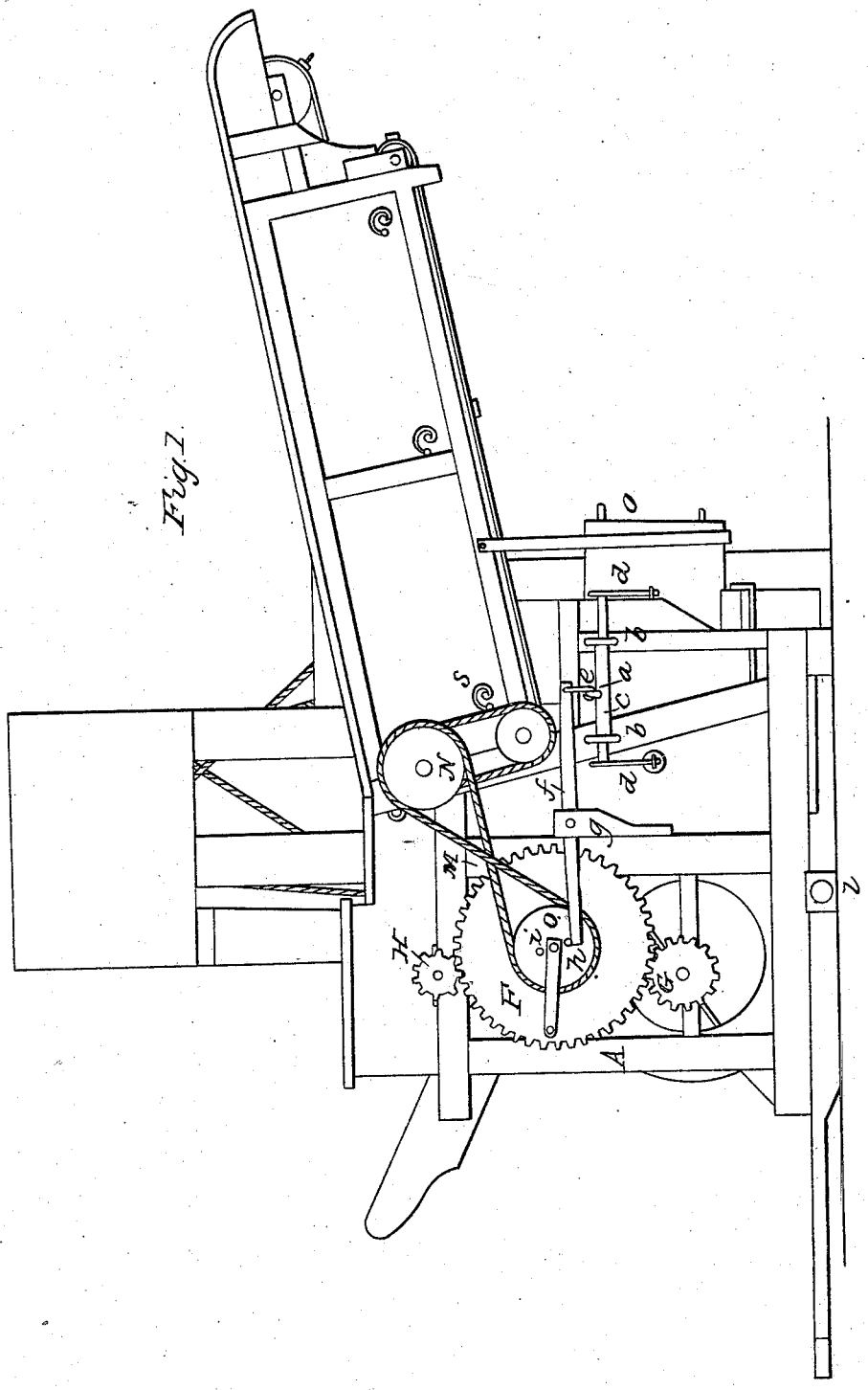
3 Sheets—Sheet 1.

A. RALSTON.

Grain Separator.

No. 2,467.

Patented Feb. 21, 1842.



A. RALSTON.

Grain Separator.

