J. E. MILLER.

THRESHING MACHINE.

APPLICATION FILED APR. 14, 1908.

990,284.

Patented Apr. 25, 1911.

4 SHEETS—SHEET 1.

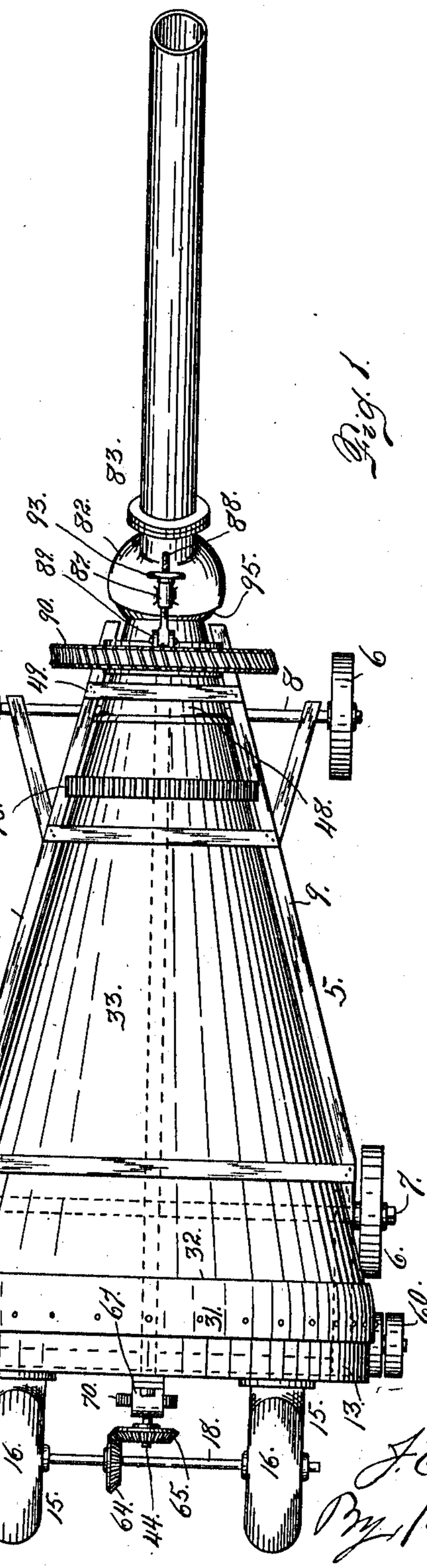


Fig. 1.

Witnesses

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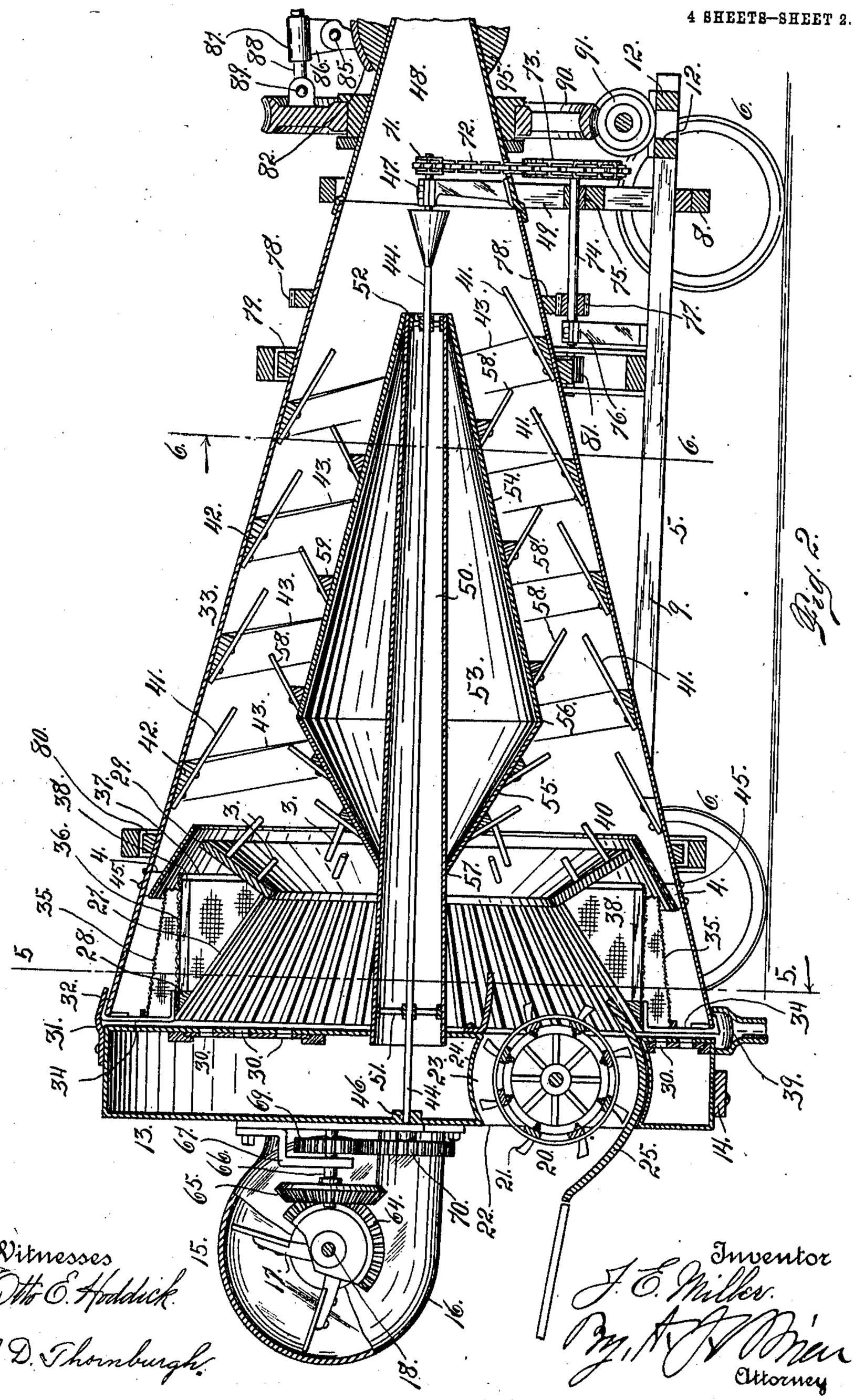


