

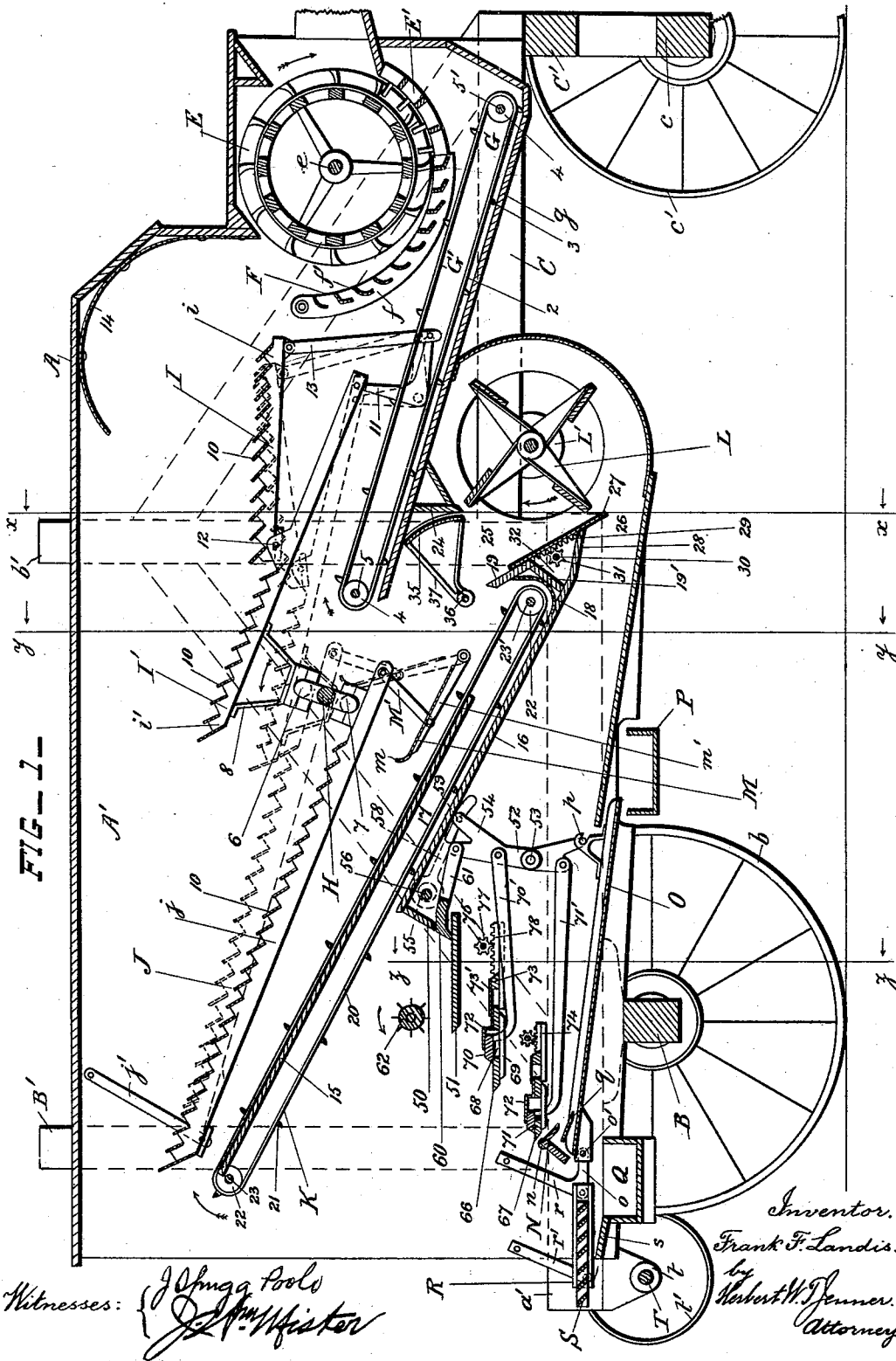
(No Model.)

3 Sheets—Sheet 1.

F. F. LANDIS.
THRASHING MACHINE.

No. 544,044.

Patented Aug. 6, 1895.



