J. M. SWENSON.

THRESHER AND SEPARATOR.

APPLICATION FILED NOV. 16, 1908.

953,068.

Patented Mar. 29, 1910.

5 SHEETS—SHEET 1.

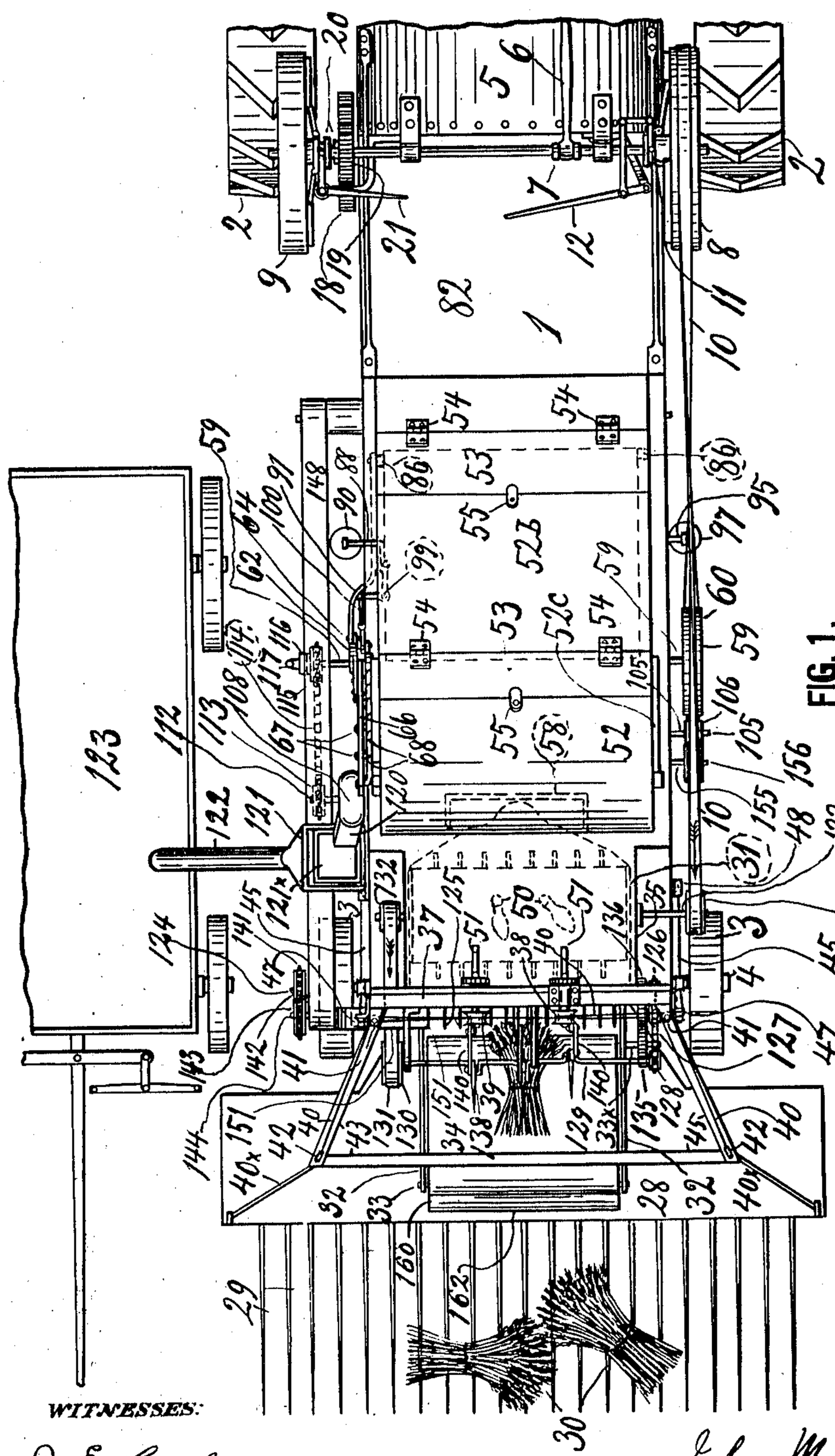

FIG. 1.

WITNESSES:

D. E. Carlsen.

M. M. Carlsen.

INVENTOR:

John M. Swenson.

BY HIS ATTORNEY:

