5 Sheets—Sheet 1.

J. H. ELWARD.

THRASHING-MACHINE.

No. 187,607. Patented Feb. 20, 1877.

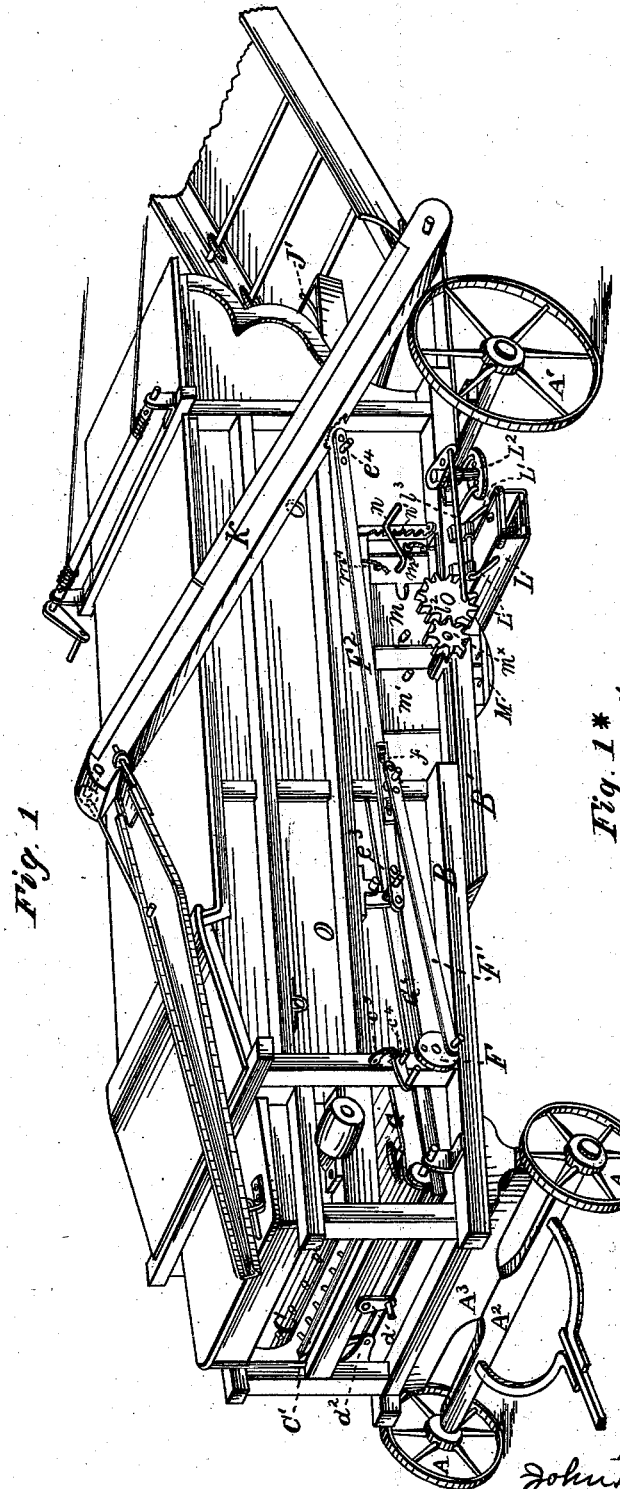

Fig. 1

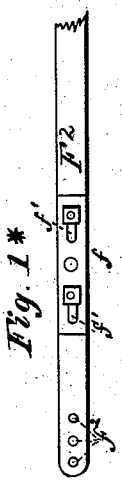

Fig. 1*

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THRASHING-MACHINE.

