

J. T. SMITH.
FLAX THRESHER.

(Application filed Dec. 3, 1900.)

3 Sheets—Sheet 1.

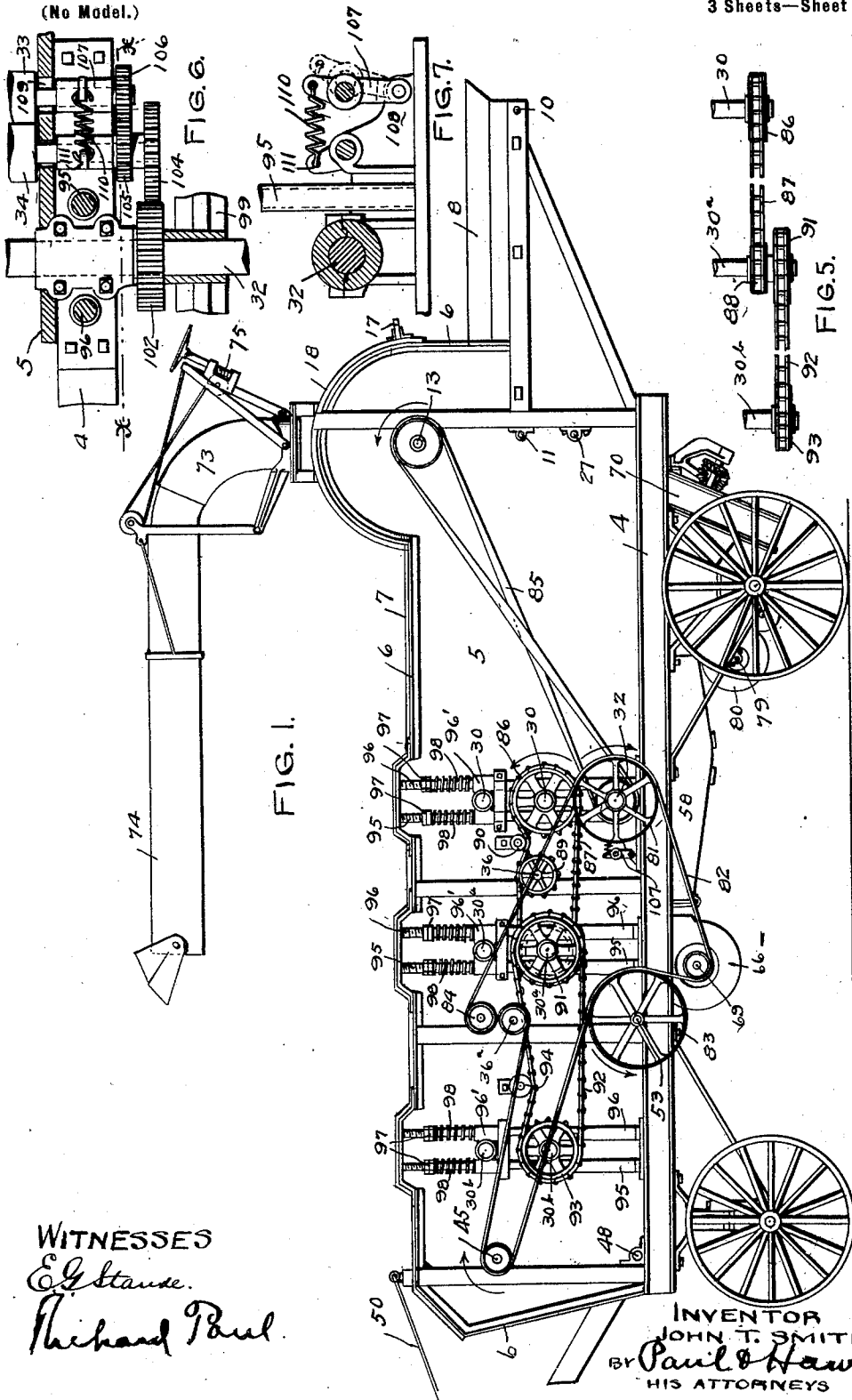


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

FIG. 7.

FIG. 8.

WITNESSES
E. G. Stause.
Richard Paul.