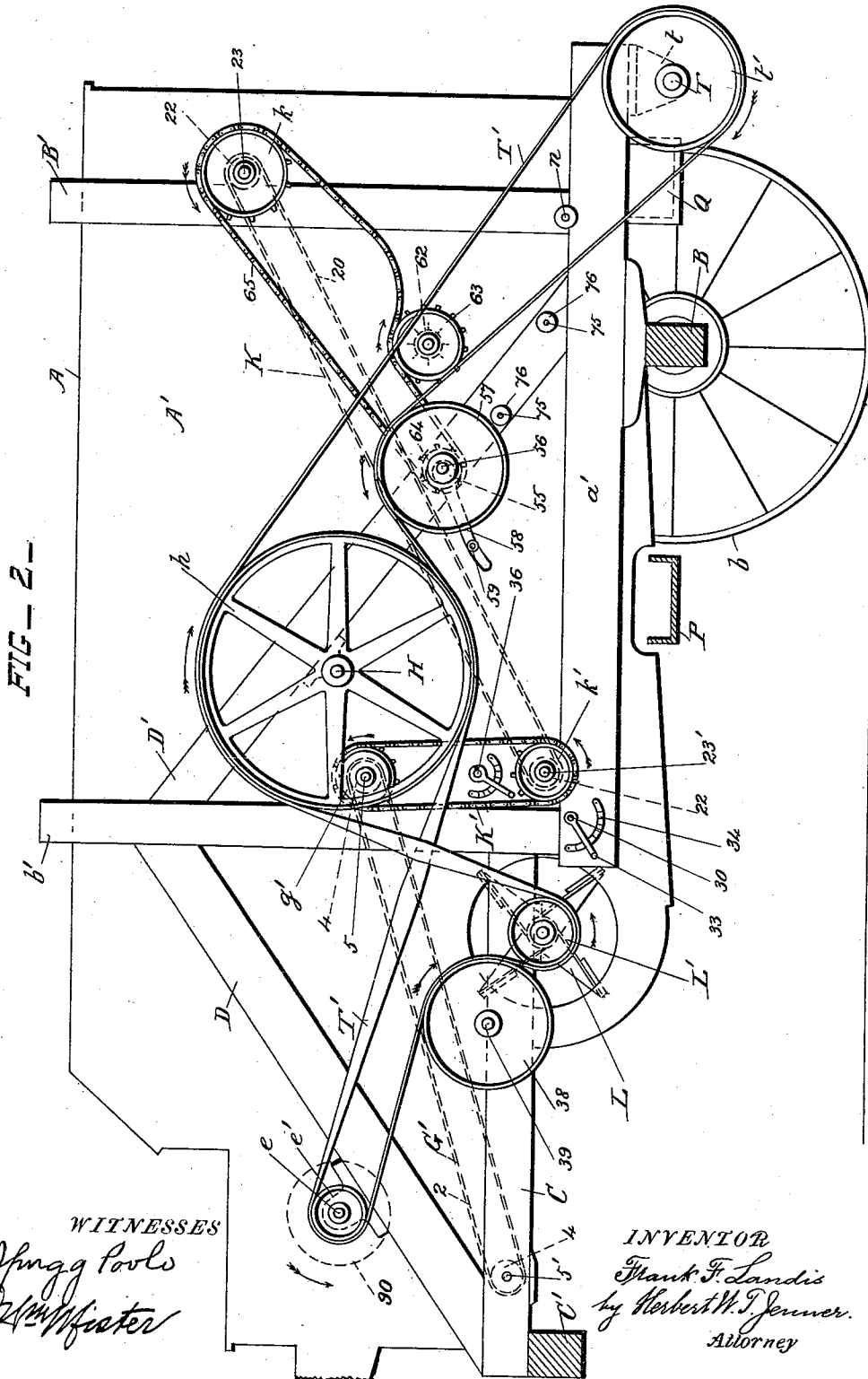
(No Model.)

3 Sheets—Sheet 2.

F. F. LANDIS.
THRASHING MACHINE.

No. 544,044.

Patented Aug. 6, 1895.