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Fig. 2

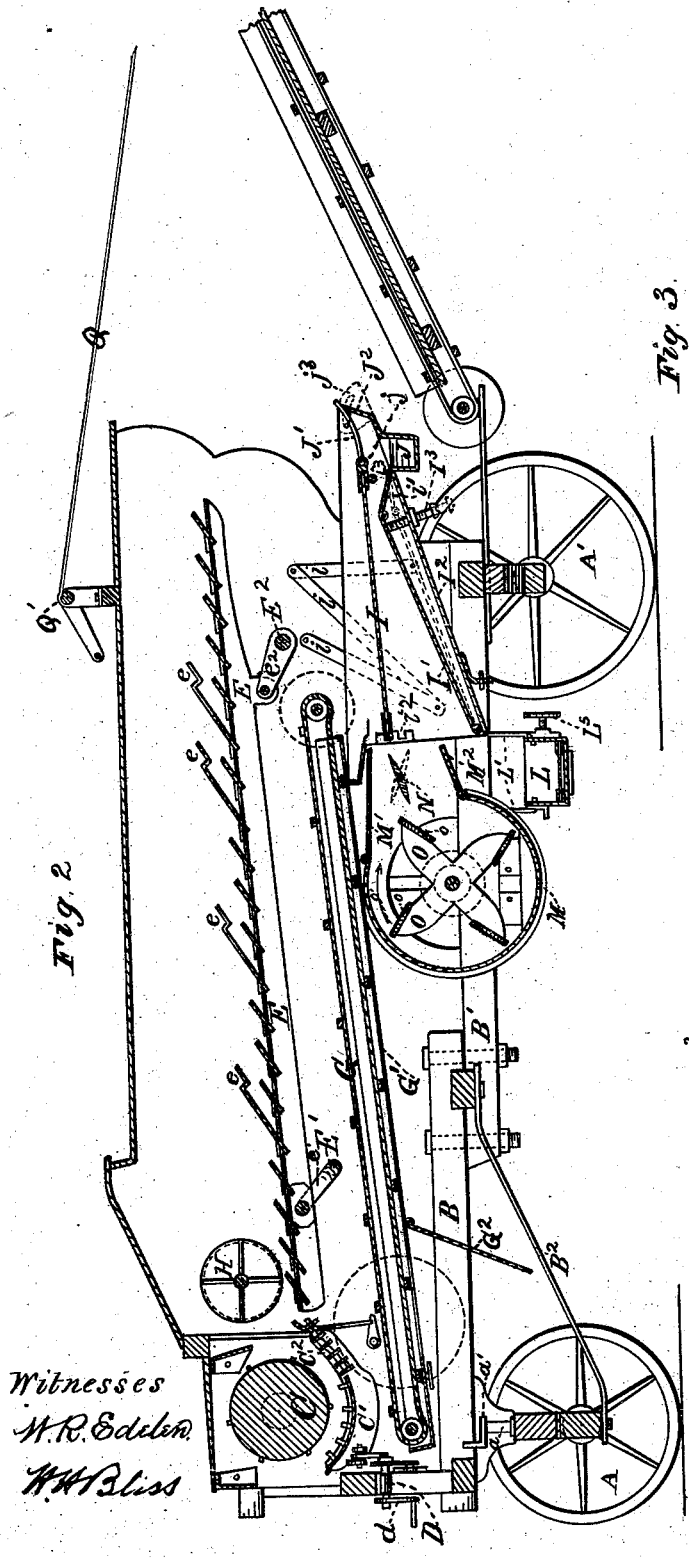

Fig. 3

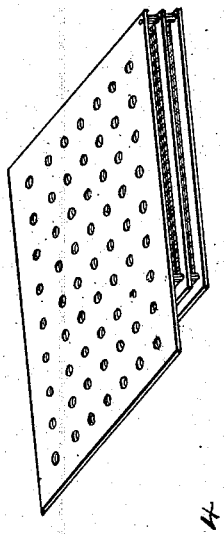

Fig. 4

Fig. 5

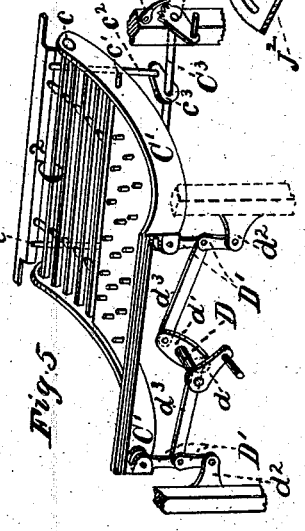

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Fig. 7.

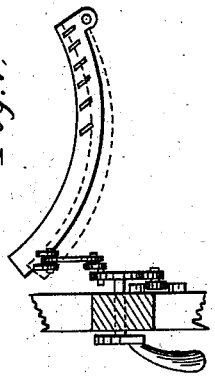

Fig. 10.

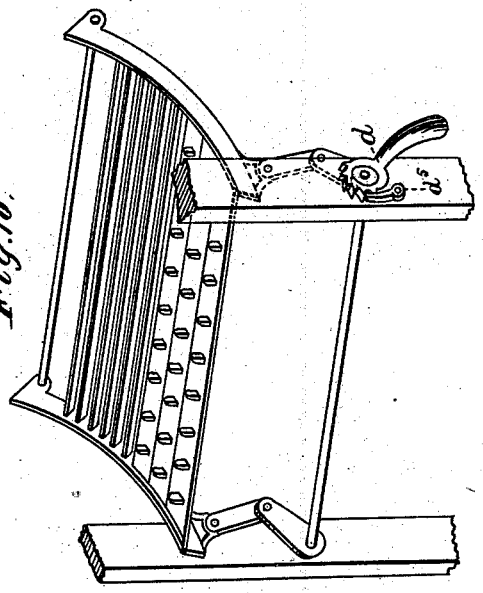

Fig 6

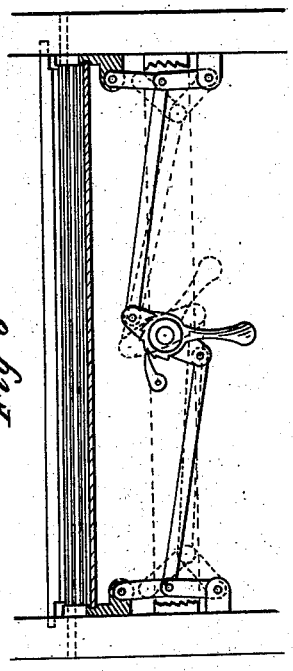

Fig. 8.

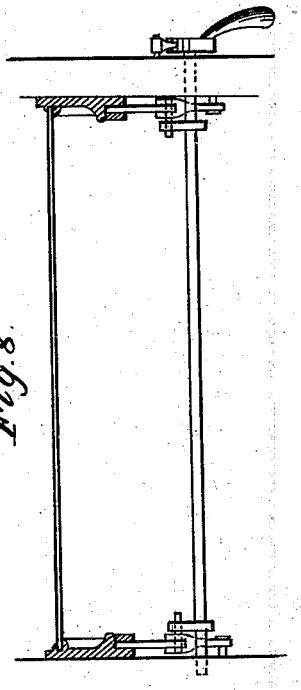

Fig. 9.