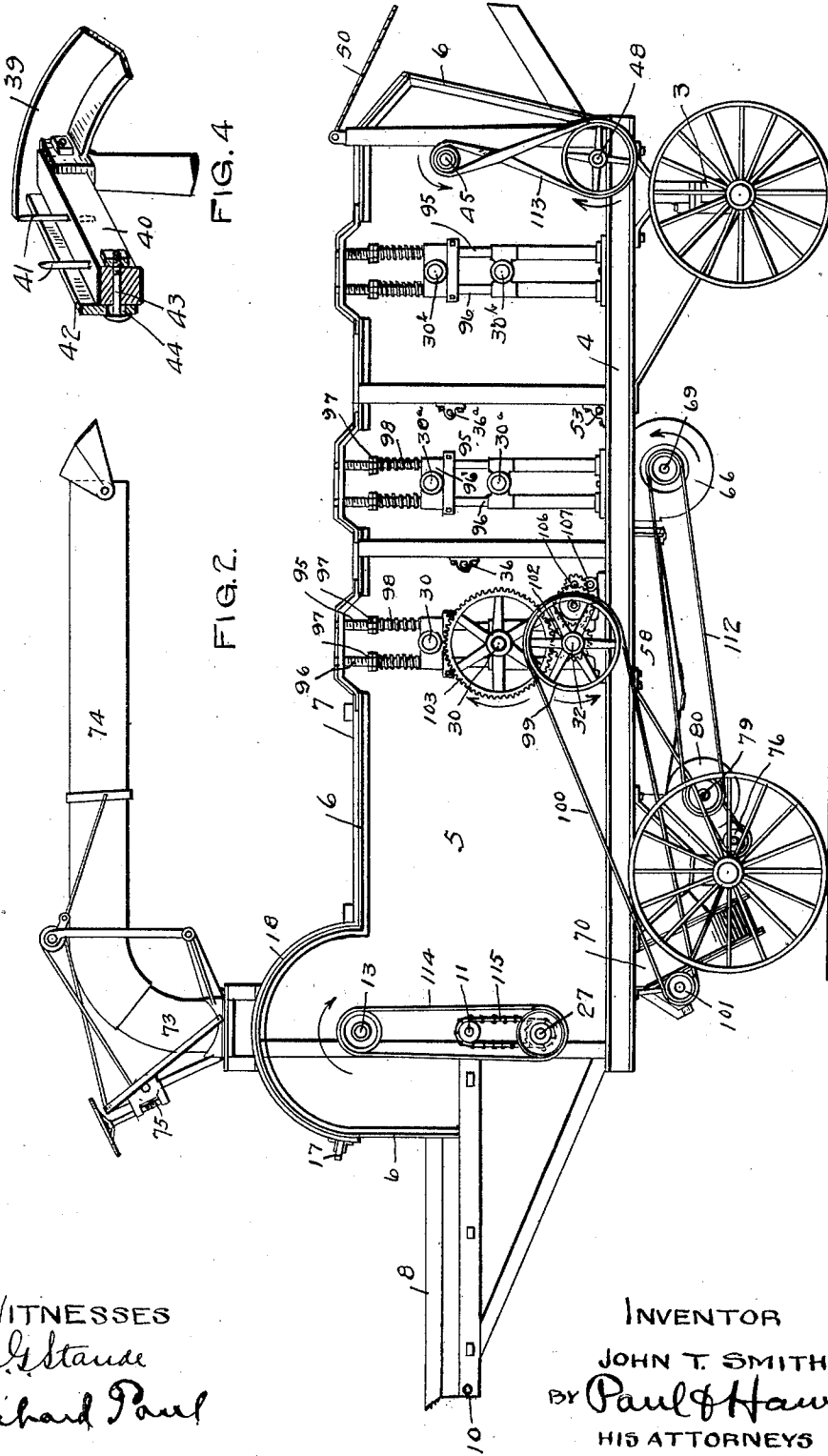
INVENTOR
JOHN T. SMITH
BY Paul & Hawley
HIS ATTORNEYS

J. T. SMITH.
FLAX THRESHER.

(Application filed Dec. 3, 1900.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES
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No. 716,587.