WITNESSES

J Spragg Pool
J M Wister

INVENTOR

Frank F. Landis
by Herbert W. Jenner.
Attorney

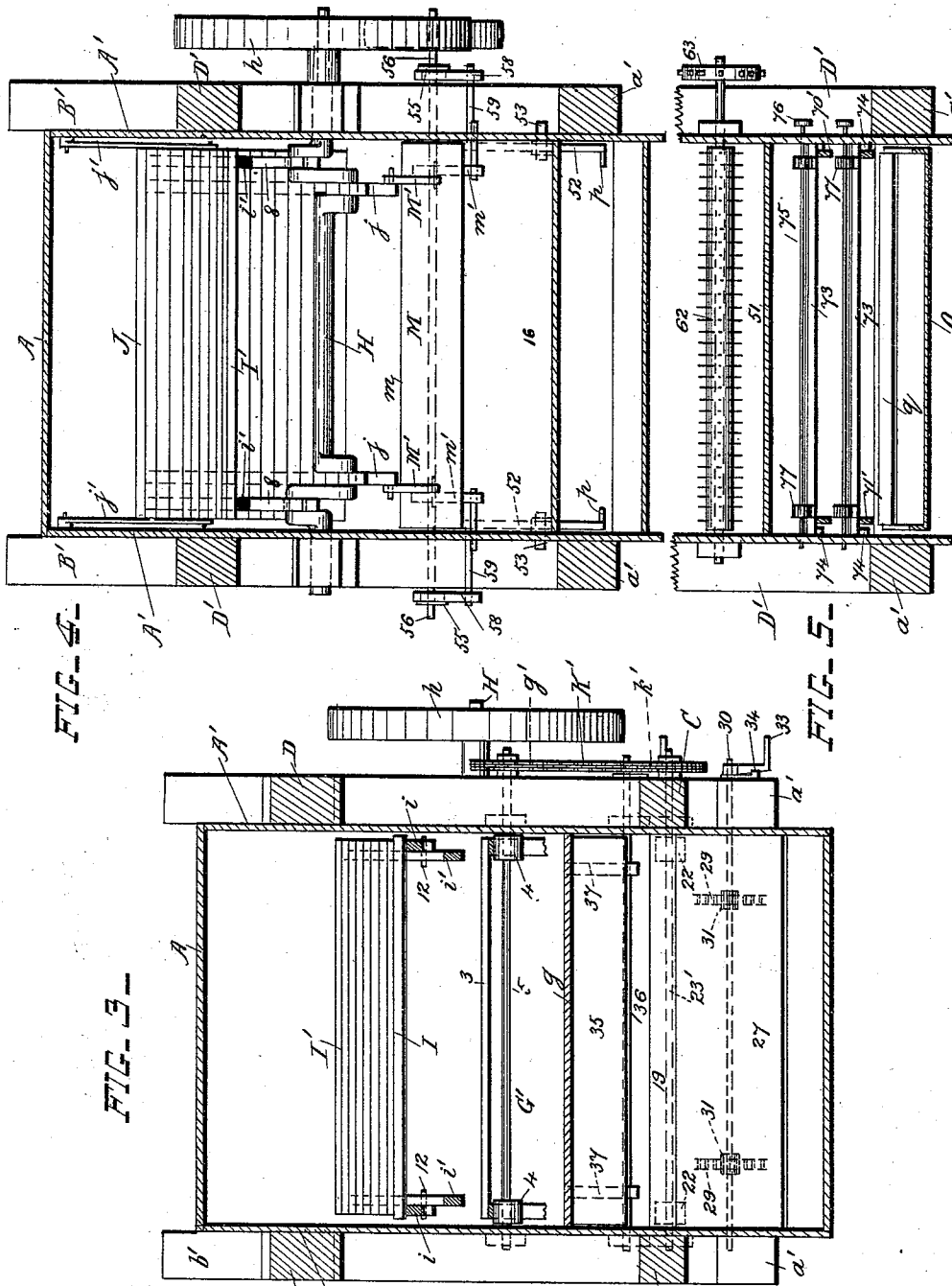
(No Model.)

3 Sheets—Sheet 3.

F. F. LANDIS.
THRASHING MACHINE.

No. 544,044.

Patented Aug. 6, 1895.



WITNESSES
J. A. P. Pool
J. M. Wister

INVENTOR
Frank F. Landis
by Herbert W. Jenner
Attorney

UNITED STATES PATENT OFFICE.

FRANK F. LANDIS, OF WAYNESBOROUGH, PENNSYLVANIA.

THRASHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 544,044, dated August 6, 1895.

Application filed February 16, 1895. Serial No. 538,702. (No model.)

To all whom it may concern:

Be it known that I, FRANK F. LANDIS, a citizen of the United States, residing at Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Thrashing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to thrashing-machines; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings, Figure 1 is a longitudinal section through a thrashing-machine constructed according to this invention. Fig. 2 is a side view of the machine, looking in the opposite direction from Fig. 1 and showing the driving mechanism. Fig. 3 is a cross section taken on line *xx* in Fig. 1. Fig. 4 is a cross-section taken on line *yy* in Fig. 1. Fig. 5 is a cross-section taken on line *zz* in Fig. 1.

A is the casing of the machine. This casing is provided with sides *A'*, having their lower parts secured to two longitudinal sills *a'*. These sills are supported by the bolster B, which carries the rear wheels *b*.

B' are uprights secured to the sills *a'* at the rear end of the machine, and *b'* are uprights secured to the sills *a'* at the middle portion of the machine.