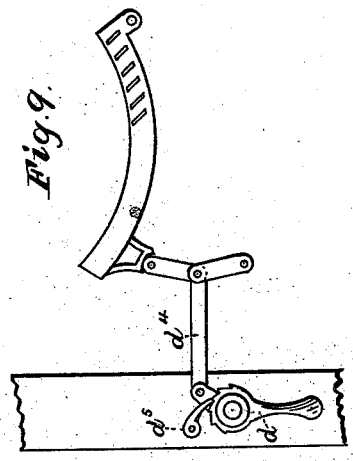

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Fig. 11

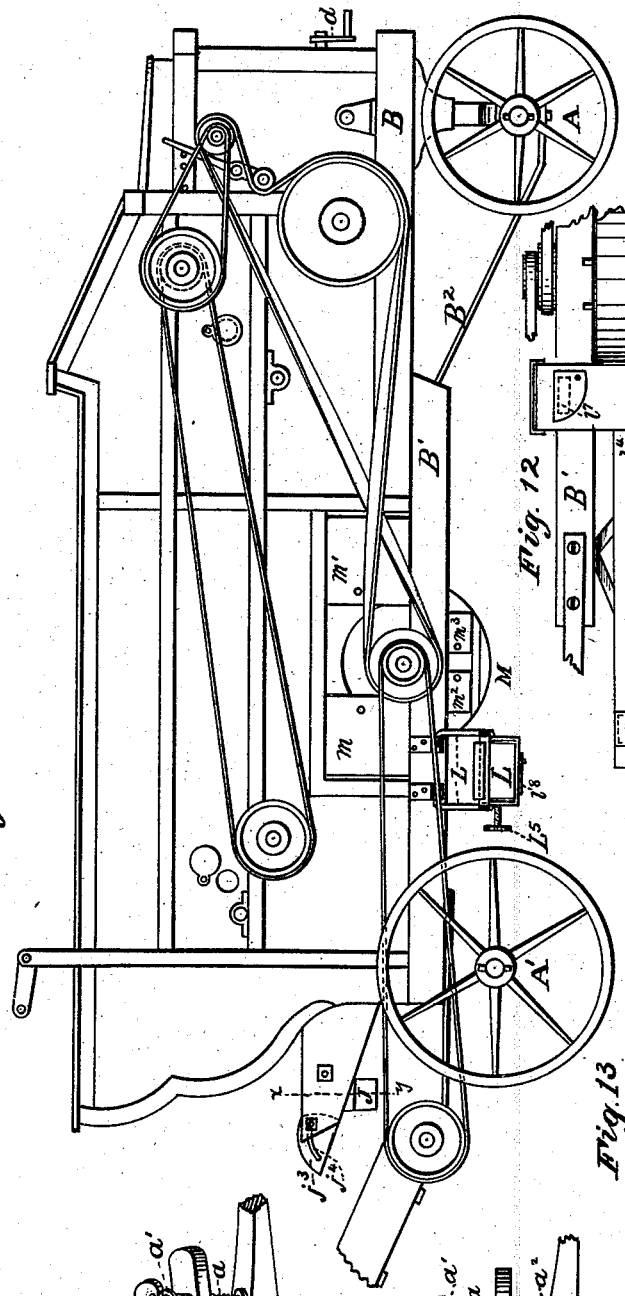


Fig. 12

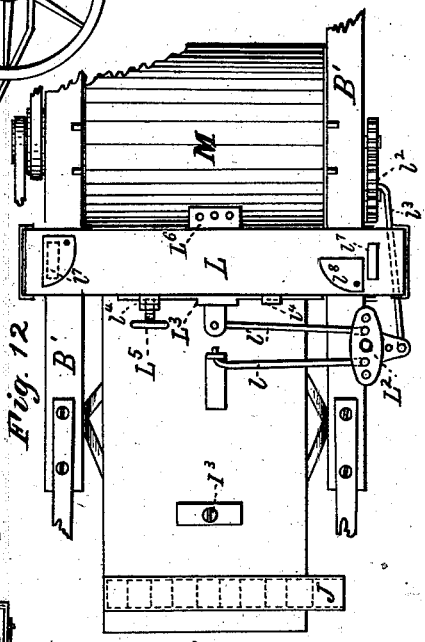


Fig. 13

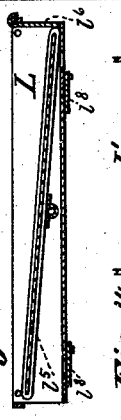


Fig. 14.

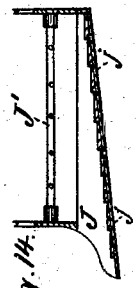


Fig. 15

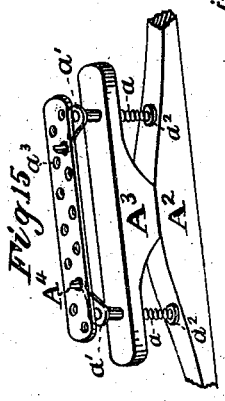


Fig. 16

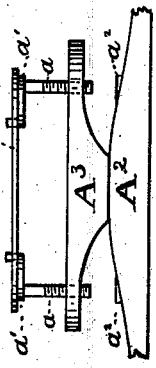
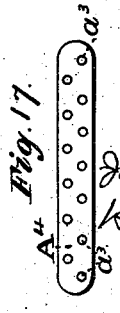


Fig. 17.