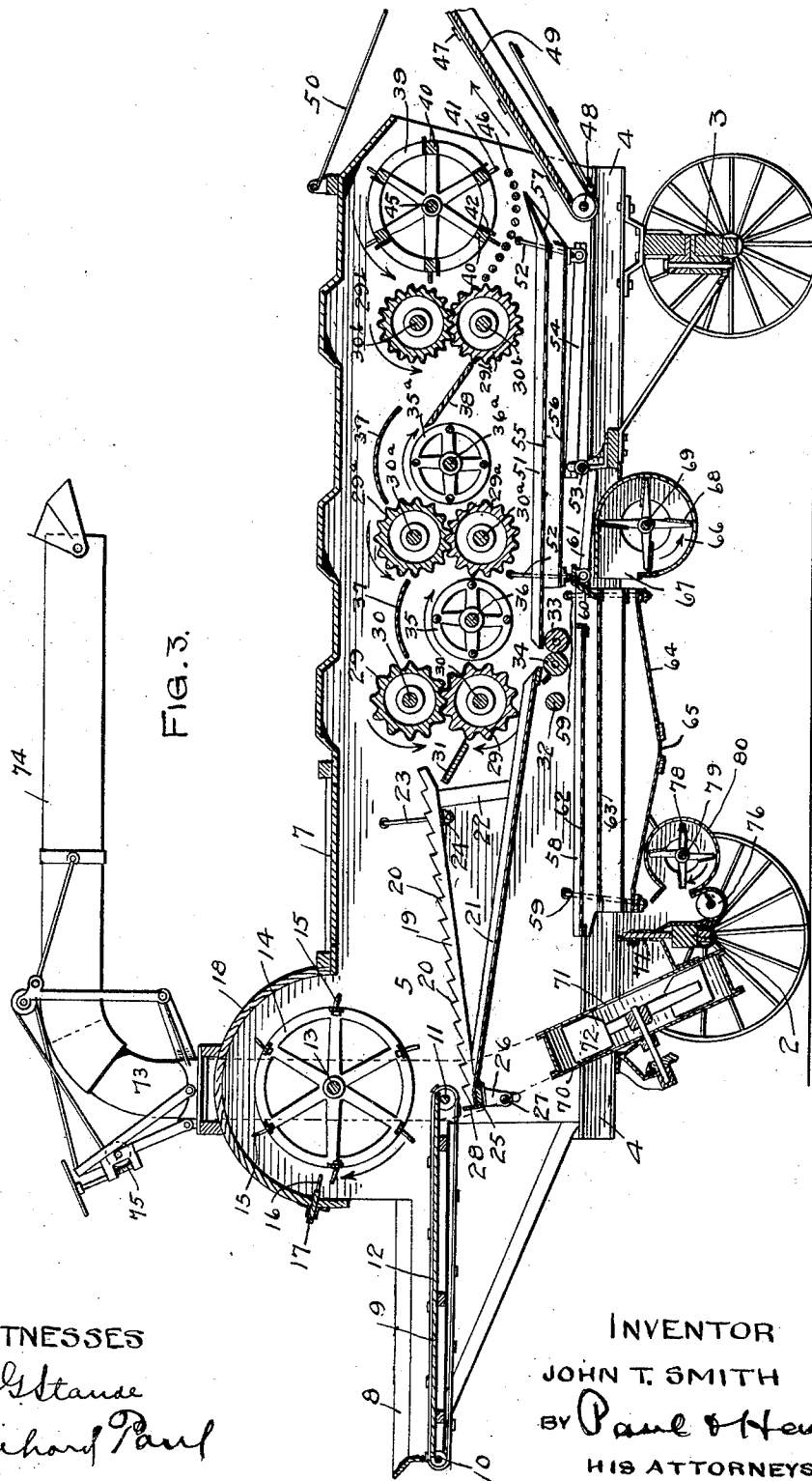
Patented Dec. 23, 1902.

J. T. SMITH.
FLAX THRESHER.

(Application filed Dec. 8, 1900.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES
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UNITED STATES PATENT OFFICE.

JOHN T. SMITH, OF HERON LAKE, MINNESOTA.

FLAX-THRESHER.

SPECIFICATION forming part of Letters Patent No. 716,587, dated December 23, 1902.

Application filed December 3, 1900. Serial No. 38,447. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. SMITH, of Heron Lake, Jackson county, Minnesota, have invented certain new and useful Improvements in a Combined Flax Threshing and Reducing Machine, of which the following is a specification.

My invention relates to machines for threshing flax or hemp and reducing the straw to tow; and the primary object of the invention is to provide a machine adapted to thresh the flax, clean the seeds, and reduce the straw to a high grade of tow suitable for paper-stock or for spinning purposes, all by one continuous operation.

A further object is to provide a machine of such construction that the flax may be fed to it rapidly and the straw advanced through the brake-rolls in an even continuous stream, whereby the rolls and the cleaning mechanism can be kept up to their full capacity when in operation.

A further object is to provide a flax-breaking machine having a large screening-surface, whereby its capacity and efficiency as a cleaner are greatly increased.

A further object is to provide a machine adapted for breaking or reducing hemp as well as flax and also for threshing wheat and other grains.

The invention consists generally in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a flax threshing and reducing machine embodying my invention. Fig. 2 is a similar view of the opposite side of the machine. Fig. 3 is a longitudinal vertical section of the machine. Fig. 4 is a detail of one of the beaters. Fig. 5 is a plan view of the chain-and-gear mechanism for operating the rolls. Fig. 6 is a plan view showing the means for driving the boll-crushing rolls. Fig. 7 is a sectional view on the line xx of Fig. 6.