C are longitudinal sills secured at their rear ends to the uprights *b'*, parallel with the sills *a'* and a short distance above them. The front ends of the sills C rest upon a cross-piece C', which is supported above the bolster *c*, (which carries the front wheels *c*;) by intermediate connections. (Not shown in the drawings.)

D are diagonal braces arranged between the front ends of the sills C and the upper ends of the uprights *b'*.

D' are diagonal braces arranged between the upper ends of the uprights *b'* and the rear portions of the sills *a'*.

The sills *a'* and C, the uprights *b'*, and the braces D and D' form a trussed framework which effectively supports the machine-casing upon each side of the machine.

E is the cylinder mounted upon the shaft *e*,

which is provided with a driving-pulley *e'*. E' is the concave supported under the cylinder. The thrashing-cylinder and its concave are provided with teeth and are of any approved construction.

F is a grain-deflector supported behind and below the cylinder. This grain-deflector consists of two curved side plates *f*, secured to the casing eccentric of the cylinder, and a series of deflecting-bars *f'*, secured between the said side plates substantially horizontal and parallel with each other.

The deflecting-bars are preferably angle-shaped or concavo-convex, and are arranged with their hollow sides next to the cylinder, so that the grain is caught by them and deflected downward.

G is the grain-receiver, provided with the upwardly and rearwardly inclined bottom portion *g* and arranged below and to the rear of the concave and the grain-deflector.

G' is a conveyer arranged in the grain-receiver. This conveyer is of any approved construction, and preferably consists of driving-bands 2 carrying cross-slats 3. The bands pass over carriers 4 secured upon shafts 5 and 5'; and *g'* is a driving-wheel secured on the end of the shaft 5 outside the machine-casing.

H is a crank-shaft arranged at about the middle of the machine-casing and provided with a driving-pulley *h* outside the casing. The bearings of the crank-shaft H are preferably secured to the braces D', and the bearings of the cylinder-shaft *e* are preferably secured to the braces D, so that the casing is relieved of strain. The crank-shaft H is provided with cranks 6 and 7, arranged on opposite sides of its center, and the cranks 6 are arranged to operate the first straw-shaker.

The first straw-shaker is formed of two parts I and I'. The rear part I' consists of two side bars *i'*, the rear ends of which are operatively connected with the cranks 6 by the brackets 8. The bars *i'* are upwardly and rearwardly inclined, and their rear portions are provided with upwardly and rearwardly inclined cross-slats 10. The front ends of the bars *i'* are pivoted to the vertical arms of the bell-crank levers 11, which are pivotally supported by the machine-casing. The front part I of the first straw-shaker consists of two

side bars *i'*, provided with upwardly and rearwardly inclined cross-slats 10. The rear ends of the bars *i* are pivoted to the middle parts of the bars *i'* by the pins 12. The front ends of the bars *i* are carried by the vertical connecting-rods 13, pivoted to them and to the horizontal arms of the bell-crank levers 11.

A straw-deflector 14 is provided, and consists of a curved plate secured inside the upper part of the machine-casing, over the rear part of the grain-deflector F, and the front part of the first straw-shaker.

J is the second straw-shaker, arranged to the rear of the first straw-shaker. The second straw-shaker J consists of two upwardly and rearwardly inclined side bars *j*, provided with upwardly and rearwardly inclined slats 10, similar to the two parts of the first straw-shaker. The front ends of the side bars *j* are operatively connected to the cranks 7 of the crank-shaft H, and the rear ends of the side bars *j* are supported by the downwardly and rearwardly inclined links *j'*, pivoted to them and to the machine-casing.

An upwardly and rearwardly inclined gather-board 15 is secured in the casing under the second shaker J. A second upwardly and rearwardly inclined gather-board 16 is secured under the front part of the gather-board 15 and extends forward to a point under the rear end of the bottom portion *g* of the grain-receiver. A passage 17 is formed between the two gather-boards, and 18 is a curved retaining-plate at the lower end of the gather-board 16. Cross-pieces 19 and 19' are secured to the casing and are adapted to support the curved plate 18 and the blast-deflector, which will be more fully described hereinafter.

K is a conveyer of any approved construction. This conveyer is preferably provided with driving-bands 20, carrying cross-slats 21. The bands pass over carriers 22, secured upon shafts 23 and 23', and *k* is a driving-wheel secured on the end of the shaft 23 outside the machine-casing. A driving-wheel *k'* is secured on the end of the shaft 23' outside the machine-casing, and K' is a chain or other flexible connection passing around the wheel *k'* and around the wheel *g'*, which drives the conveyer G, as hereinbefore described. The upper part of the conveyer K passes over the upper side of the gather-board 15, and the lower part of the conveyer is arranged in close proximity to the gather-board 16 and passes through the passage 17 between the gather-boards, the lower end of the said conveyer being close behind the curved retaining-plate 18.