A. M. Carlsen.

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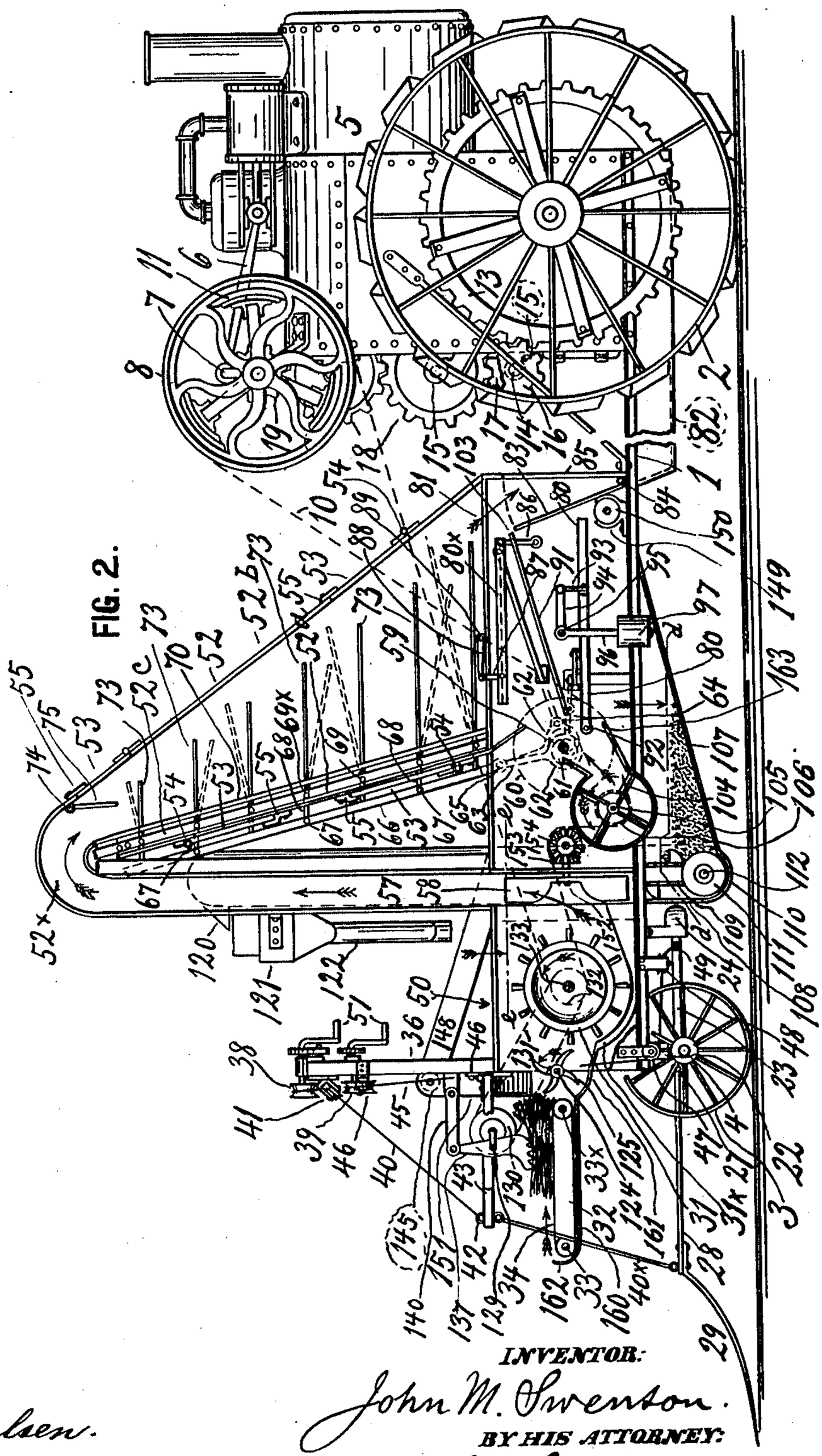
FIG. 2.



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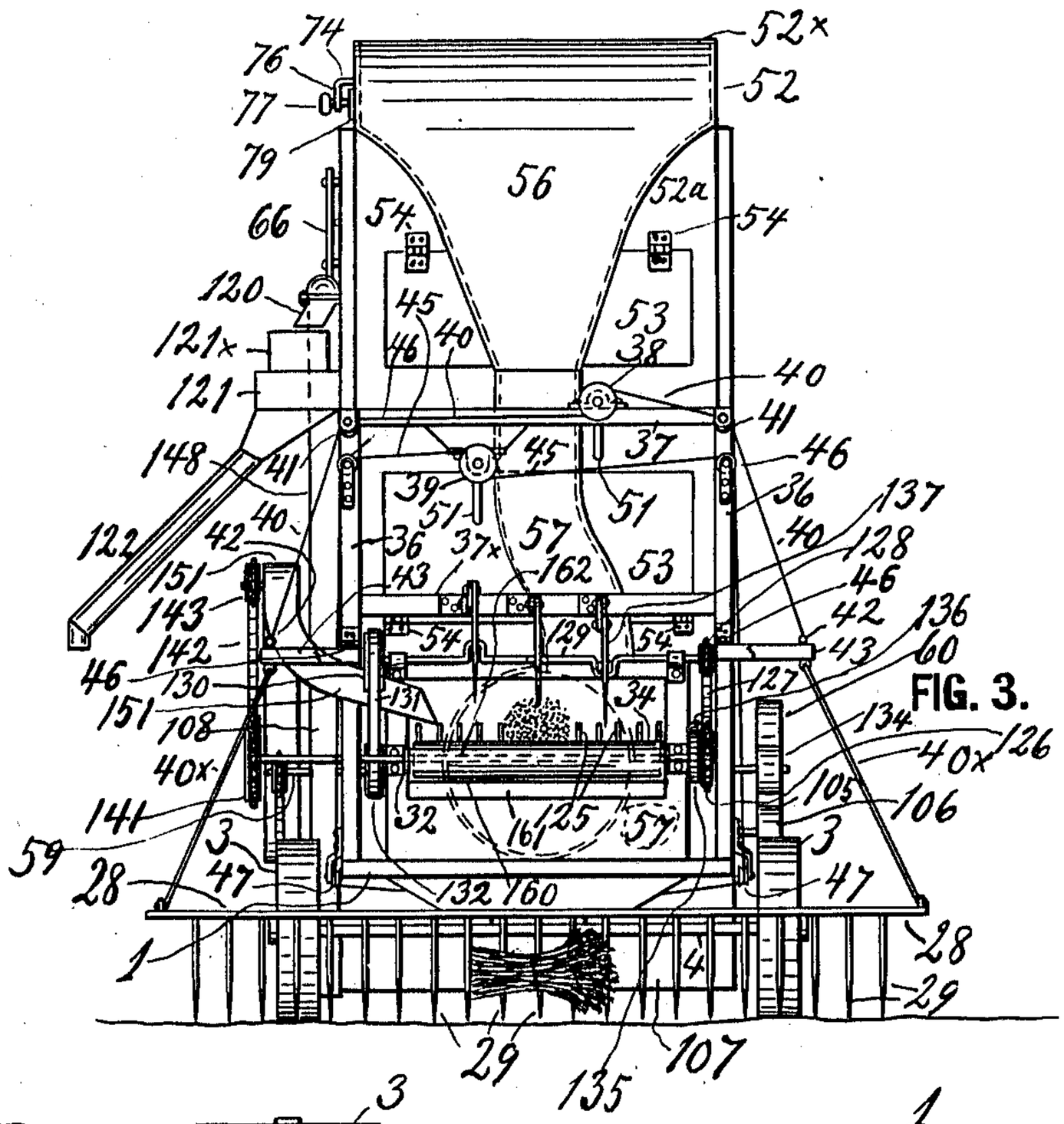

FIG. 3.