In the drawings, 2 and 3 represent, respectively, the forward and rear axles, having suitable wheels and supporting I-beams 4, that form the sills or base of the machine-casing. These sills may be connected together and secured to the axles of the ma-

chine in any suitable or preferred manner. Upon the sills I arrange a casing 5, provided at the ends and top with angle-bar rails 6 and a suitable top or covering 7. The walls of this casing at the top and on the sides are preferably of wood and inclose the operating parts of the machine, to be hereinafter described. At the rear end of the machine I prefer to provide a hopper 8, extending, preferably, in the rear of the casing and provided with a horizontal floor 9, having shafts 10 and 11 at its ends, over which a slatted belt or conveyer 12 operates to sweep forward the material deposited on said floor. At this point the material to be threshed and reduced is delivered to the machine, either by being thrown upon the floor by an attendant or by delivery thereto from a laterally-operating carrier. Above the discharge end of said floor I provide a shaft 13, whereon a cylinder 14 is arranged. This cylinder is over-shot in action and is provided at intervals in its circumference with rows of picker-pins 15, that are adapted to coact with the teeth 16 of a comb device 17, that is mounted in an arched hood 18 above said cylinder. As the cylinder revolves its picker-pins pass near the discharge end of said floor and gather up the bunches of straw thereon and carry them up into the hood 18 past the teeth of the comb device, which aids in pulling the bunches of tangled straw apart and separating the loose seeds and unbroken seed-bolls from the straw. Beneath said revolving cylinder and the discharge end of the floor 9 I provide a reciprocating shaker comprising a series of bars 19, preferably having teeth 20, said bars being upwardly inclined and arranged parallel with a space between them and connected at their rear ends to a downwardly-inclined imperforate plate 21. Suitable bracing-bars 22 connect the forward end of said plate with said bars, and suitable links 23 are pivotally connected to the walls of the casing and to a cross-bar 24, whereby said shaker is supported at its forward end. A cross-bar 25 is provided at the rear end of the shaker having lugs 26, mounted on a crank-shaft 27, whereby said shaker is reciprocated. I prefer also to provide a shield 28 to prevent the seeds and fine material from being discharged over the rear end of the plate 21. The straw discharged

from the revolving cylinder 14 falls upon the toothed bars 19, and the seeds, chaff, and other fine refuse material falls between said bars upon the inclined plate 21. This plate also catches all the unbroken seed-bolls that have been loosened and separated from the straw by the tossing and picking action of the cylinder. The inclined plate 21 is preferably longer than the bars 19 and projects forward beyond the same, and above the forward end of said plate I provide the first set or pair of crushers or brake-rolls 29, mounted upon shafts 30. These rolls are provided in their surfaces with a series of corrugations or teeth, preferably twelve in number, those on the upper roll meshing or coacting with those on the lower roll to crush and reduce the material fed between them. The rolls are near the forward ends of the bars 19 to receive the straw therefrom, and between said bars and the lower roll of the pair I prefer to provide a guide-board 31 to support the straw and direct it between the rolls.

Beneath the plate 21 I prefer to provide the main driving-shaft 32 and the smooth-surfaced boll-crushing rolls 33 and 34. These rolls are adapted to receive the unbroken seed-bolls from the plate 21 and crush them to separate the seeds therefrom, and the roll 33 is preferably held in yielding contact with the roll 34 by the mechanism to be hereinafter described.

Above the boll-crushing rolls, near the discharge side of the crushers 29, I provide a revolving beater-cylinder 35, mounted on a shaft 36 and adapted to beat and whip the material as it passes from between the corrugated crushers. Any unbroken seed-bolls or loose seeds that are separated by the action of the corrugated crushers and the beater 35 will drop down into the boll-crushers beneath. Near the revolving beater 35 I provide a second pair of corrugated reducing-rolls 29^a, mounted on shafts 30^a and having a greater number of teeth or corrugations than the rolls of the first pair to reduce the stock still further as it passes between them. In front of the crushing-rolls 29^a I prefer to provide a second beater 35^a, mounted on a shaft 36^a, that is preferably above the plane of the shaft 36, so that as the material merges from between the rolls 29^a it will be engaged by the beater 35^a and beaten and whipped against the corrugations of the upper roll, and a considerable quantity of the woody portions and loose refuse material separated from the straw before it passes to the third set of rolls. To prevent the material from being thrown up against the top of the casing, I prefer to provide curved guard-plates 37 over the beaters 35 and 35^a, and in front of the beater 35^a I prefer to arrange an inclined guide-board 38, which serves to direct the material into the third pair or set of corrugated crushing-rolls 29^b, that are mounted upon shafts 30^b. The corrugations of this third pair of rolls are finer than those of the rolls preceding and re-

duce still more the material fed between them. By the time the material reaches the third set of crushers the woody portion of the fiber has been crushed and to a considerable extent separated from the fiber, and the corrugations of the third set of rolls still further reduces the fiber, softens the same, and crushes any woody portions that may have escaped the preceding rolls. Upon leaving the third set of crushers the material is exposed to the action of a rapidly-revolving cylinder 39, the heads or ends of which are connected at intervals by bars 40, having rows of pins 41 projecting therefrom and also preferably provided with plates 42, that are adjustably secured on the bars 40 by bolts 43, passing through slots 44 in said plates. Said cylinder is mounted on a shaft 45, and beneath the cylinder I provide a suitable grating 46. As the material passes from the second set or pair of rolls it travels over the beater 35^a, and as it leaves the third set of rolls it passes under the cylinder 29. Consequently both sides of the stream of material is beaten and whipped by the action of the revolving beater and cylinder. The teeth and plates of the cylinder 29 comb out and separate the long fibers and beat and whip the same against the corrugations of the crushing-rolls and finally deliver them to the slatted conveyer 47, driven from a shaft 48 over an inclined plate or floor 49. A rope or cable 50 permits the operator to adjust the carrier at any desired inclination.

