said rack, substantially as described.

2. In a grain cleaner and separator, the combination with the frame, the lower shoe and screens suitably mounted in said shoe, of the lower supporting and vibratory bars pivoted to the bottom of the frame, means for actuating said bars, brackets pivotally connecting the bars to each side of said shoe, bell-crank hangers pivotally connected to the frame and to the higher end of the shoe, and a rod connecting the free end of the bell-cranks and extending through slots in the side of the shoe underneath the upper screen, substantially as described.

3. In a grain cleaner and separator, the combination with the frame, the fan and fan-shafts, and shoes and hangers for supporting the shoes, of the lower vibratory bars pivoted at their lower ends to the frame, said bars being slotted at their upper ends, means interposed between the same and the shaft for rocking said bars as the crank rotates the upper vibratory bars intermediately pivoted to the frame having projections at their lower end engaging the slots in the lower vibratory bars, the upper ends of the upper bars being slotted, straps adjustably connected to the upper shoes and pins extending from said straps engaging the slots in the upper bars, substantially as described.

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Witnesses:

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