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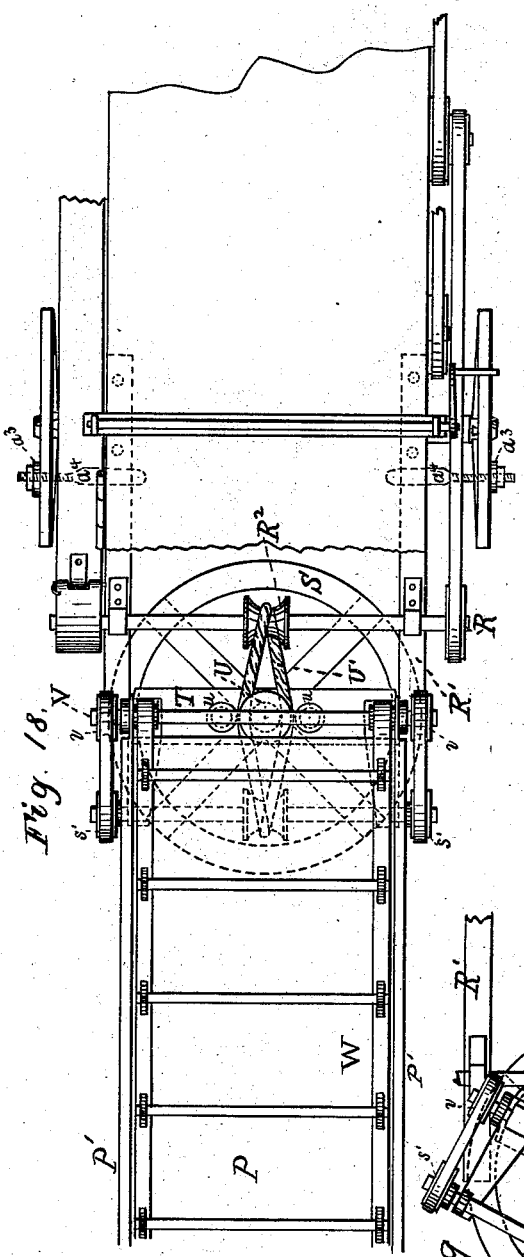

Fig. 18.

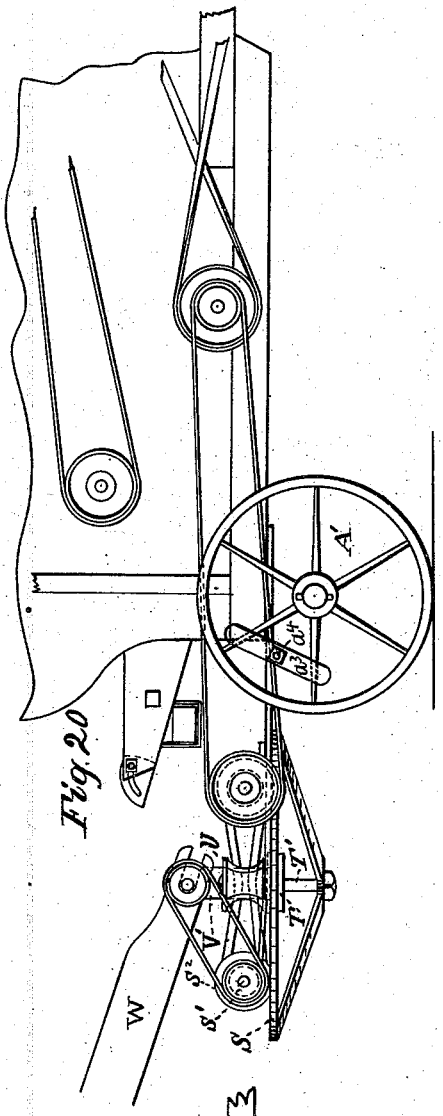

Fig. 20

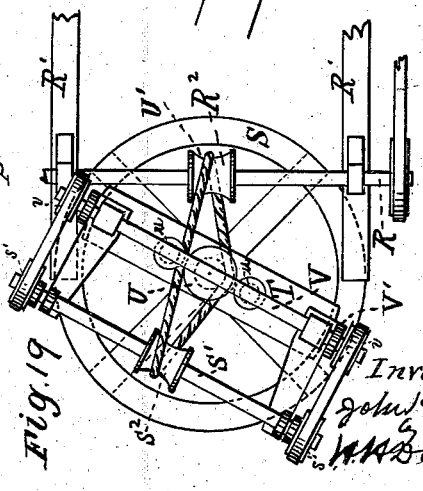

Fig. 19

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UNITED STATES PATENT OFFICE.

JOHN H. ELWARD, OF ST. PAUL, MINNESOTA.

IMPROVEMENT IN THRASHING-MACHINES.

Specification forming part of Letters Patent No. **187,607**, dated February 20, 1877; application filed February 8, 1877.