In the passage of the material through the second pair of crushing-rolls, over the second beater, and through the third pair of rolls a considerable quantity of seed and fine material may be dislodged and separated from the tow-stock, and in some cases unbroken seed-bolls may pass through the first pair of rolls or even the second pair, and it is therefore important to provide some means beneath the second and third pair of crushers and beaters to catch the seeds and unbroken bolls and refuse material falling therefrom and subject the same to a screening and cleaning operation. With this end in view I provide a shoe 51, extending horizontally beneath the second and third pairs of crushing-rolls, pivotally supported upon links 52 and connected with a crank-shaft 53 by a pitman 54. Motion is thus imparted to the shoe to cause the oscillation or vibration of the same beneath the crushers. In the upper part of said shoe I provide a sieve 55, the rear end of which projects over the boll-crusher 33 to deliver thereto any unbroken seed-bolls that may be dislodged from the straw by the action of the second and third sets of crushers and beaters. The seeds and fine material will fall through said sieve upon a floor 56 and be discharged over the rear end of the same. I prefer to provide an inclined plate 57 at the forward end of the shoe, extending under the grating and adapted to direct the material falling thereon to the sieve 55.

Beneath the boll-crushers I provide a sieve-shoe 58, pivotally supported on the links 59 and connected at its forward end, through the medium of a plate 60 and pitman 61, with the crank-shaft 53. The operation of this shaft thus oscillates both the shoe 51 and the shoe 58. Within the shoe 58 I arrange the sieves 62 and 63 one above the other, the upper being preferably of coarser mesh than the lower and adapted to separate the chaff and coarse material, while the seeds fall through and are caught by the sieve beneath. The sieves and sieve-shoe are so arranged that as the seed-bolls are crushed by the rolls 33 and 34 the seeds will fall from the forward end of the sieve 62, and the seeds and fine material from the plate 60 will fall upon said sieve 63 near its forward end, so that during the cleaning or screening movement of the material it will travel the entire length of the sieve and be thoroughly cleaned before reaching the discharge end thereof.

I prefer to provide a hopper-bottom 64 for the sieve-shoe 58, having a discharge-opening 65, through which the screenings—such as wild mustard, ragweed seeds, &c.—that fall through the sieves upon the hopper-bottom are discharged. The upper or coarser sieve will take out the coarse refuse material, allowing the flaxseeds to fall through upon the lower sieves, which by its vibrating movement will advance them toward its rear or discharge end. More or less chaff or other fine refuse material will fall through the meshes of the upper sieve, and I prefer to provide a fan-casing 66 near the forward end of the shoe having its blast opening or mouth 67 in position to direct a blast of air through the sieve-shoe above and below the lower sieve, so that any fine chaff that falls through the upper sieve with the seeds will be lifted out and carried back to the rear of the shoe. Within said fan-casing I provide a fan 68, mounted on a suitable shaft 69. Near the rear end of the sieve-shoe I provide a blower-casing 70, having an opening 71, opposite the rear end of the sieve and provided with a suitable fan 72. Connected with the casing 70 is a swiveled pipe-section 73, and forming a continuation of the same is a pipe 74, vertically movable by means of a screw-and-belt mechanism 75, that is common to blowers of this kind. I make no claim in this application to this form of blower, as the same is in general use on threshing-machine separators.

Beneath the rear end of the sieve-shoe I prefer to provide a transverse conveyer 76, wherein the seeds fall from the tail end of the sieve, being directed thereto by a suitable tail-board 77, provided on the rear axle. I have found that if the air-blast at the forward end of the shoe be made strong enough to lift out the chaff from the seeds there will be danger of the seeds being carried away by the blast into the blower. I therefore prefer to provide a second or auxiliary blast-fan 78, mounted on a shaft 79, within a suit-

able casing 80, and arrange the blast-opening so that the current of air will be directed up past the rear end of the sieves to lift the chaff out of the seeds and carry it away into the blower. The shoe and the sieves therein are unusually long and have consequently a large screening-surface, and by employing the double air-blast—one at the front and the other at the tail of the shoe—I am able to accomplish a much more thorough cleaning of the seeds than is usually attained in mechanisms of this kind. I am able also to greatly increase the screening capacity of the machine.