L is a fan or blower of any approved construction, and L' is a driving-pulley secured on the fan-shaft, which is journaled in bearings secured to the sills C.

A substantially-vertical blast-board 24 is secured to the under side of the bottom portion *g* of the grain-receiver to the rear of and above the fan, and 25 is a blast-passage be-

tween the blast-board 24 and the cross-piece 19.

A second blast-passage 26 is formed at the bottom of the machine-casing for conducting a portion of the blast to the cleaning devices.

The blast-deflector 27 slides crosswise of the passage 26 and rests in an inclined position upon the said cross-piece 19 and a cross-piece 28 secured to the casing. The under side of the deflector 27 has one or more toothed racks 29 secured to it. A shaft 30 is journaled in the casing and has one or more toothed pinions 31 secured on it and gearing into the toothed racks 29. The pinions are arranged in the chamber 32, formed between the cross-pieces 19' and 28 and the blast-deflector, so that the teeth of the racks and their pinions cannot be clogged by the dust and chaff of the machine. A crank 33 is secured on the end of the shaft 30 outside the casing, and 34 is a notched plate or other similar retaining device secured to the outside of the casing and operating to hold the crank and the blast-deflector in any desired position. When the blast-deflector is pushed down more of the blast is deflected upward and very little of it passes through the passage 26 to the cleaning devices.

A blast-regulator 35 is secured on the shaft 36 and regulates the passage of the blast through the passage 25. This regulator consists of a curved plate secured to the shaft 36 by arms 37, and when raised the plate is to the rear of the blast-board 24 where it does not cut off any of the blast. The shaft 36 is provided with an operating crank or handle outside the casing, and has means for securing the crank in any desired position similar to the retaining devices for the blast-deflector.

A guide-pulley 38, for tightening the driving-belt, is journaled on a pin 39 on the outside of the casing in front of and above the fan-shaft.

M is a vibrator for constantly changing the direction of the blast with reference to the straw-shakers. This vibrator consists of a plate provided with a curved upper edge *m*. This plate extends across the casing and is supported by the arms *m'*, whose lower ends are pivoted to the casing below and a little in front of the crank-shaft H. *M'* are connecting-rods pivoted to the lower ends of the bars *j* of the second straw-shaker and to the said arms *m'*. The vibrator is raised when the lower end of the second straw-shaker is raised, as indicated by the dotted lines in Fig. 1, and the positions of the parts of the first straw-shaker at the same time are also indicated in a similar manner.

Most of the grain is removed from the straw by the grain-deflector, and the straw and a small quantity of grain still remaining mixed with it are thrown upon the first straw-shaker. The first straw-shaker agitates and tosses the straw, works it to the rear, and discharges it

onto the second shaker. The grain which is shaken out of the straw by the first shaker falls upon the gather-board and the grain-receiver beneath it, and is carried rearward by the respective conveyers. The second shaker tosses the straw and works it to the rear end of the machine. The few remaining grains which fall through the slats of the second shaker fall on the gather-board beneath it and are removed by the conveyer K. The strong blast which passes up the passage 25 operates upon the grain and chaff as they fall from the rear end of the bottom portion of the grain-receiver onto the gather-board 16, and the chaff is blown to the rear of the machine, the use of a separate chaffer being dispensed with.

The straw-shakers remove the straw very rapidly from the front to the rear end of the machine, and separate the grain from it in a very effective manner when the straw is tough and strong and but little broken by the thrashing-cylinder. When, however, the straw has become dry and brittle and the thrashing-cylinder knocks off all the chaff and blades in addition to breaking the straw to a considerable extent, the resulting mixture of straw, chaff, and blades is apt to become matted together in passing over the straw-shakers, so that the grain is not all shaken out. This is especially the case on straw-shakers which act with a rapid motion, which is desirable, as it greatly increases the capacity of the machine.

In order to prevent the matting of the material on the straw-shakers, the straw is operated on by a vibrating or pulsating blast while it is being tossed up and down and delivered from the first shaker to the second shaker. When the second shaker is in the position shown by the full lines in the drawings, the blast is nearly parallel with its under surface. The vibrator changes the direction of the blast as the lower end of the second shaker is raised and the upper end of the first shaker is lowered until the direction of the blast becomes nearly vertical. This combined action of the vibrating or pulsating blast and the tossing motion of the straw-shakers causes the material to form into two layers on the straw-shakers, the lower layer being the heavy and coarse material and the upper layer being formed of the light blades, chaff, and dust. The separation of the material into layers is very favorable to the separation of the grain and prevents the material from becoming matted.