To all whom it may concern:

Be it known that I, JOHN H. ELWARD, of St. Paul, in the county of Ramsey, and State of Minnesota, have invented certain new and useful Improvements in Thrashing and Separating Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a perspective view of my improved thrasher and separator, with part of the casing removed. Fig. 1* is a detached view of a plate used to regulate the throw of the shaker. Fig. 2 is a vertical longitudinal section. Fig 3 is a detached perspective view of the flax and timothy seed attachment. Fig. 4 is a longitudinal vertical section of the same, showing its position relatively to the tail-board of the shoe. Fig. 5 is an enlarged view of the concave, the grating, and their adjusting devices. Figs. 6, 7, 8, 9, 10, represent these adjusting appliances, and modifications of the same. Fig. 11 is a side elevation of the machine. Fig. 12 is a plan view of the rear part. Fig. 13 is a longitudinal section of the grain-delivery spout. Fig. 14 is a transverse vertical section of rear part of the separator, taken on line *x y*, Fig. 11. Figs. 15 and 16 are detached views of the devices employed for seating the machine firmly upon the front axle when in operation. Fig. 17 is a detached view of the locking-plate. Figs. 18 and 19 are plan views of the straw-stacker attachment. Fig. 20 is a side elevation of the same.

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

A are the front wheels. A^1 are the rear wheels. A^2 is the front axle, attached to the front bolster A^3 by a king-bolt in the usual manner.

Referring to Figs. 15 and 16, *a a* are adjusting or leveling screws fitting threads in bolster A^3, the upper ends of the screws having cranks a^1 a^1, and the upper side of the axle being provided with bearing-plates a^2 a^2 upon which the lower ends of the screws rest when they (the screws) are screwed down, so as to support the bolster and the front end of the machine firmly upon the axle, and prevent the machine from rocking or tilting upon the king-bolt, when the machine is thrashing, as shown in Fig. 15.

When the screws have been sufficiently tightened up, they are retained in position by means of a locking plate, A^4, the crank-pins entering holes a^3 in this plate, as will be readily understood from an inspection of the drawings without further explanation.

The main frame of the machine, and the inclosing casing are substantially the same as those of ordinary thrashers, with exceptions to be hereinafter noted, and may be made of any desired material.

One important exception relating to the frame-work is making the side sills in two pieces, B B^1, (see Figs. 1, 2, and 11,) these pieces being secured to each other by bolting or otherwise.

The object of this construction is to afford room for the front wheels to turn or be cramped entirely under the body of the machine, thus making it much easier to handle with a team.

In the drawings I have removed the casing or shell from immediately below the cylinder and concave, in order to more readily exhibit the internal construction of that part of the thrasher.

B^2 is a center brace, (see Fig. 2,) to support the lower end of the king-bolt. C is the cylinder, of any usual or approved construction. C^1 C^1 are the segments of the concave, pivoted at *c* to the main frame-work. C^2 is the grating pivoted at c^1 to the segments C^1.

The rear side of the grating is adjustably supported upon vertical links c^2 c^2, the lower ends of the links being attached to crank-arms c^3 (one only being shown) of rock-shaft C^3. This rock-shaft is mounted in the main frame, and carries at one end a crank, c^4. The pawl c^5 engages with ratchet-teeth on the hub of crank c^4, to retain the grating in the position to which it may be adjusted by the rock shaft and links.

I have found that in practice there are serious objections to the employment of cogs or cams for adjusting vertically the front end of

the concave, owing to the obstruction of these devices by dirt and straw. To obviate these difficulties, I have invented a combination of toggle-levers with the concave, as follows: Referring to Figs. 2 and 5, D is a rock-shaft, mounted upon the frame-work, and carrying a crank or arm, d, at one end, and a T-piece, d^1, at the other end. D^1 D^1 represent toggle-levers, pivoted to supporting-lugs d^2, and to ears projecting from the under side of the concave segments C^1 C^1. d^3 d^3 are links connecting opposite end of the T-piece, or double crank d^1, with the central pivot of each of the toggle-levers.

When the levers are in the position shown in Fig. 5, and in full lines in Fig. 6, the front end of the concave will be raised to its highest point, from which it can be lowered, as desired, as indicated in dotted lines in Fig. 6. In these two figures the actuating lever or crank is arranged at the front end of the machine, immediately below the edge of the concave. In Figs. 7, 8, 9, and 10, I have shown other methods of applying the toggle-lever to accomplish the same object. In Figs. 8, 9, and 10, I employ a shaft arranged transversely of the thrasher. In Figs. 8 and 9 the shaft is connected with the central pivots of the levers by means of links d^4, while in Fig. 10 the lower lever of each pair is rigidly attached to the shaft. In all of the constructions I propose to employ pawls d^5 to engage with ratcheted surfaces upon the hubs or pivoted ends of the hand levers or cranks d to maintain the concave in the position to which it has been adjusted. E is the separating table or shaker, formed of inclined blind slats of substantially the ordinary construction, and provided with a number of wire-tossing fingers, a part or all of which have angular shoulders at their upper ends, as at e e, Fig. 2, for the purpose of more thoroughly agitating and loosening up the straw as it passes over the table, and thus effectually separating the grain. This table has a variable backward and forward, and rising and falling, motion imparted to it by the following devices: E^1 E^2 are shafts mounted in suitable bearings on the frame, and provided each with two cranks, e^1 e^2, one crank of each shaft being pivoted to the supporting-rib at each side of the separating-table.