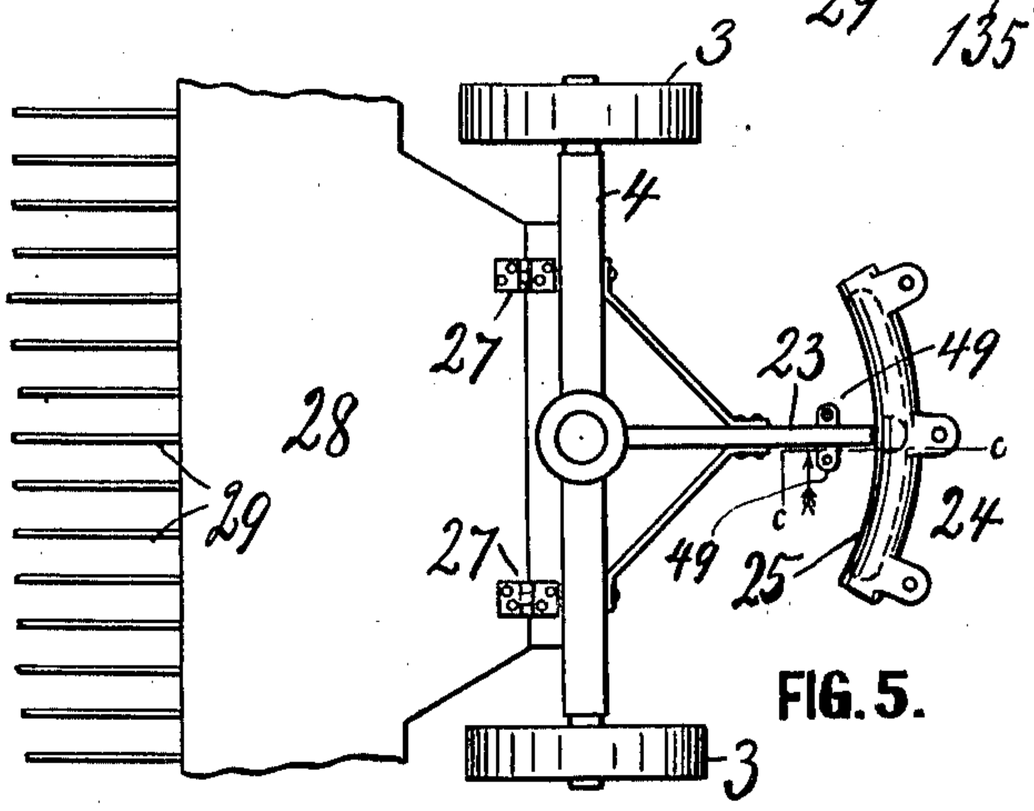

FIG. 5.

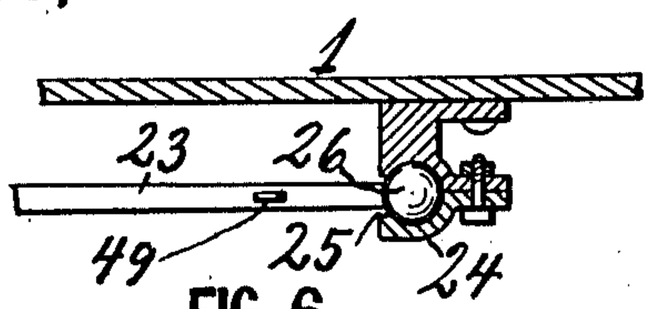

FIG. 6.

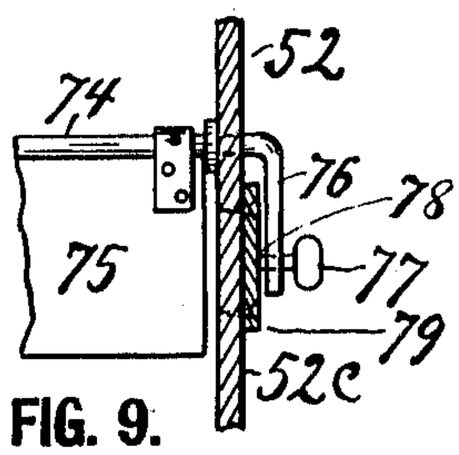

FIG. 9.