The blast carries off all the dust, chaff, and light material and drives it up into and through the straw on the second shaker. The grain-heads and other heavy rubbish are carried up the gather-board 16 by the conveyer K and are delivered to the cleaning devices. An inclined guide-board 50 is arranged at the end of the gather-board 16 for the material to slide down onto the first grain-plate 51, which is supported in the casing in a substantially horizontal position. Rocker-arms 52 are piv-

oted on pins 53, projecting from the sides of the casing; and 54 are lugs on the upper ends of the said arms. Eccentrics 55 are secured one on each end of a shaft 56, outside the machine-casing, and the said shaft is provided with a pulley 57 for revolving it. Eccentric rods 58 connect the eccentrics to pins 59, projecting from the lugs 54, through slots in the side of the casing. A push-piece 60 slides back and forth on the first grain-plate between it and the guide-board 50, and 61 are arms secured to the push-piece and pivoted to the upper ends of the rocker-arms 52. A spiked roller 62 is journaled in the casing above the rear end of the first grain-plate 51, and is provided with a driving-wheel 63 on its end outside the casing. A driving-wheel 64 is secured on the shaft 56, and 65 is a flexible connection, such as a chain, passing around the wheel 64, over the wheel 63, and around the wheel 6, so that both the spiked roller 62 and the conveyer K are driven from the shaft 56. The second grain-plate 66 is arranged below and to the rear of the first grain-plate, and 67 is the third grain-plate arranged below and to the rear of the second grain-plate.

The three grain-plates may be longitudinally adjustable in the casing and may be provided with toothed combs at their rear edges, if desired, as described in a separate application for Letters Patent, filed February 4, 1895, Serial No. 537,281.

The second and third grain-plates have slots 68, or they may be formed of two parts secured together by battens 69 forming slots or openings between the parts. The second grain-plate is provided with a push-piece 70 and the third grain-plate is provided with a similar push-piece 71. Arms 70' and 71' are pivoted to the rocker-arms 52 on opposite sides of their pivots, and the rear ends of these arms are curved upwardly, pass through the slots 68 in the grain-plates, and are secured to the respective push-pieces 70 and 71. The push-pieces are supported above their respective grain-plates, but as in working fine dust gets between the push-pieces and the grain-plates it is better to have a small opening between each push-piece and its grain-plate for the whole or greater part of its length, so that the wind from the fan may pass through the said opening and blow away the dust, which would otherwise wear away the adjacent surfaces.

The grain-plates 66 and 67 have similar angle-shaped guards 72 secured to their front parts and extending rearwardly over the tops of the push-pieces.

The width of each grain-plate 66 and 67 may be varied by means of similar extension-pieces 73. Each extension-piece slides horizontally on guides 74 secured to the casing, and is provided with a thin plate 73', which rests on top of the grain-plate. Any approved adjusting devices may be used for moving the extension-pieces back and forth. The adjusting mechanism may conveniently consist of a

shaft 75, journaled in the casing and provided with a knob or handle 76 for revolving it. Toothed pinions 77 are secured on the shaft 75 and gear into toothed racks 78, which are
5 secured to the extension-pieces.

N is the dividing-bar arranged below and to the rear of the third grain-plate 67. This bar is angle-shaped and is provided with pivots *n* at its apex. The bar can be turned on
10 its pivots and adjusted to different inclinations to adapt it to different kinds of material.

O is an upwardly and rearwardly inclined gather-board for the grain supported under the grain-plates.

15 P is the grain-spout at the front end of the gather-board O, and Q is the tailings-spout at its rear end.

R are channel-shaped side plates supported by the downward and rearwardly inclined
20 links *r* and *r'*, pivoted to them and to the sides of the casing. These side plates are arranged partly over the tailings-spout and partly extending beyond it.

The rear end of the gather-board O is pivoted to the lugs *o* on the lower ends of the front links *r* by the pins *o'*. The front end of the gather-board O is pivoted to the pins
25 *p*, which project from the lower ends of the rocker-arms 52.

30 S is a grate provided with upwardly and rearwardly inclined slats, and *s* is a guide-board under the grate for conveying the material which falls through the slats into the tailings-spout. The grate is slidable longitudinally in the side plates and may be pushed
35 forward to catch the material which slides off the rear side of the dividing-bar. A short guide-board *q* is arranged under the front side of the dividing-bar and is carried by the
40 gather-board O. This guide-board *q* prevents any grain from splashing out of the rear end of the gather-board.