Any suitable system of gearing may be employed in the operation of the machine; but I prefer to drive the operating parts in the following manner: On the driving-shaft 32, at one side of the machine, I provide a driving-pulley 81, over which a belt 82 passes to the fan-shaft 69, from thence to a large pulley 83 on the double crank-shaft 53, then to the beater-shafts 45 and 36^a and a suitable idler-pulley 84. The picker-shaft 13 is driven by a belt 85 from the drive-shaft. The shaft 30 of the lower rear crusher is provided with a large gear or sprocket 86, over which a chain 87 passes to a smaller sprocket 88 on the shaft 30^a of the succeeding pair of rolls. The chain belt 87 also engages a sprocket 89 on the beater-shaft 36, being held in engagement therewith by a suitable idler-roll 90. The lower shaft 30^a of the second pair of crushers is provided with a sprocket-gear 91, over which a chain belt 92 passes to a similar gear 93, having a less number of teeth on the lower shaft 30^b of the forward pair of rolls. I may provide an idler-roll 94 to engage the upper section or run of the chain belt 92.

The shafts of all the crushers are arranged between rods 95 and 96, that are supported vertically outside the casing 5 between the I-beam sills and the angle-bar rails on each side of the machine. These bars are in pairs, and each pair is provided with a vertically-slidable bearing 96', wherein the shafts of the upper crushers are mounted. The upper ends of the rods 95 and 96 are preferably threaded and provided with suitable nuts or burs 97, between which and the bearings 96' coil-springs 98 are arranged. These springs hold the upper crushers in contact with the lower with a yielding pressure, and the teeth of the lower crushers, coacting with those of the upper, will drive the upper crushers and thoroughly reduce and crush the material fed between them.

The driving-shaft on the opposite side of machine is provided with a driving-pulley 99, over which a belt 100 passes to the shaft 101 of the blower, and a gear 102 on the driving-shaft meshes with the teeth of a large gear 103 on the lower shaft 30 of the rear set of crushers. The rear boll-crushing roll is driven from the gear 102 by a gear 104, and a pinion 105 on the shaft of the rear boll-crushing roll meshes with a similar pinion 106 on

the shaft of the forward boll-crusher. An arm 107, pivoted on a bracket 108, is provided at each end of the forward boll-crusher and wherein its shaft is mounted and adapted to swing back and forth within slots 109 in the machine-casing. The arms 107 are connected by springs 110 with lugs 111 on the bearing for the rear boll-crusher, and the crushers are thereby held in yielding contact with each other, the forward one being adapted to swing in its bearings, the teeth of the pinion 106 being of sufficient length to permit movement of the crusher without becoming disengaged from the pinion 105. The forward boll-crusher is thus yieldingly held on each side of the machine and will coact with the rear crusher to break open the seed-bolls and discharge the seeds separated therefrom upon the sieve beneath.

The secondary or auxiliary fan I prefer to drive by a belt 112 from the fan-shaft 69. The carrier-shaft 48 is driven by a belt 113 from the beater-shaft 45.

The crank-shaft 27 is driven by a belt 114 from the picker-shaft 13, and a chain belt 115 connects a sprocket on the crank-shaft with a similar sprocket on the shaft 11 of the slatted conveyer 12.

The machine may be used for breaking and crushing flax or hemp straw after threshing and reducing the flax to a fine quality of tow, or the bundles of flax may be fed into the machine before threshing and the seeds threshed out and cleaned and the straw reduced to tow by one operation. The machine may also be used for threshing wheat or other grains, and when so used, there being no seed-pods, the boll-crushers may be disconnected; but in other respects the machine will be operated in substantially the same manner as when used for threshing and reducing flax. When used as a wheat-thresher, the beaters will whip the heads of the grain and separate the kernels therefrom, while the large screening-surface of the machine will permit a rapid and effective separation of the chaff and dirt from the grain. In treating flax-straw the second and third beaters of the series will engage both sides of the stream of material, pounding and beating the flax fiber against the corrugated rolls, breaking the woody portion, and softening the tough fiber. I prefer to arrange the crushing-rolls a sufficient distance apart, so that the flax fiber in passing from one set of rolls driven at a slower speed than the succeeding set will not be broken, but will be delivered at the discharge end of the machine in long unbroken fibers suitable for spinning purposes.

When the machine is used for threshing, I prefer to drive the overshot picker in the opposite direction from which it is normally operated, so that the bundles of flax or grain will be carried beneath the picker instead of over it, and, if preferred, I may provide suitable band-cutting means (not shown) on the circumference of said picker.

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

1. The combination, with a wheeled frame, of a casing mounted thereon, a series of crushing-rolls and beaters provided within said casing, a tossing and spreading mechanism wherefrom the straw is delivered to said crushing-rolls, sieves provided beneath the forward pair of crushing-rolls to receive the seeds therefrom, a blast-fan located near the head of said sieves, and an auxiliary fan provided near the tail of said sieves, for the purpose specified.