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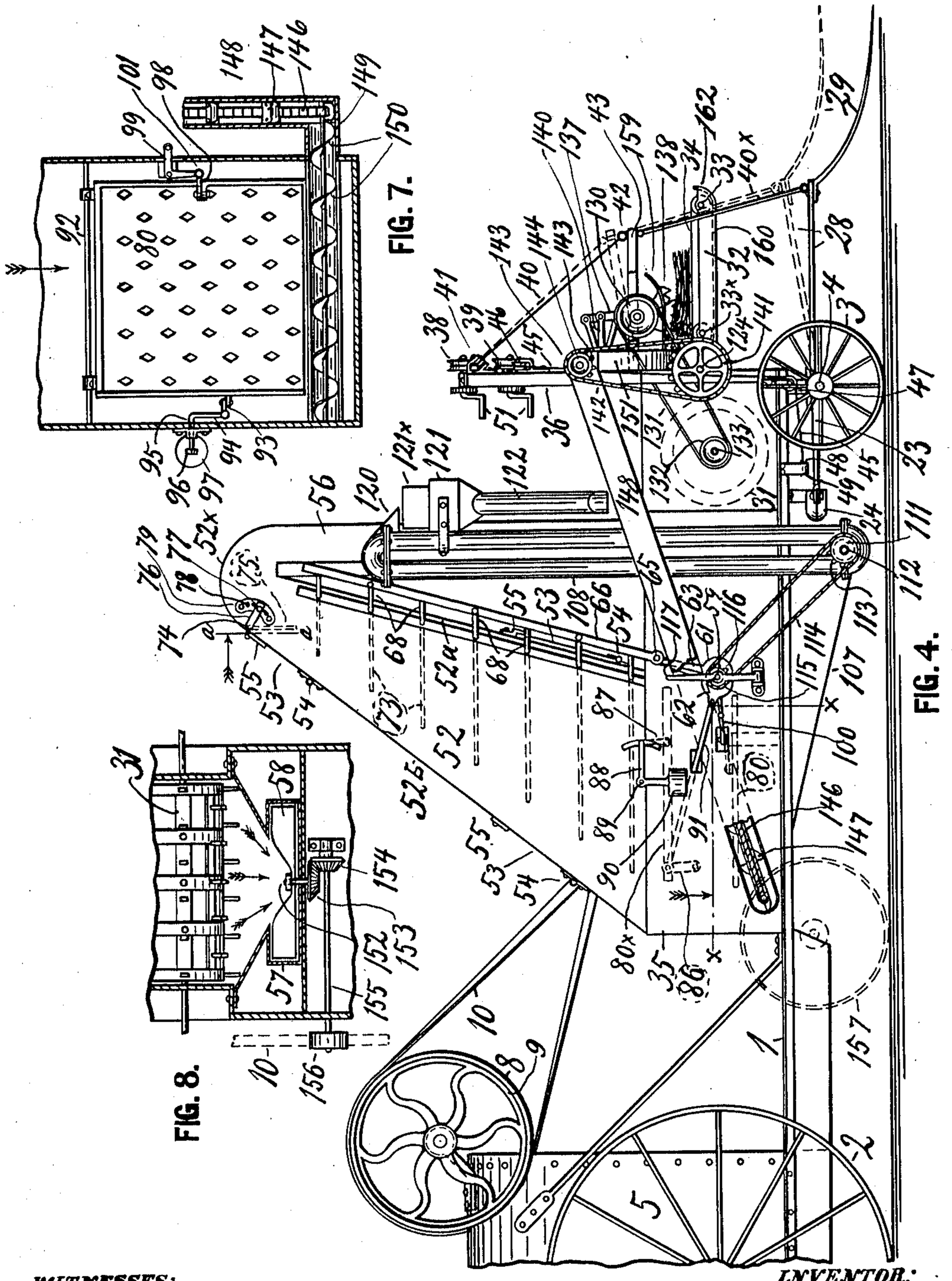

FIG. 4.

FIG. 8.

FIG. 7.

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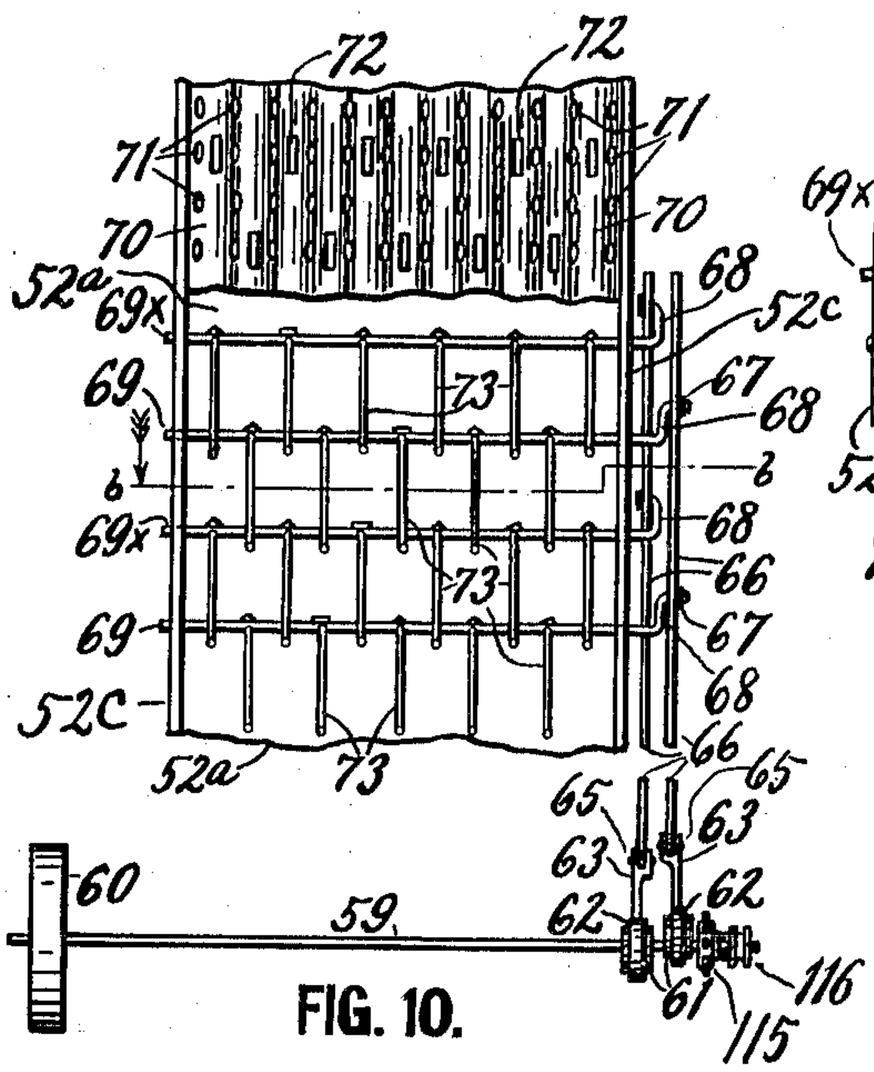

FIG. 10.