Referring to Fig. 1, F is a crank-wheel, the shaft of which carries at its opposite end a band-wheel. F^1 is a pitman connecting the crank-wheel with the horizontal bar F^2 by means of the slotted plate f, which is adjustably attached to bar F^2 by bolts which pass through the slots f^1 in the plate, or other equivalent means. Each end of the horizontal bar has a number of holes, as at f^2, and each shaft E^1 E^2 has a downwardly-projecting crank outside the casing, the holes f^2 fitting over the wrist-pins of these cranks, as at e^3 e^4, Fig. 1.

From an inspection of the drawings, it will be seen that this construction enables me to make many adjustments in the direction and extent of the throw or toss of the table E, as the kind or condition of the straw may render desirable. Thus, as indicated in Fig. 2, the cranks e^2 at the rear end of the machine may be arranged in a more nearly horizontal position than the cranks at the front end, when that end of the table will have a much greater rising and falling motion in proportion to its forward and backward movement than the front end of the table will. Again, should the straw be damp and require a vigorous and long-continued shaking to thoroughly separate the grain from it, this can be produced by moving the slotted plate f forward, in which case the same movement of the crank and pitman will increase the rising and falling motion of the table, and will diminish its forward and backward motion, as will be readily understood without further explanation; and, should it be found desirable, the throw of the pitman can be increased or diminished by putting the wrist-pin of the crank-wheel into some other one of a series of holes at varying distances from the center of the crank-shaft. G is a raddle-belt, the slats of which carry the grain rearward over the grain-table G^1, upon which it falls through the grating C^2, or through the separating-table E. G^2 is a door formed of a portion of the grain-table G^1, to afford access to the interior of the machine. (See Fig. 2.) H represents a four-bladed beater arranged in rear of the thrashing-cylinder.

The grain is delivered from the raddle belt and table G^1 to the sieve I of the winnower, the shoe of which is suspended in the usual manner by the links i i. This raddle-belt performs a novel and important function in my machine, which is different from that which it produces in machines where it is used in combination with a perforated separating-table without the shoulders or angular fingers e. Thus, in very ripe grain, or when the straw is from any cause brittle or tender, it becomes very much broken, and a large portion of it falls through the slotted table E upon the table or platform G^1. Upon this table it is collected in buches or gavels by the slats of the raddle-belt, and is thereby delivered to the action of the strong overblast of the fan, and is discharged from the machine by the air-current without falling upon the sieve, this discharge being greatly facilitated by the straw being presented at the upper or rear end of the raddle-belt in a comparatively compact form, instead of being carried over in the scattered condition in which it falls through the table E, as it would be were an endless apron employed in place of the raddle-belt.

Another advantage growing out of the use of a raddle-belt, in combination with a slatted table, is this: As the slats move over table G^1 they rake the loose straw from the grain, collecting at the same time the grain in small quantities in front of the slats, until the accumulation of grain is such that a slat will jump or climb over the grain, carrying with it its load of straw, and at each such move-

ment farther separating the straw from the grain.

I i^1 is the false bottom. The part I^1 is hinged to the true bottom I^2 at its front lower end, and the part i^1 is hinged to the rear end of the part I^1, the rear edge of this part i^1 resting loosely upon the rear upper edge of the bottom I^2. I^3 is an adjusting-screw, working in a thread in the bottom I^2, with its upper end engaging with the false bottom I^1 i^1. (See Fig. 2.) J is a returning-spout, immediately at the rear of the bottom-board I^2.

In order to insure that this spout shall freely discharge its contents I make the bottom of it in the form of a series of steps, *j*, as shown in Fig. 14.

J^1 represents one of a series of fingers, which are attached to and project from a head, *j*, to form a rack at the rear of the screen or sieve I. The head is supported in bearings, so as to rotate. J^2 is a supplemental returning-board or tailings-board, hinged to the rear upper edge of the tailings-spout or returning-spout J. Board J^2 has at each end a slotted segmental piece, j^3, by means of which it (the board) can be adjusted at any desired angle, screws passing through the slots j^4 into the side of the winnower-shoe, for that purpose. (See Figs. 2 and 11.) The tailings-spout J communicates at its lower end with the elevator K, which returns the tailings to the thrashing-cylinder, as is customary in this class of machines. As the grain falls from the raddle-belt G it passes through the sieve I, and thence upon and over the board I^1 i^1. It is acted upon by the wind-blast from the fan, as will be hereinafter fully explained. From thence the grain passes to the grain-delivering spout L. (See Figs. 2, 11, and 12.) This spout is hung to opposite sides of the machine by links or straps L^1. L^2 is a double bell-crank lever, pivoted to the under side of the machine, and connected with the grain-spout L and the shoe of the winnower by two links, *l* l^1. (See Fig. 12.) The third arm of this bell-crank lever is connected with a crank-wheel, l^2, by a pitman, l^3. (See Figs. 1 and 12.) Link l^1 is attached to a sliding plate, L^3, (see Fig. 12,) which is mounted in brackets or loops l^4 in such manner as to slide freely therein, being secured in position by a set-screw, L^5, (see Figs. 2 and 12,) or a perforated plate, L^6, may be employed in place of the sliding plate.