2. The combination, with a suitable casing provided with a hopper, of a slatted conveyer operating over the floor of said hopper, means provided above said conveyer for tossing up and separating the straw thereon, a shaker to receive the straw from said separating means, crushing-rolls whereto the straw is delivered by said shaker, a plate beneath said shaker to receive the seeds and chaff gathered up by said conveyer, a plate provided beneath said crushing-rolls and having its discharge end near the discharge end of said first-named plate, and sieves provided beneath said plates to receive the seeds and loose material therefrom, substantially as described.

3. In a machine of the class described, the combination, with a hopper, of a slatted conveyer operating over the floor of said hopper and adapted to gather up the seeds and unbroken seed-bolls, an overshot-picker device having a series of teeth above the discharge end of said conveyer, a slatted shaker whereon the straw is thrown by said picker, an inclined plate provided beneath said shaker and adapted to receive the seeds and unbroken bolls from said conveyer, crushing-rolls adapted to receive the straw from said shaker and boll-crushers provided beneath said crushing-rolls to receive the unbroken bolls from said inclined plate, substantially as described.

4. The combination, with a suitable casing provided with a hopper, of a slatted conveyer operating over the floor of said hopper, means provided above said conveyer for tossing up and separating the straw thereon, a shaker to receive the straw from said separating means, crushing-rolls whereto the straw is delivered by said shaker, a plate provided beneath said shaker and adapted to receive the seeds and unbroken bolls gathered up by said conveyer, boll-crushers provided beneath said crushing-rolls and the discharge end of said plate to receive the unbroken bolls therefrom, sieves provided beneath said boll-crushers, and means for creating a blast of air under and through said sieves, substantially as described.

5. In a machine of the class described, the combination, with a closed casing having a hopper-opening at one end, of a revolving overshot picker provided near said hopper-opening and adapted to toss up and separate

the flax-straw, a shaker provided beneath said picker, said shaker comprising a series of upwardly-inclined parallel bars or slats arranged at intervals whereon the straw is thrown by said picker, and an oppositely-inclined imperforate plate projecting beyond the forward ends of said bars whereon the seeds and fine material and unbroken seed-bolls fall therefrom, crushing-rolls adapted to receive the straw over the forward ends of said slats, substantially as described.

6. The combination, with a wheeled frame, of a casing mounted thereon having a closed top and a hopper-opening at one end, a shaker provided near said hopper-opening, said shaker comprising a series of parallel slats or bars arranged at intervals, a downwardly-inclined plate forming the lower portion of said shaker, whereon the seeds, unbroken seed-bolls and fine material fall from said bars, crushing-rolls provided near the forward ends of said bars above the lower end of said plate in position to receive the flax-straw from said bars, substantially as described.

7. The combination, with a wheeled frame, of a closed casing mounted thereon having a suitable hopper-opening, a shaker, crushing-rolls provided near said shaker and adapted to receive the straw therefrom, a series of beaters and crushers following said first-named crushers and whereto the material is delivered in succession, boll-crushing rolls provided near the first-named crushers and adapted to receive any unbroken seed-bolls from said shaker and from said first-named crushers, a reciprocating shoe provided beneath the succeeding crushers of the series, a sieve therein adapted to separate the unbroken seed-bolls from the seeds and deliver them to said boll-crushers, and an imperforate plate or floor provided beneath said sieve to receive the seeds and fine material therefrom, substantially as described.

8. The combination, with a wheeled frame, of a casing mounted thereon having closed sides and top, and a hopper-opening at one end, a shaker whereon the material is thrown, said shaker comprising a series of slats or bars, and a downwardly-inclined imperforate plate adapted to receive the seeds and unbroken seed-bolls from said bars, crushing-rolls provided near the discharge ends of said bars to receive the flax-straw therefrom and above the discharge end of said plate, boll-crushers adapted to receive the unbroken bolls from said plate, a sieve-shoe provided beneath said boll-crushers, sieves therein, and a blast-fan adapted to direct a current of air through the material falling from said sieves, substantially as described.

9. In a machine of the class described, the combination, with a closed casing having a suitable hopper-opening, of a reciprocating shaker device whereon the flax-straw, seeds, unbroken bolls and refuse material are thrown, crushing-rolls provided near said shaker to receive the flax-straw therefrom,

boll-crushers beneath said crushing-rolls and adapted to receive the unbroken seed-bolls from said shaker, a sieve-shoe provided beneath said boll-crushers, sieves mounted therein, a blast-fan provided near the head of said sieve and adapted to direct a current of air through the material falling therefrom, and an auxiliary fan provided near the tail of said sieves, for the purpose specified.