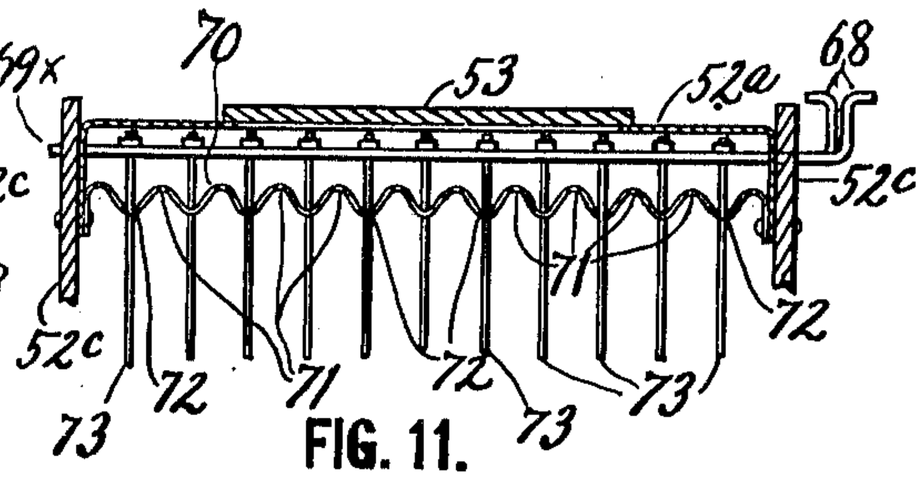

FIG. 11.

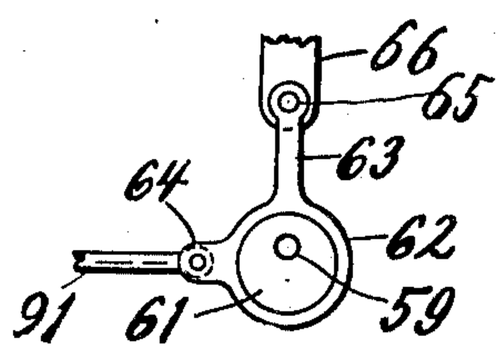

FIG. 12.

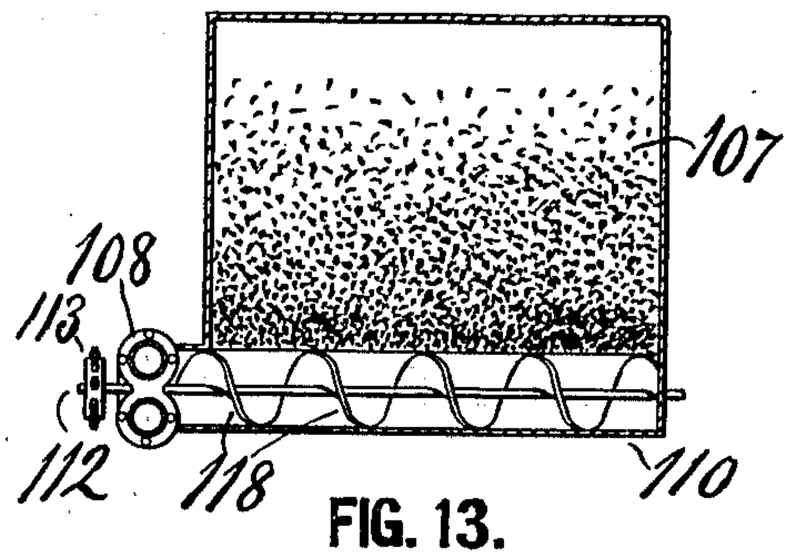

FIG. 13.

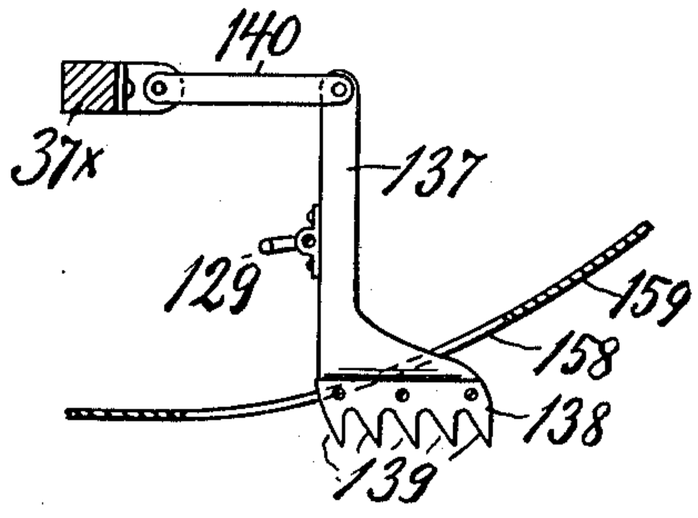

FIG. 14.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN M. SWENSON, OF WHITE ROCK, SOUTH DAKOTA.

THRESHER AND SEPARATOR.

953,068. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed November 16, 1908. Serial No. 462,762.

To all whom it may concern:

Be it known that I, JOHN M. SWENSON, a citizen of the United States, residing at White Rock, in the county of Roberts and State of South Dakota, have invented a new and useful Thresher and Separator, of which the following is a specification.

My invention relates to machines which usually combine means for both threshing and separating grain, but which are most often called "separators" and for shortness I will also in this specification make use of said term.

In the accompanying drawings, Figure 1 is a top view of my complete machine including a portion of an engine that drives and operates it; and a wagon hauling away grain. Fig. 2 is a side elevation of Fig. 1 with the engine more fully shown and the side of the separator frame removed. Fig. 3 is a front elevation of the combined shock gatherer, thresher and separator. Fig. 4 is a right hand side elevation of Fig. 1, with some parts omitted. Fig. 5 is a detail top view of the lower front parts of the machine. Fig. 6 is a sectional view on the line *c—c* of Fig. 5 with a portion of the bottom of the main truck added. Fig. 7 is a section on line *x—x* of Fig. 4. Fig. 8 is a section on line *e—e* of Fig. 2 looking downward and forward into the machine. Fig. 9 is a sectional detail view on the line *a—a* of Fig. 4. Fig. 10 is a slightly perspective detail interior face view of the rear wall of the separating tower and with most of its sieve broken away to expose mechanism behind it, also the shaft and eccentrics operating said mechanism are shown. Fig. 11 is an enlarged cross section on the line *b—b* of Fig. 10 with the sieve 70 in place. Fig. 12 is a detail side view of either one of the two eccentrics and its yoke in Fig. 10. Fig. 13 is a horizontal section on the line *d—d* of Fig. 2. Fig. 14 is a cross section of the band cutter shaft with some adjacent parts.