3 Sheets—Sheet 2.

No. 2,467.

Patented Feb. 21, 1842.

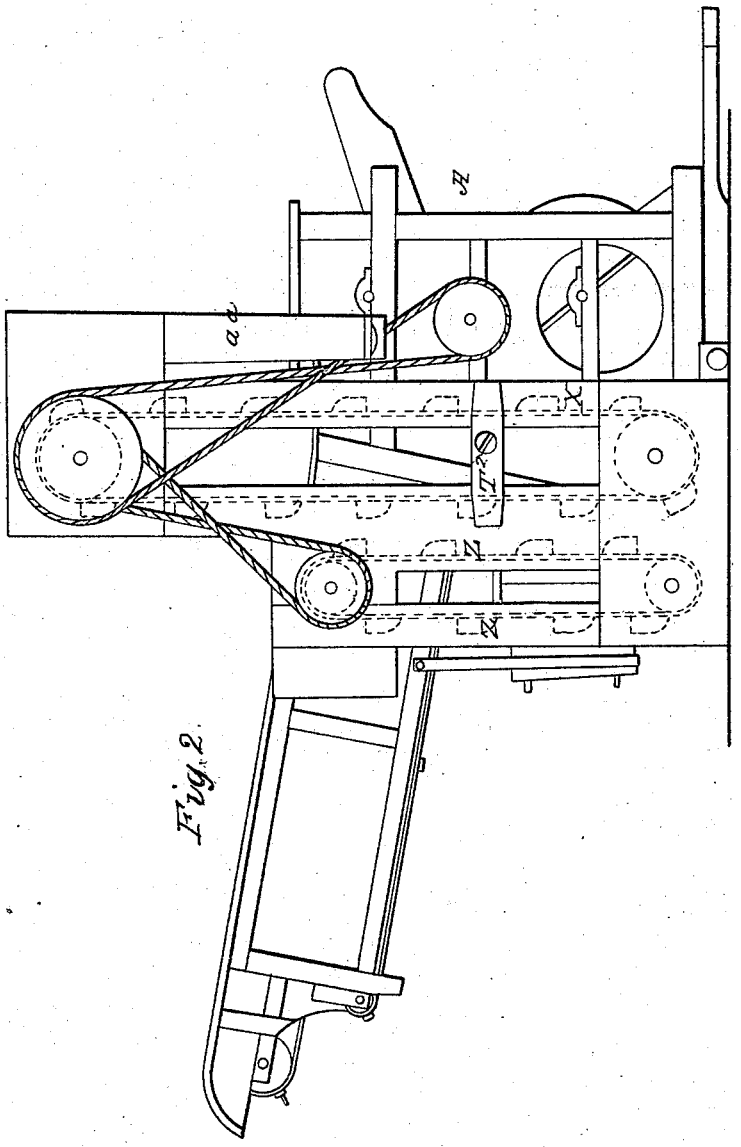


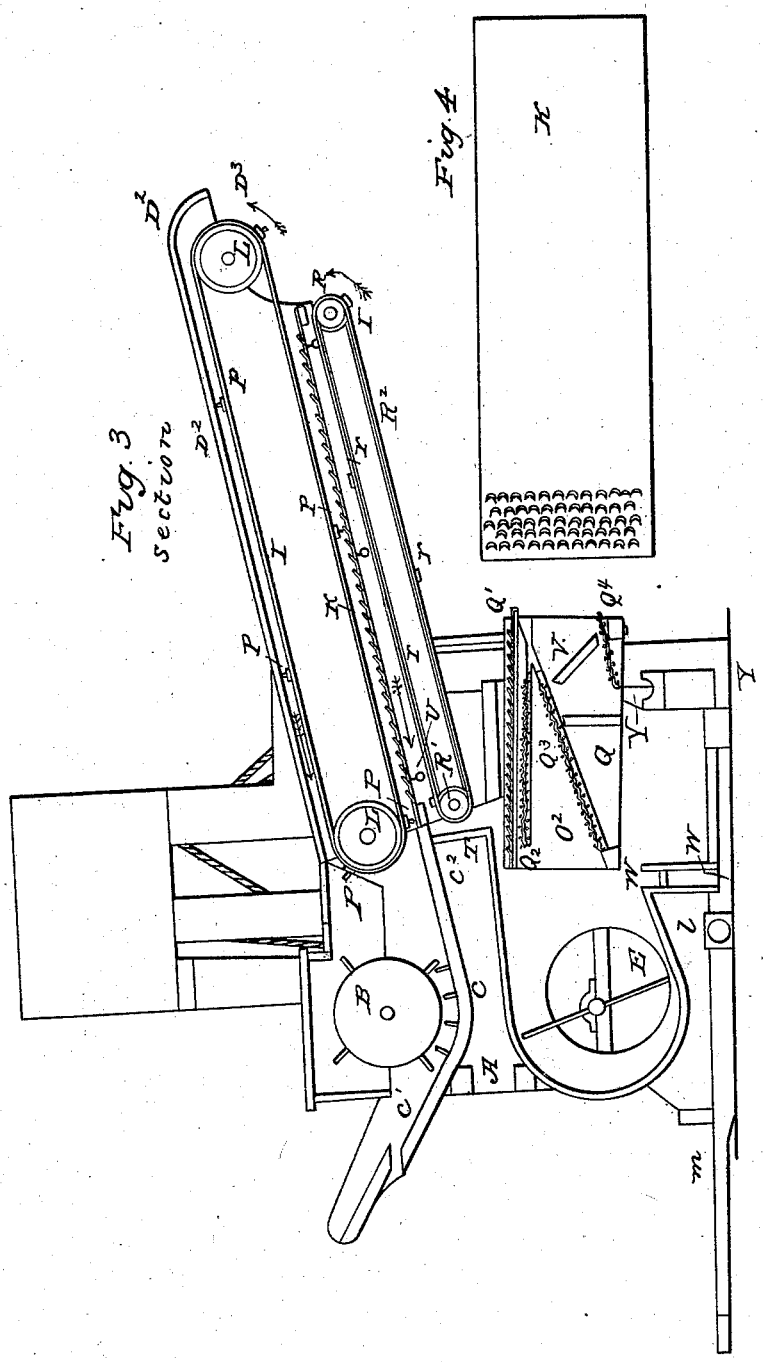
Fig. 2.

3 Sheets—Sheet 3.

A. RALSTON.

Grain Separator.

No. 2,467. Patented Feb. 21, 1842.



UNITED STATES PATENT OFFICE.

ANDREW RALSTON, OF HOPEWELL, PENNSYLVANIA.

MACHINE FOR THRESHING AND WINNOWING GRAIN.

Specification forming part of Letters Patent No. 2,467, dated February 21, 1842; Reissued January 15, 1856, No. 342.

To all whom it may concern:

Be it known that I, ANDREW RALSTON, of Hopewell, Washington county, State of Pennsylvania, have invented a new and useful Machine for Threshing, Separating, Winnowing, and Elevating Grain, which is described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1 is a side elevation, showing the gearing &c. Fig. 2 is a side elevation, showing the elevators, by dotted lines. Fig. 3 is a vertical longitudinal section through the center of the machine, showing the internal arrangement of the several parts. Fig. 4 plan of the straw screw showing a few of the perforations therein.

Similar letters refer to corresponding parts.

The frame A of the threshing machine, cylinder B, and concave C are made similar to others in use. The straw conveyer D is likewise arranged generally in the manner of some others in use, although its construction differs in several important items as will be hereafter described. It consists of two endless straps I passed around two parallel cylinders L L turning in the conveyer frame D by means of a crossed band M passed around a pulley N on the end of one of the rollers L and a pulley O on the face of the cog wheel F. To these endless parallel straps are attached parallel transverse bars P provided with teeth in the manner of a rake for more effectually taking hold of the straw and carrying it from the threshing cylinder up over the inclined straw screen K and discharging it over the upper or rear end thereof. Over this conveyer is placed a cover D^2 at such a distance therefrom that the teeth will nearly touch its under side as they pass along under it. The arrow indicates the direction the conveyer turns. The straps are prevented from slipping on the rollers by pins or cogs in their periphery entering corresponding perforations in the straps.