T is the driving-shaft of the straw-stacker, which may be of any approved construction.
45 This shaft is journaled in bearings *t* at the rear end of the machine and is provided with a pulley *t'* for revolving it.

The cylinder is driven by the pulley 90, secured on one end of its shaft and indicated by the dotted circle in Fig. 2. The driving-belt T' for the separating and cleaning mechanism passes around the pulley *e'* on the other end of the cylinder-shaft, over the tightener-pulley 38, around the pulley L' on the fan-shaft. Thence making a half-turn the belt
55 passes over the top of the pulley *h* on the crank-shaft, around the pulley *t'* on the straw-stacker shaft, over the pulley 57 on the eccentric-shaft, under the said pulley *h* on the
60 crank-shaft, and thence making another half-turn the belt returns to the pulley *e'* on the cylinder-shaft. The directions of the motions of the various parts of the machine are indicated by the arrows in the drawings.

65 The mixed grain and tailings which fall upon the first grain-plate are worked to the rear of the plate by the push-piece. The short

and quick reciprocating motions of the push-piece produce a quivering motion in the whole pile of material on the first grain-plate and
70 cause the material to separate into layers. The grain is worked to the bottom of the pile and the rubbish is worked to the top against the spiked roller. The spiked roller, which usually revolves in the direction of the arrow,
75 combs the coarse material from the top of the pile and carries it over the top of the roller. The coarse material is operated on by the blast and falls at the rear of the machine, partly in the tailings-spout and partly on the
80 grate beyond it.

The grain which drops from the rear edge of the first grain-plate is subjected to the blast from the fan, which causes all the light rubbish to fall on the rear side of the pile
85 on the second grain-plate, while the clean grain drops onto the front side of the pile and slides off it onto the gather-board. The push-piece of the second grain-plate has shorter reciprocations than the push-piece of the first
90 grain-plate, but its separating action on the material is similar. The material is again subjected to the action of the blast as it drops from the second grain-plate onto the third grain-plate. The separation on the third
95 grain-plate is similar to that on the second grain-plate, and is assisted by the push-piece of the third grain-plate. The third grain-plate delivers very little grain over its front edge and still less over its rear edge, as at
100 that point there is little left but rubbish. The blast impinges against the front side of the dividing-bar and causes all the rubbish to slide off its rear side into the tailings-spout. When the grain is very full of rubbish the
105 front side of the divider-bar is adjusted so as to be nearly vertical, thereby guiding a strong and sharp blast against the edge of the grain-plate; but if the grain is not very full of rubbish the front side of the divider-
110 bar may be set at an acute angle. Any grains which fall on the front side of the divider-bar slide off it onto the gather-board. The tailings are returned to the cylinder to be rethashed by an elevator of approved construction. (Not shown in the drawings.)
115

When the machine has been in operation for some time, heavy rubbish, such as pieces of cornstalks, will accumulate in it, and should be got rid of. To effect this the grate
120 S is pushed forward over the tailings-spout. The tailings then fall through the slats of the grate, and the coarse rubbish is worked to the rear by the grate and is discharged out of the machine.
125

In thrashing very light and dry oats or light grass-seed a less forcible vibrating blast is necessary, and the blast-regulator 35 is moved down to reduce the force of the blast to the required extent.
130

In thrashing oats which are fairly clean and in good condition, and while thrashing at a rapid rate, it is desirable to move the first grain-plate forward, nearer to the rocker-

arms, and to reverse the direction of revolution of the spiked roller from that hereinbefore described.

The reversal of the direction of the motion of the spiked roller is accomplished by removing the drive-chain from engagement with the upper side of the wheel 63 and permitting it to engage with the under side of the said wheel.

The extension-pieces 73 are moved nearer the grain-plates when it is desired to shorten the bases of the piles of material which rest on the grain-plates. When the extension-pieces are pushed in and the piles have narrower bases, the front sides of the piles are steeper, and this allows the grain to run more freely off them, which is necessary when thrashing at a rapid rate.

The peculiar manner in which the gather-board O and the grate S are pivotally connected and supported, as hereinbefore fully described, causes the gather-board to have a pitching motion forwardly which works the grain down into the grain-spout and causes the grate to have a pitching motion to the rear, so as to discharge the heavy rubbish out of the machine.

What I claim is—

1. In a thrashing machine, the combination, with a fan, and the blast board 24 at the upper part of its casing; of the inclined cross-piece 19 arranged at the rear of the fan, and the blast passages 25 and 26 leading to the straw-shaking and grain-cleaning devices respectively; the slidable blast deflector 27 resting on the crosspiece 19 and controlling the area of the passage 26, and the blast deflector 35 consisting of a pivoted curved plate normally supported behind the said blast board and controlling the area of the upper passage 25, substantially as set forth.