10. The combination, with a wheeled frame, of a casing mounted thereon having a closed top and sides and provided at one end with a hopper-opening and with a discharge-opening at the other, a shaker provided within said casing, a series of crushing-rolls and beaters whereto the straw is delivered from said shaker, boll-crushers provided beneath said crushing-rolls and adapted to receive the unbroken seed-bolls from said shaker, a sieve provided beneath the forward crushing-rolls and beaters and adapted to deliver the unbroken seed-bolls therefrom to said boll-crushers, an imperforate plate provided beneath said sieve to receive the seeds and fine material therefrom, a sieve-shoe beneath said boll-crushers and adapted to receive the seeds therefrom and from said imperforate plate, sieves mounted in said shoe, a blast-fan adapted to direct a current of air through said shoe and through the material falling from said sieves, and a suitable conveyer provided near the tail of said sieves to receive the seeds therefrom, substantially as described.

11. The combination, with a wheeled frame, of a casing mounted thereon, a shaker provided in said casing, crushing-rolls to receive the straw from said shaker, boll-crushers provided beneath said rolls to receive the unbroken seed-bolls therefrom and from said shaker, a shoe beneath said boll-crushers, sieves provided therein, a blast-fan provided near the head of said shoe and adapted to direct a current of air through the material falling from said sieves, a conveyer near the tail of said shoe to receive the seeds from said sieves, an auxiliary fan beneath said shoe and adapted to direct a current of air past the tail of said sieves, and a blower opposite the rear end of said shoe and whereto the coarse refuse material is directed by said air-blasts, substantially as described.

12. In a machine of the class described, the combination, with a casing, of a boll-crusher roll mounted therein, means for driving said roll, a second boll-crusher roll, pivoted arms whereon the shaft of said second boll-crusher roll is mounted, and springs connected with the free ends of said arms and with fixed supports whereby said second-named roll is held in yielding contact with said first-named roll, substantially as described.

13. The combination, with a wheeled frame, of a casing mounted thereon, a series of crushing-rolls and beaters provided within said casing, a tossing and separating mechanism wherefrom the straw is delivered to said crushing-rolls, a shoe provided beneath said

- rolls and beaters, a sieve therein, boll-crushers provided beneath the first pair of crushing-rolls and adapted to receive the unbroken bolls therefrom and from said sieve, an imperforate plate provided in said shoe beneath said sieve, and sieves provided beneath said boll-crushers and the discharge end of said plate to receive the loose seeds therefrom, substantially as described.
14. The combination, with a casing, of means for receiving the straw and tossing and separating the same, a slatted shaker adapted to receive the straw from said separating means, crushing-rolls whereto the straw is delivered by said shaker, an imperforate inclined plate arranged beneath said shaker and adapted to gather up the unbroken seed-bolls, and boll-crushers provided beneath said crushing-rolls and the discharge end of said plate, substantially as described and for the purpose specified.
15. The combination, with a casing having a suitable hopper, of means for tossing and separating the straw, a perforated shaker whereto the straw is delivered by said tossing and separating means, a series of crushing-rolls and beaters adapted to receive the straw from said shaker, an inclined plate provided beneath said shaker to receive the unbroken bolls therefrom and from said separating means, boll-crushers beneath the first pair of crushing-rolls and the discharge end of said plate, and a sieve extending beneath the remaining crushing-rolls and beaters of the series and having its discharge end above said boll-crushers, substantially as described and for the purpose specified.
16. The combination, with a wheeled frame, of a casing mounted thereon, a series of crush-

ing-rolls and beaters provided within said casing, a tossing and spreading mechanism wherefrom the straw is delivered to said crushing-rolls, boll-crushers provided beneath said rolls and adapted to receive the unbroken bolls therefrom and from said tossing and spreading mechanism, sieves provided beneath said boll-crushers to receive the seeds therefrom, a blast-fan located near the head of said sieves, and an auxiliary fan provided near the tail of said sieves, for the purpose specified.

17. In a machine of the class described, the combination, with a wheeled frame, of a casing mounted thereon, a hopper provided in one end of said casing, a floor in the bottom of said hopper whereon the material is thrown, a slatted conveyer operating over said floor, a revolving overshot picker-wheel above the discharge end of said floor and having a series of teeth, an arched hood above said picker, a comb device provided in said hood and having teeth to coact with the teeth of said picker, a shaker whereon the material is thrown from said picker, a series of crushing-rolls adapted to receive the straw from said shaker, an inclined plate provided beneath said shaker to receive the unbroken seed-bolls therefrom, and boll-crushers provided beneath said crushing-rolls to receive the unbroken bolls therefrom and from the discharge end of said plate, substantially as described.

In witness whereof I have hereunto set my hand this 24th day of November, 1900.

JOHN T. SMITH.

In presence of—
L. B. LERUD,
C. A. WOOD.