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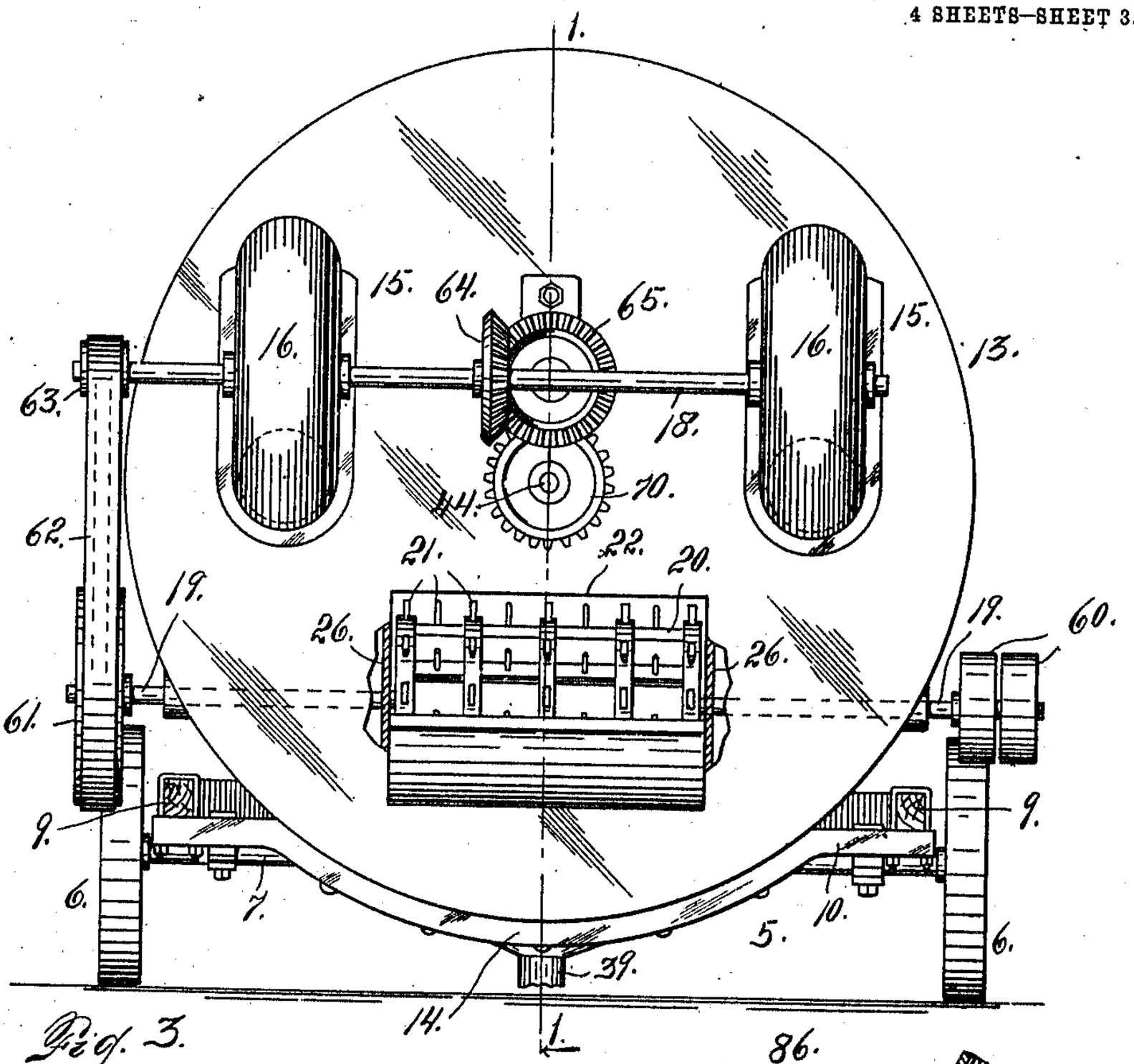