2. In a thrashing machine, the combination, with a fan, and the casing provided with two passages 25 and 26 leading to the straw-shaking and grain-cleaning devices respectively; of the crosspieces arranged at the rear of the fan and forming a chamber 32 between the two said passages, an inclined blast deflector 27 supported above the said chamber, and operating mechanism for sliding the said blast deflector, arranged in the said chamber, substantially as set forth.

3. The combination, with a revoluble crank shaft provided with cranks arranged at opposite sides of its center; of the first shaker having its rear end connected to the said crank shaft, said first shaker being formed of two parts I and I' each consisting of side bars and inclined slats, the rear end of the part I being pivoted to the middle portions of the side bars of the part I', the oscillatory bell-crank levers 11 and the connecting rods 13 connecting the rear ends of the said parts I and I'; a second straw shaker provided with inclined slats and having its front end connected to the said crank shaft, and means for

supporting the rear end of the second straw shaker, substantially as set forth.

4. The combination, with a revoluble crank shaft; of a straw shaker formed of two parts, I and I', each consisting of side bars and inclined slats, the rear end of the rear part, I', being operatively connected with the said crank shaft; the oscillatory bell-crank levers pivotally supporting the front end of the part, I'; and connecting rods pivoted to the front end of the front part, I, and to the other arms of the said bell-crank levers, the rear end of the part, I, being pivoted to the middle portions of the side bars of the part, I', substantially as set forth.

5. The combination, with a fan, and a straw shaker; of a vibrator arranged intermediate of the said parts and operating to cause a continual change in the angle at which the blast strikes the under side of the straw shaker, substantially as set forth.

6. The combination, with a fan, and a straw shaker; of a vibrator pivoted at its lower end, and means for oscillating the vibrator continuously and thereby changing the angle at which the blast strikes the straw shaker, substantially as set forth.

7. The combination, with a fan, and a straw shaker; of a vibrator pivoted at its lower end, and driving devices operating to raise and lower the upper part of the vibrator and the lower part of the straw shaker synchronously, substantially as set forth.

8. The combination, with a fan, a straw shaker, and means for continuously raising and lowering the lower end of the straw shaker; of a vibrator having its lower end pivotally supported below the straw shaker, and an arm pivotally connecting the vibrator with the lower part of the straw shaker, substantially as set forth.

9. The combination, with a fan, and a straw shaker; of a vibrator consisting of a plate having an upwardly curved edge, and pivoted supporting arms; and means for oscillating the vibrator continuously, substantially as set forth.

10. The combination, with a grain plate, a push piece above the grain plate, and reciprocating arms passing through apertures in the grain plate and operating to reciprocate the push piece; of a guard secured to the front part of the grain plate and extending rearwardly over the push piece, substantially as set forth.

11. The combination, with a grain plate, of an extension piece provided with a thin plate resting on the front part of the grain plate, whereby the effective width of the grain plate may be varied, substantially as set forth.

12. The combination, with the three grain plates, and their push pieces provided with arms substantially as set forth; of the pivoted rocker arms and means for reciprocating them, the push piece arms of the second and third grain plates being pivoted to the rocker

arms above and below the rocker arm pivots, and the push piece arms of the first grain plate being pivoted to the upper parts of the rocker arms above the aforesaid arms, substantially as set forth.

13. The combination, with a grain plate, a push piece above the grain plate, and driving mechanism operating to impart short and quick reciprocations to the push piece, whereby the material resting on the said plate is separated into layers and worked to the rear of the plate; of a substantially horizontal guard plate secured over the said push piece between it and the pile of grain, assisting to support the said pile of grain, and permitting the grain to slide both to the front and rear, substantially as set forth.

14. The combination, with the gatherboard O, and the reciprocatory rocker arms 52 at its lower end; of the side plates R, the downwardly and rearwardly inclined links r r' pivotally supporting the said side plates, the

said links r having lugs o supporting the upper end of the said gatherboard; and the slidable grate carried by the said side plates, substantially as set forth.

15. The combination, with a grain plate, of a dividing bar having its front and rear sides inclined downwardly in opposite directions and pivots at its apex, the said apex being arranged under the rear edge of the grain plate and remaining substantially stationary in that position when the said bar is turned on its pivots to adjust the inclination of its sides and to direct the blast with greater or less force against the edge of the said grain plate, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK F. LANDIS.

Witnesses:

S. B. RINEHART,

T. S. CUNNINGHAM.