The stationary inclined straw screen K for permitting the grain and chaff to pass through its perforations, whilst the straw is carried over it by the conveyer D consists of an inclined metallic plate perforated with a number of oval apertures with an instrument adapted to take out about three fourths of the metal from the aperture leaving one fourth therein which is turned upward at a greater angle than that at which the screen is placed forming a tongue for the purpose of allowing the straw to slide up over it freely and at the same time to allow the grain to descend under it through said aperture. One aperture and one tongue only are described. But all the rest are made in the same manner. This screen extends from the lower part c^2 of the concave c which forms an inclined plane of an angle coincident with that of the screen K.

A number of transverse spring bars v armed with teeth projecting upward are arranged under the straw screen K in such a manner that said teeth will project up through the oblong apertures in the straw screen so as to catch hold of the straw and unravel it when knotted or entangled as the teeth of the conveyer draw it over the screen.

Below the straw screen K and parallel therewith are arranged, around revolving rollers R R′, three other endless parallel straps or bands R^2 having parallel transverse strips of wood r attached to them, and thus constructed is called the returner and is for the purpose of returning the grain toward the lower end of the straw screen K to the vibrating screens placed below said returner, being moved in the same direction as that of the conveyer as indicated by the arrow by means of a band S passed around the pulley N and another pulley on the end of the roller R′. The grain is guarded from the action of the fan during its return motion by a guard T placed in nearly a vertical position between the returner and fan. The grain with the chaff c is shoved by said returner down over an inclined board B^2 placed between or below the returner R. Below the returner and next to it, is arranged a chaff screen Q′. It is run into grooves in th shoe which is constructed, suspended, and vibrated much in the manner of the ordinary fan shoe. The said chaff screen is made in the following manner. It consists of a thin plate of metal punched with a semicircular instrument for the purpose of producing semicircular apertures and at the same time leave the parts of the metal thus partly punched from said plate overhanging said apertures at an angle of 30 or 40 degrees, or at any suitable angle, greater than that of the plate for the pur-

pose of allowing the grain to pass through said apertures and at the same time prevent the chaff and straw entering them and thereby preventing choking. Besides by thus having these lips overhanging the apertures inclining upward in a direction from the fan, the wind from the same passes more freely through the perforations and with an increased draft, which also promotes the separation of the grain from the dirt, &c., and thus effects a very valuable and important office in the machine. The position of this screen is a little above the axle of the fan and below the lower end of the returner. It is nearly the length and breadth of the shoe.

Below the chaff screen and at a short distance therefrom is arranged a fine screen Q^2 which is the same width of the chaff screen but much shorter and is also inserted in grooves in the shoe. An inclined screen Q^3 is placed below said fine screen leading back toward the fan to an inclined transverse spout *w* which conducts the grain to the elevators.

Near the bottom of the shoe (rear end,) is arranged a short inclined screen Q^4 of two kinds of meshes, the one fine and the other coarse inclining in the same direction with the last mentioned inclined screen and leading to another transverse inclined spout Y leading to a second set of elevators Z, the lower end of said last mentioned screen being arranged perpendicularly under the upper end of the inclined screen Q^3 between which last mentioned screens is placed an inclined board V for conducting the tail grain or tailing (as it is called) from its being only partly cleaned and requiring another operation. This screen is therefore called, for the sake of distinction, the "tail screen." The main object effected by it is to catch or stop all the grain that may be thrown off with the dirt from the fine screen Q^2 and by means of different meshes to separate the dirt therefrom.

The upper or fine meshes of the tail screen will let the cheat, cockle, &c. pass through. The lower or coarse meshes, which are directly over the transverse inclined tail spout Y will let the wheat, with some small particles of dirt, pass through to said spout, while the rat dung, heads, and larger particles of dirt will slide over the lower edge of the screen, from which spout the grain will be taken by the tail elevators Z to the returner by another spout for a second operation which will clean it effectually by the operation of the machine itself without the necessity of an attendant at the tail end, except occasionaly to remove the chaff. The tail screen is made flexible for the purpose of adjustment in order to arrest more or less of the tailing thrown over the end of the screen.