Referring to the drawings by reference numerals, the main frame or truck 1 of the machine has its rear end supported by two traction wheels 2 and its front end by two steering wheels 3 turning on the ends of a supporting axle 4.

On the rear end of the truck is mounted a motor which in the present instance consists of a steam engine, having boiler 5, pitman 6, crank shaft 7 and two fly wheels 8 and 9, of which the latter is fixed on the shaft. The fly wheel 8 serves as a drive pulley for the main belt 10 by which the threshing and separating mechanisms are operated. Said wheel is therefore loose on the crank shaft and only connected to it by a clutch 11 controlled by a hand lever 12 so that the separator may be thrown in and out of action while the engine is running and moving the machine on the ground. The latter motion is transmitted from the crank shaft to one of the traction wheels by a train of gear wheels mounted on the boiler and comprising a large gear 13 fixed on the traction wheel, the shaft 14 in bearings 15, the gears 16 and 17 fixed on said shaft and meshing one with the gear 13 and the other with one of two idler gears 18, of which the upper one is driven by a pinion 19. The latter is connected with a clutch 20, which may be thrown into engagement with the fly wheel 9 by a lever 21 any time that the machine is to move on the ground either with or without the separator in operation.

The front axle is pivotally connected at its middle to the bolster 22 of the front end of the truck. From said axle extends rearwardly an arm 23 (see Fig. 5), whose rear end is guided in a segmental tube 24 secured up under the truck (as shown in Fig. 6) and provided with a slot 25 for the arm to swing in, while the end of the arm is formed with a head 26 adapted to resist backward and forward motion of the arm and the axle. To the front side of the axle is hinged at 27 a platform 28, whose forward edge is provided with a series of tines making up a fork 29, by which the grain shocks standing on the field are picked up, as shown at 30 in Fig. 1. Projecting forwardly over said platform at a suitable elevation above it, is a feeding device for the threshing cylinder 31. Said feeding device comprises a frame 32, rollers 33 and 33^{x} mounted therein and an endless carrier apron 34 passed over the rollers and operated by the rear roller 33^{x}. When the machine is in operation two men are stationed on the platform 28, one at each side of the feeder and by pitch-forks pick up the sheaves from the fork 29 and throw them upon the feeder 34, which moves them under certain band cutters and a retarder to the threshing cylinder, which will presently be more fully described.

Secured upon the base portion is the chest-

shaped separator frame 35, at the front corners of which are secured two uprights 36, whose upper ends are united by a cross bar 37, and farther down is a cross bar 37× (see Fig. 3). On said cross bar 37 are mounted two windlasses 38 and 39. The windlass 38 serves to raise and lower the fork 29 when the ground is uneven. Its drum is therefore provided with two cables 40, which are guided by sheaves 41, and connected with their lower ends at 42 to the front corners of a U-shaped frame 43, which has its arms pivotally secured at 44 to the uprights, and said frame corners 42 are connected by either rods or cables 40× to the front corners of the fork platform 28. 40 and 40× thus act as a single cable at each corner of the fork platform, the frame 43 simply acting as a beam to hold the cables in the desired position. Upon the other windlass 39, are wound two cables 45, which serve to steer the front wheels of the machine, and are therefore guided by sheaves 46—47—48 (see Fig. 2) and connected at 49 to the steering arm 23. In the operation of the machine a man is stationed at 50 upon the front end of the deck of the separator frame to manipulate the cranks 51 of said windlasses.