Fig. 3.

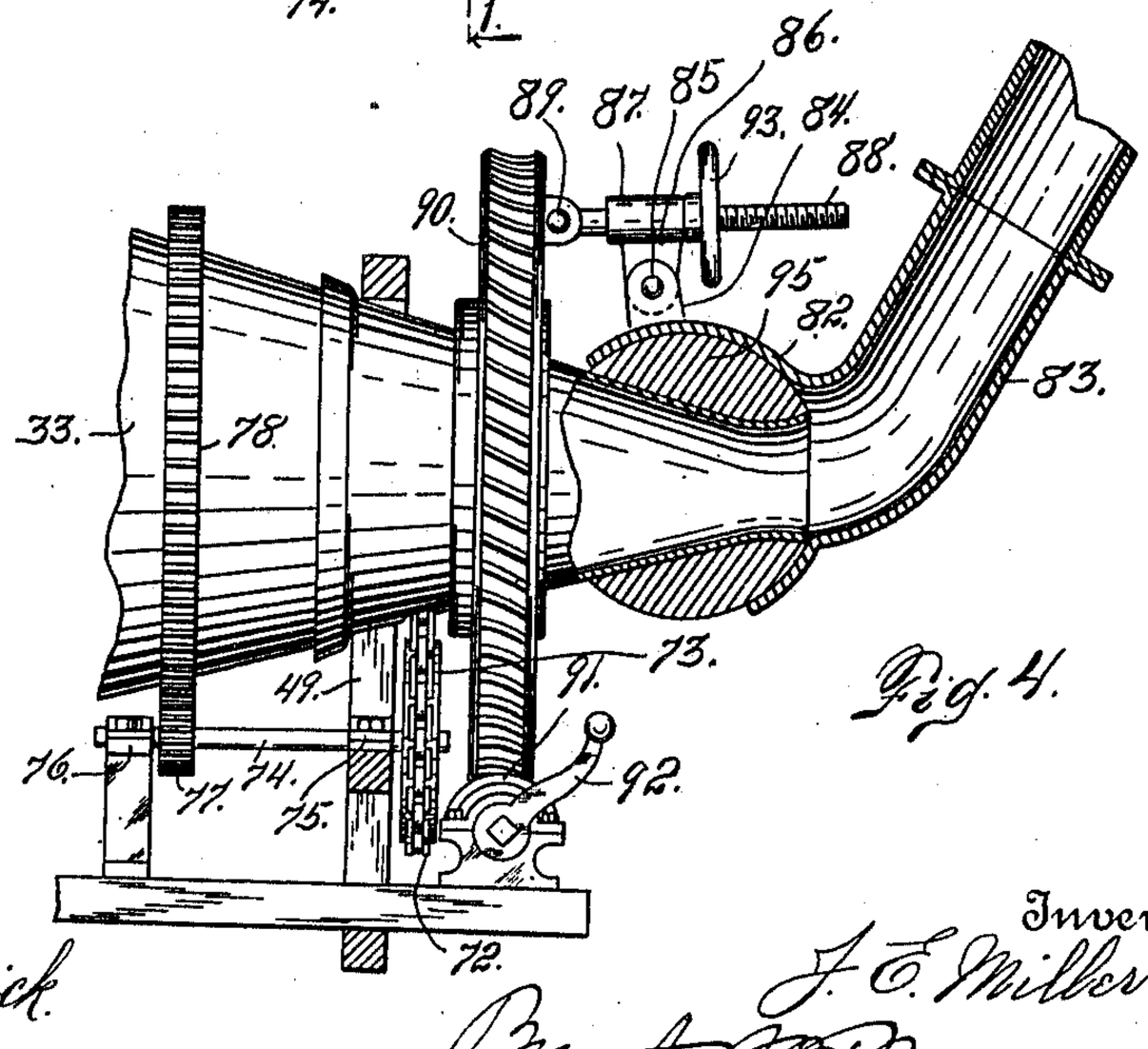


Fig. 4.