The elevators X and Z are made like those used in flouring mills and are arranged on the opposite side of the frame from that containing the gearing. One is called the grain elevator and the other is called the tail elevator. They are turned by bands and pulleys. The elevators X, are for elevating the cleaned grain to the granary, or other place, or to the bags to be filled, to which the grain is conducted by the spout A. The elevators Z are for elevating the tail grain to a short side spout which conducts it back to the returner and screens for a second operation. The trunks of the elevators are secured to the frame by screws or T, bolts, or otherwise, so that they may be removed or adjusted at pleasure.

The manner of shaking the screens equally at both ends, instead of principally at one end, as heretofore, is produced by the following arrangement of parts. Two boxes, ears, or eyes *b* are fixed in the side of the main frame, in which are placed the gudgeons, or reduced ends of a horizontal axle *c* to which are fixed two vertical arms *d* to whose ends are attached chains which connect them to the sides of the shoe Q. From the periphery of the axle *c* there projects a horizontal arm *a* to whose outer extremity is attached a vertical connecting rod *e*, which is also connected to the end of a horizontal lever *f* whose fulcrum *g*, which is near the center, is inserted horizontally into the side of the frame; which lever is acted upon by cams or pins *h i* projecting from the side of the pulley on the main cog wheel F so as to depress one end of the lever and at the same time elevate the other which gives the vibrating movement to the shoe containing the screens.

The fan E for separating the chaff and dirt, &c., from the grain is made like the common wheat fan and is placed in the frame A below the concave C of the thrashing machine. It is turned by a cog wheel F meshing into a pinion G on the axle of the fan—which cog wheel F also turns the thrashing cylinder B by meshing into a pinion H on its axle.

The frame of the machine is placed upon an axle *l* on which are put wheels for the purpose of moving it from place to place as desired, connected to forward pair of wheels by hounds *m* of the usual, or any other form and to which the horse power used for propelling the machine may also be connected. When the machine is to be used the axle must be brought down upon the ground in the manner represented in the drawing, by removing the wheels. In replacing the wheels the hounds and axle are lifted while the rear sill of the frame rests on the ground until the axle be raised sufficiently high to allow the wheels to be put on, which can be effected by one man.

Operation: The grain to be threshed and cleaned is put into the hopper C′ and by the teeth of the cylinder B it is struck and brought against the teeth of the concave C which separates the grain from the straw. The conveyer D conveys the whole up over the stationary screen K—the grain and part of the chaff fall through the apertures bin and screen upon the inclined board B^2 of the returner R^2 the straw is thrown off by the rakes of the conveyer at the rear end at D^3. The returner R^2 shoves the grain and chaff back toward the threshing cylinder down over said inclined board B^2 and discharges it over the lower end upon the chaff screen Q′ through which the grain falls to the screens below while the chaff is shook by the shoe Q and blown off at the rear end by the fan E the grain falls into the spout W which conducts it to the elevators X which elevate it to the granary or bagging spout. The tailings are caught upon the screen Q^4 from which the grain descends to the spout Y—which conducts them to the tailing elevators Z which elevate them to a short inclined cross spout into which they are emptied and conducted to the screens to undergo a second operation.

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

1. The combination of the stationary screen K and spring rakes U their teeth projecting through the apertures in the screen with the straw carrier arranged above said screen all as set forth.

2. Also in combination with the foregoing arrangement the inclined plane B^2 and returner R^2 the latter having cross pieces *r* for pushing the grain down the inclined plain B^2 to the screens Q′, &c., all as set forth.

3. Also constructing the movable shoe Q with a chaff screen Q′ as set forth in combination with the screens Q^2 Q^3 and tail screen Q^4 arranged below it and the inclined board V for separating the tailings from the clean grain the whole being combined and operating as described; likewise the combining the foregoing with the return belt R^2 and fan E and further combining these with the elevators X and Z and the trunks W and Y.

ANDREW RALSTON.

Witnesses:
THOS. W. CALL,
JAS. M. FADDERS.

[FIRST PRINTED 1913.]