Upon the rear portion of the separator frame 35 is erected a forwardly inclined tower 52, which at its front and rear sides, 52ª and 52ᵇ respectively, is provided with doors 53 hinged at 54 and held closed by latches 55; said doors giving access to the mechanism inside the tower in building and repairing the same. To the arched top 52× of the said tower is connected the upper broadened end 56 of the blower tube 57 through which passes to the tower a strong current of air from a rotary blower 58, which, as shown in Fig. 8, is located almost directly in rear of the threshing cylinder 31, so as to blow into the top of the tower the entire mixed products of grain, straw, chaff etc. emanating from the rear of the cylinder and its concave 31×. The separating of the straw, grain, &c. then commences and is carried on and completed by the following mechanisms. In the separator frame is journaled a transverse shaft 59, which has fixed at one end a pulley 60 turned by the main belt 10, and at the other end are fixed in opposite directions two eccentrics 61 (as best shown in Fig. 10), each of which operates a yoke 62 having an upwardly extended arm 63 and a shorter horizontal arm or lug 64 (best shown in Fig. 12). To each yoke arm 63 is pivoted at 65 a rocker rod 66 having pivotal engagement at 67 with a series of rocker arms 68, which are formed at the adjacent ends of two sets of rock shafts 69 and 69× (see Fig. 10), which are journaled in the side timbers 52ᶜ of the tower and extend between the front wall 52ª thereof and an inclined sieve 70 (see Figs. 10 and 11). Said sieve is corrugated or formed with vertical grooves and in the bottom of each groove are the sieve apertures 71, while in the intervening ridges are provided vertical slots 72 for vertically vibrating arms 73 extending from the rock shafts. To prevent the straw from being blown down too fast or freely over the ends of the arms 73, I journal near the top of the tower a rock-shaft 74 (best shown in Fig. 9) with a guarding plate or wing 75 fixed on it within the tower. The position of this wing is regulated by a rocker arm 76 fixed at one end of the shaft outside the tower and provided with a thumb-screw 77, which with its point engages alternately either one of several indentures 78 of a plate 79 fixed on the tower. In Fig. 2 is indicated in dotted lines how the arms 73 of the two sets of shafts vibrate up and down alternately and thereby let down the straw gradually while beating and shaking the grain out of it. The heavy grain then passes through the sieve 70 and down along the wall 52ª of the tower and drops upon a horizontal sieve 80, while the chaff and the light grain and weed seeds drop upon the sieve 80× and the straw passes down as arrow 81 in Fig. 2 upon the floor 82 in front of the boiler door so as to be used for fuel in the boiler furnace. If some or all of it is not so used, the door 83, which is hinged at its bottom end 84, is closed into its opening 85 and the straw is allowed to pass through an opening (not shown) in the floor or base 1 and falls upon the ground where it may be either burned or gathered up by rakes or any other suitable machinery. The upper sieve 80× has one end supported by two links 86, and the other end by a link 87 suspended from the horizontal arm of a bell-crank lever 88, which is pivoted at 89 (see Fig. 4) to the frame work and has its downward arm provided with a weight 90. This sieve or chaffer is agitated longitudinally by a rod 91 connecting it with one of the yoke arms 64. The lower sieve 80, has one end slidingly supported on a rod 92 (see Fig. 7) and is otherwise supported by a link 93 from the horizontal arm 94 of the short rock-shaft 95, journaled in the frame work and having a depending arm 96 with a weight 97 on it. This sieve is agitated transversely by a link 98 and a horizontally swinging bell-crank lever 99, whose outer arm is operated by a rod 100 and one of the arms 64 of the eccentric yokes. The joint 101 in Fig. 7 is a ball joint to permit both the lever to swing horizontally and the sieve vertically, it being understood that when the machine goes up or down an incline the weights 90 and 97 cause the sieves 80 and 80× to fall and rise so as to maintain horizontal positions. Between the last mentioned sieves is fixed to

the framework an inclined solid guide plate or board 103 (see Fig. 2) and near the lower end thereof and of the adjacent ends of the sieves is provided a rotary fan 104, whose shaft 105 has a pulley 106 (see Figs. 1 and 2) driven by the main belt 10.

From the above description of the lower portion of the separator proper it will be understood that when the machine is in operation the fan 104 furnishes a current of air which blows the chaff into the straw passing down at arrow 81 and thus sends it out of the separator, while the grain that drops through the upper sieve 80×, slides down the inclined guide 103 and is then, together with the grain dropping through the sieve 70 of the tower, spread along the lower sieve 80, through which it drops into a magazine 107 carried underneath the truck 1 and may hold twenty-five or more bushels, or enough for a wagon load. When the magazine is full or nearly full a wagon is driven up to the side of the machine and loaded with grain from the magazine. This is done by an elevator comprising a vertically disposed elevator frame 108, having an endless bucket chain 109 (see Fig. 2) communicating with one end of a pit 110 of the magazine, where it is operated by a wheel 111 fixed on a shaft 112 having a sprocket 113 driven by a link-belt 114 and a smaller sprocket 115 placed loosely on the eccentric shaft 59 (see Figs. 4 and 10). On said shaft is slidingly keyed a clutch member 116, which by a hand-lever 117 is thrown into clutching contact with the sprocket 115, whenever the elevator is to be used, and out of clutching contact when it is to be stopped.

The shaft 112 is also provided with spiral wings 118 working in the pit to move the grain to the elevator buckets, as shown in Fig. 13; and the upper end of the elevator frame has a spout 120 through which the elevated grain is thrown from the buckets into the hopper 121 of a chute 122 by which it is conveyed into a wagon placed as 123 in Fig. 1. Upon said hopper is mounted an automatic grain weighing device 121×.

In front of the threshing cylinder is journaled a shaft 124 with spiders 125 fixed on it and serving to retard the straw and grain fed to the cylinder and thereby cause it to be loosened and separated so as not to clog the cylinder. Said shaft is turned slowly by a sprocket 126 fixed on it and a link-belt 127 and another sprocket 128 which is fixed on one end of a multiple crank shaft 129; on the latter is fixed a pulley 130 driven by a belt 131 from a pulley 132 fixed on the shaft 133 of the cylinder 31, and the latter is turned by its fixed pulley 134 and the main belt 10 from the engine. The roller 33× of the feeder apron is rotated by a gear wheel 135 fixed on it and driven by another gear wheel 136 fixed on the shaft of the retarder.

The band cutting device shown enlarged in Fig. 14, comprises the multiple crank shaft 129, a series of cutter arms 137 journaled one to each crank and provided at its lower end with a notched blade 138 having several cutting edges 139 by which to cut the banks of the sheaves passing under the blade when the latter is operated by the crank. The upper end of each arm 137 is connected by a link 140 to the frame bar 37×. The blades work through slits 158 of a shield 159 (see Fig. 14) so that the grain and straw cannot raise with the cutters.

On one end of the retarder shaft 124 is fixed a sprocket 141 driving a link belt 142 and thereby a sprocket 143 fixed on a short shaft 144, and on the latter is fixed a wheel 145 (see Fig. 2) operating an endless elevator apron 146 having buckets or cleats 147 and moving in an inclined hollow frame 148, which, as shown in Fig. 7, has its lower end in communication with a tube 149 in which the apron rotates a spiral-winged shaft 150, which through the open upper side of the tube (see Fig. 2) receives all the ears and parts of ears not fully threshed and therefore dropping from the end of the lower sieve 80, and moves them into said elevator, which conveys them to the threshing cylinder to be threshed over again, delivering same through its discharge spout 151.

The main blower or fan 58 (see Fig. 8) has on its shaft 152 fixed a miter gear 153, which is driven by a miter gear 154 fixed on a shaft 155 having a pulley 156 driven by the main belt 10.