In Figs. 1 and 12 I have shown this spout projecting from the right-hand side of the machine, looking toward the rear, to facilitate the delivery of the grain upon that side, but by shifting the position of the sliding plate L^3, the spout can be made to project from the opposite side of the machine. l^5 is a grass-seed screen, pivoted centrally in the spout L, to separate the seed from the grain. As this sieve is inclined, it also facilitates the discharge of the grain. Each end of this spout is provided with a door, l^6, and the bottom of the spout has two openings, l^7 l^7, covered by slides l^8 l^8. (See Fig. 12.) One of these slides must be kept open to discharge the grass-seed. M is the fan-case, provided at each end with two upper draft-slides, *m* m^1, and two lower ones, m^2 m^3. A pinion, $m^\times$, on the end of the fan-shaft, meshes with and drives the cogged crank-wheel l^2. In Fig. 2, M^1 is a wing-board, hinged to the rear upper portion of the fan-case, and adjusted by means of a cord, m^4, Fig. 1. M^2 is a similar wing-board, hinged to the lower part of the fan-case, and adjusted by a second cord, m^5, in substantially the usual manner. N is a blast-deflector or center-board, pivoted in thh air-passage between the wing-boards M^1 M^2. The shaft or pivot of the center-board N projects through the casing, and has a crank-arm, *n*, attached to it, which engages with a notched bar or rack, n^1. Thus the position of the board can be adjusted at the will of the operator.

O is the fan, the blades *o* of which revolve in the direction indicated by the arrow o^1, creating what is called "an overblast," the air-current from which is delivered with its greatest strength above the center-board N, and sweeps across the upper face of the sieve I.

Owing, as I believe, to the fact that the sills B^1 obstruct the space at the end of the fan-case immediately below the fan-shaft, which thereby necessitates arranging the lower draft-slides m^2 m^3 near the lower edge of the case or shell M, the fan draws the greater part of its air through these openings, or at least the air taken in at this point acquires the greatest velocity, and is, when it leaves the fan, the stronger and controlling current, for which reason I am enabled to deflect this strong current by means of the center-board, and to cause said current, or a certain portion of it, to impinge upon the false bottom I^1 i^1, and be returned from thence against the under side of the sieve I without materially impairing its strength—a result which could not be accomplished in so satisfactory a manner with an underblast, it being evident that with such current the center-board, when turned into the position indicated by dotted lines, would intercept the blast and act as a cut-off to seriously break its force.

Again, in underblast machines it is sometimes necessary to raise the rear edge of the lower wing-board, in such manner as direct the air-current up against the under side of the horizontally rearward-projecting upper board of the fan-case. From thence the current is deflected downward to the bottom board, and from thence upward against and through the sieve.

Compelling the air-current to pursue this zigzag course materially weakens it, and, further, necessitates the use of a short sieve, which must be placed at such distance from the fan as to reduce the effectiveness of the blast, all of which defects in operation are remedied in my construction. So, also, in case the grain and chaff are heavier upon one side of sieve I than they are at the other side, I can increase the strength of the air-blast upon that

side of the sieve where the grain is heaviest by closing, or partially closing, the front upper draft-slide upon that side, and opening, or partially opening, the rear draft-slide upon the same side, and at the same time opening wider the front draft-slide upon the opposite side of the machine.

When desired, I can still further effect this change in the direction of the strong air-current by closing the rear upper draft-slide upon that side of the machine opposite to the heavy grain.

Under some circumstances the false bottom may lie flat upon the bottom I^2, as indicated in dotted lines, Fig. 2; but in case it be found that light grain is being blown over the tailings-board J^2, this bottom I^1 i^1 may be moved in the position shown in full lines, Fig. 2, which will create a sort of dead-air chamber in rear of the highest point, near screw I, so that such light grain, or grain which has not been fully separated from the hulls, will pass into the tailings-spout J, and be returned to the thrashing-cylinder.

This operation is particularly desirable in thrashing wheat and oats, or rye and oats, which have been sowed and harvested together.

The nest of sieves, Figs. 3 and 4, are intended for thrashing flax or timothy seed. In using them, the projecting upper screen is to extend rearward. The tailings-board, or supplemental board J^2, is to be let down into the position shown in Fig. 4, under which arrangement this board will form a returning-board to collect such bolls and unthrashed heads as may pass over the rear end of the upper screen, and deliver them to the tailings-spout J, so that they shall be returned to the cylinder. I remove the sieve I, and put in the nest of sieves with their front ends resting in the notches i^2, Fig. 2, their rear ends being supported by the upper sieve of the nest resting upon a bolt or rod, i^3, which extends across the shoe for this purpose. By supporting the rear ends of the lower sieve upon the upper one I am enabled to hang them all upon the single rod i^3, and thus leave an unobstructed space below screen I for the adjustment of the false bottom I^1 i^1.

When the trap-door G^2 is opened, as in Fig. 2, access may be had to the interior of the machine to adjust the raddle-belt, or for other purposes.

One special advantage which is derived from providing the table G^1 with a door, G^2, is the ease with which obstructions can be removed from the table, especially at the lower front end, where a large part of the grain is received through the grating C^2, it being apparent that in case, from slackness of the belts, or otherwise, the raddle-belt should stop, and the grain, chaff, and straw accumulate upon table G^1, in consequence, such accumulation can be much more readily removed through trap G^2 than it could be through openings in the side or end of the machine, and it is evident such trap could not be advantageously used with an endless apron.

On Sheet 5 I have shown devices for supporting and driving the stacker-belt, which will admit of the upper end of said stacker being swung sidewise to facilitate the convenient delivery of the straw. P is the bottom or stationary floor supported by sides P′ P′ and a rope, Q, from a windlass, Q′, upon the top of the machine, as usual. (See Fig. 2.) R is a shaft, mounted in arms R^1, which extend rearward from the machine. This shaft drives the belt of the elevator K, and carries near its center a grooved or spool shaped pulley, R^2. S is a flange or ring, supported upon arms R^1 R^1. S^1 is a shaft, mounted upon bearings in arms projecting from a carrier to be described. S^2 is a pulley upon the center of shaft S^1, and s' s' are two flat pulleys at the ends of the shaft. T is a bar or carrier, provided with grooves at each end, into which the ring S fits. T′ is a spindle, secured firmly in a spider or bracket, which depends from the lower face of ring S, and passes up through the carrier T. Thus it will be seen that the carrier is free to oscillate about the spindle T′ as a center. U is a loose guiding-pulley upon spindle T′. *u u* are similar pulleys, mounted upon studs projecting from carrier T. U′ is a belt passing around pulleys R^2 S^2 and between pulleys U *u u*. V is a shaft at the lower end of the stacker, which is mounted at the inner ends of the arms V′ V′, which are firmly secured to carrier T, the inner ends of these arms or plates being high enough to permit shaft V to be arranged above the belt U′, or, when preferred, above the pulleys U *u u*. The pulleys s' s' are belted to pulleys *v v* on the ends of shaft V.

From an examination of the drawings it will be seen that the upper end of the stacker W is free to move laterally, and can describe a number of degrees upon a circle, carrying with it the carrier T without disturbing the proper working relation of pulleys S^2, R^2, and belt U′.

I am aware that thrashers have been heretofore constructed with an offset or shoulder in each of the side sills, to permit the front wheels to turn under the machine, the sill being in a single piece; but my method of making each sill in two pieces spliced together is preferable, because it enables me to locate the fan much lower and yet have the desired space at the ends of the fan-case for the admission of air, as it will be readily seen from an inspection of Fig. 2, that if the part B of the sill were extended in its full width to the rear of the machine, it would nearly close the air-entrances at the upper part of the fan-case.

Referring to Figs. 18 and 20, a^4 is a rod hooked at one end and screw-threaded at the other. It is hooked upon the arm R^1, and has a cross-tie, a^4, placed upon its outer end, which is clamped against the wheel by means of nuts, thus preventing any sliding of the wheel upon the axle.

It will not be necessary to describe in de-

tail the operation of the machine, as this will be readily understood without further explanation.

What I claim is—

1. In a mounted thrasher, an adjusting mechanism, whereby the front end of the machine can be adjusted or leveled relative to the front axle, substantially as set forth.

2. The combination, with the wheel A, of hooked rod a^4 and cross-tie a^3, as and for the purpose set forth.

3. In a thrashing-machine, the combination, with the concave of toggle-levers, a crank-shaft or rock-shaft, and links connecting the crank-shaft with the toggle-levers for adjusting the position of the concave, substantially as set forth.

4. The combination, with crank-wheel F, pitman F^1, and connecting-bar F^2, of the adjusting-plate *f*, as and for the purpose set forth.

5. The combination, with the crank-arms E^1 E^2, of an adjustable connecting-bar, F^2, as and for the purposes set forth.

6. In a separating-machine, the separating-table E, provided with blind-slats and shouldered wires *e e*, as and for the purposes set forth.

7. The combination, in a thrasher and separator, of the slatted separating-table E, shouldered fingers *e*, grain-table G′, and the grain-rake or raddle-belt G, substantially as set forth.

8. In a thrasher and separator, a grain-table, G^1, provided with the trap or hinged portion G^2, to afford access to the interior of the machine, substantially as set forth.

9. In a grain-separator, the combination, with the fan of a winnower-shoe having an adjustable false bottom, substantially as set forth.

10. In a separator, the combination of a blast-fan, a screen, and an adjustable false bottom made in two parts hinged to each other, substantially as set forth.

11. In combination with the winnower-shoe, the supplemental returning-board J^2 and adjusting-segments j^3, substantially as set forth.

12. The bell-crank L^2 and link l^3, in combination with link *l* hinged to the shoe, and adjustable link l^1, substantially as set forth.

13. Link l^1, in combination with spout L and adjusting-plate L^3, substantially as set forth.

14. Spout L, having bottom openings l^7 l^7 and slides l^8 l^8, in combination with the centrally-pivoted grass-seed screen l^5, substantially as set forth.

15. In a grain-separator, the combination of an overblast fan and a central blast-deflector, N, with the screen or sieve I, and the bottom board of the winnower-shoe, substantially as set forth.

16. The combination, with the overblast fan, the central blast-deflector, and the screen, of an adjustable bottom board in the winnower-shoe, substantially as set forth.

17. The combination of the adjustable tailings-board J^2, and returning-spout J with the nest of sieves consisting of the long coarse-meshed upper sieve and the short finer-meshed lower sieves, substantially as set forth.

18. In combination with the swinging plate T and shafts R S^1, the pulleys R^2 S^2, belt U′, loose pulley U, and supporting mechanism for driving the swinging stacker, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JOHN H. ELWARD.

Witnesses:

W. T. JOHNSON,

H. H. BLISS.

5500 words