Having thus described each sub-mechanism and its operation as well as the combined structure and its operation, I will further say that whenever the thresher and separator is intended for use as a stationary machine the fork 29, platform 28 and the raising and lowering means for same may be omitted in building the machine; and if the machine is to be operated by a belt from a motor mounted on some other truck than the one carrying my separator, then I provide the latter with an additional pair of supporting wheels, as indicated by dotted lines 157 in Fig. 4 and leave out my two-wheeled engine and boiler.

In further describing the feeding device of the thresher it will be observed that between the lower edges of the side rails 32 in which the ends of the rollers 33 and 33× are journaled, extends a solid table 160 whose rear edge joins a sloping extension 161 of the concave 31× of the thresher, and the front edge 162 is curved upward so much higher than the endless conveyer 34, that any grain or straw that may accidentally be dragged forward upon the table by the lower run of the conveyer will not drop down from the feeder but will automatically be

returned upon the upper run and be carried again toward the retarder 125 and the threshing cylinder.

In Fig. 2, 163 designates a wind-guide at the lower side of the wind outlet from the blower or fan; by tilting said guide up or down with its outer edge the wind is turned more or less upward, and also given more or less density, as may be required for different kinds of grains threshed and separated.

What I claim is:—

1. In a grain separator, a frame, and a hollow inclined tower mounted thereon, a vertically slotted sieve substantially parallel to the lower inclined wall of the tower, two series of rock-shafts extending horizontally one shaft above the other between the sieve and the said wall and provided with tines extending through the slots in the sieve, a rocker arm at one end of each shaft, two rods pivoted one to the rocker arms of each series of shafts, and means for reciprocating said rods in alternate order, and means for introducing the threshed grain and straw into the top of said tower.

2. In a grain separator, a frame, and a hollow inclined tower mounted thereon, a vertically slotted sieve substantially parallel to the lower inclined wall of the tower, two series of rock-shafts extending horizontally one shaft above the other between the sieve and the said wall and provided with tines extending through the slots in the sieve, a rocker arm at one end of each shaft, two rods pivoted one to the rocker arms of each series of shafts, and means for reciprocating said rods in alternate order, and means for introducing the threshed grain and straw into the top of said tower, said means comprising a rotary fan arranged in rear of the threshing cylinder and having a tube extended upwardly and into the top of the tower.

3. In a grain separator, a frame, and a hollow inclined tower mounted thereon, a vertically slotted sieve substantially parallel to the lower inclined wall of the tower, two series of rock-shafts extending horizontally one shaft above the other between the sieve and the said wall and provided with tines extending through the slots in the sieve, a rocker arm at one end of each shaft, two rods pivoted one to the rocker arms of each series of shafts, and means for reciprocating said rods in alternate order, and means for introducing the threshed grain and straw into the top of said tower, said means comprising a rotary fan arranged in rear of the threshing cylinder and having a tube extended upwardly and into the top of the tower, and an adjustable guide in the top of the tower for giving the entering straw and grain the desired direction downwardly upon the tines.

4. In a grain separator, a frame, and a hollow inclined tower mounted thereon, a vertically slotted sieve substantially parallel to the lower inclined wall of the tower, two series of rock-shafts extending horizontally one shaft above the other between the sieve and the said wall and provided with tines extending through the slots in the sieve, a rocker arm at one end of each shaft, two rods pivoted one to the rocker arms of each series of shafts, and means for reciprocating said rods in alternate order, and means for introducing the threshed grain and straw into the top of said tower, said sieve having vertically extending corrugations forming grooves in which the sieve apertures are formed while the slots for the tines are formed in the ridges between the grooves.

5. In a grain separator, a frame, and a hollow inclined tower mounted thereon, a vertically slotted sieve substantially parallel to the lower inclined wall of the tower, two series of rock-shafts extending horizontally one shaft above the other between the sieve and the said wall and provided with tines extending through the slots in the sieve, a rocker arm at one end of each shaft, two rods pivoted one to the rocker arms of each series of shafts, and means for reciprocating said rods in alternate order, and means for introducing the threshed grain and straw into the top of said tower, said separator frame having adjacent to the ends of the lowest tines an opening allowing the straw to fall upon the ground, and adjacent thereto a door opening with a door hinged at its lower end to serve as a guide to direct the straw in horizontal direction out of the separator frame when so desired, for the purpose set forth.

6. In a grain separator, a frame, and a hollow inclined tower mounted thereon, a vertically slotted sieve substantially parallel to the lower inclined wall of the tower, two series of rock-shafts extending horizontally one shaft above the other between the sieve and the said wall and provided with tines extending through the slots in the sieve, a rocker arm at one end of each shaft, two rods pivoted one to the rocker arms of each series of shafts, and means for reciprocating said rods in alternate order, and means for introducing the threshed grain and straw into the top of said tower, an upper and a lower vibrated sieve arranged below the open bottom end of the tower, and a fan adjacent thereto for cleaning the grain separated from the straw in the tower and dropping downward therefrom.

7. In a grain separator, a frame, and a hollow inclined tower mounted thereon, a vertically slotted sieve substantially parallel to the lower inclined wall of the tower, two series of rock-shafts extending horizontally one shaft above the other between the sieve

and the said wall and provided with tines extending through the slots in the sieve, a rocker arm at one end of each shaft, two rods pivoted one to the rocker arms of each series of shafts, and means for reciprocating said rods in alternate order, and means for introducing the threshed grain and straw into the top of said tower, an upper and a lower vibrated sieve arranged below the open bottom end of the tower, and a fan adjacent thereto for cleaning the grain separated from the straw in the tower and dropping downward therefrom, a grain magazine below the lower sieve adapted to hold a wagon load of grain at a time, and an elevator arranged to deliver grain from the magazine into wagons placed near the separator, and a horizontal spiral-winged shaft in the base of the magazine for moving the grain into the elevator.

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

JOHN M. SWENSON.

Witnesses:

NEWELL N. POWELL,

C. P. JOHNSON.