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4 SHEETS—SHEET 4.

Fig. 5.

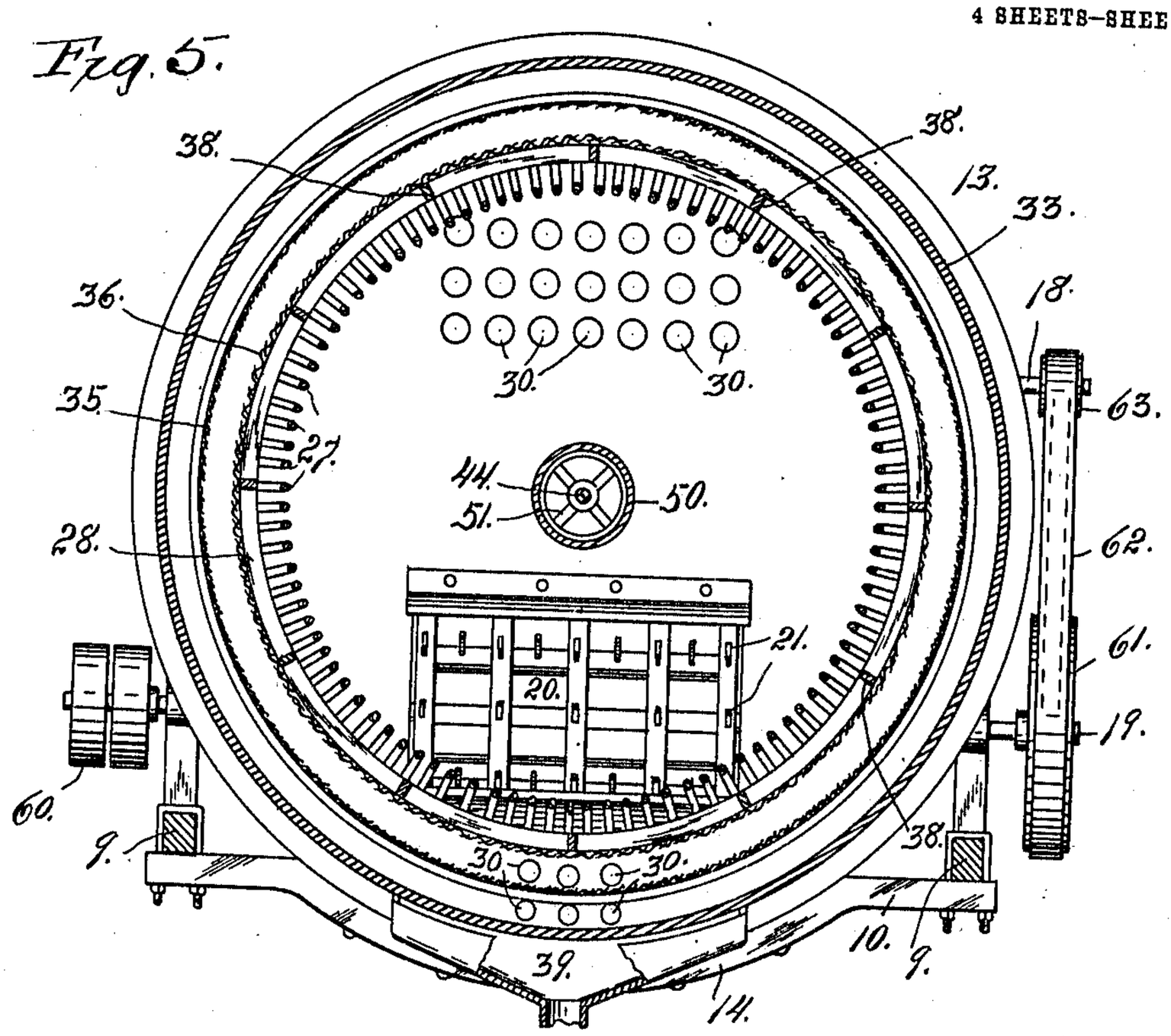
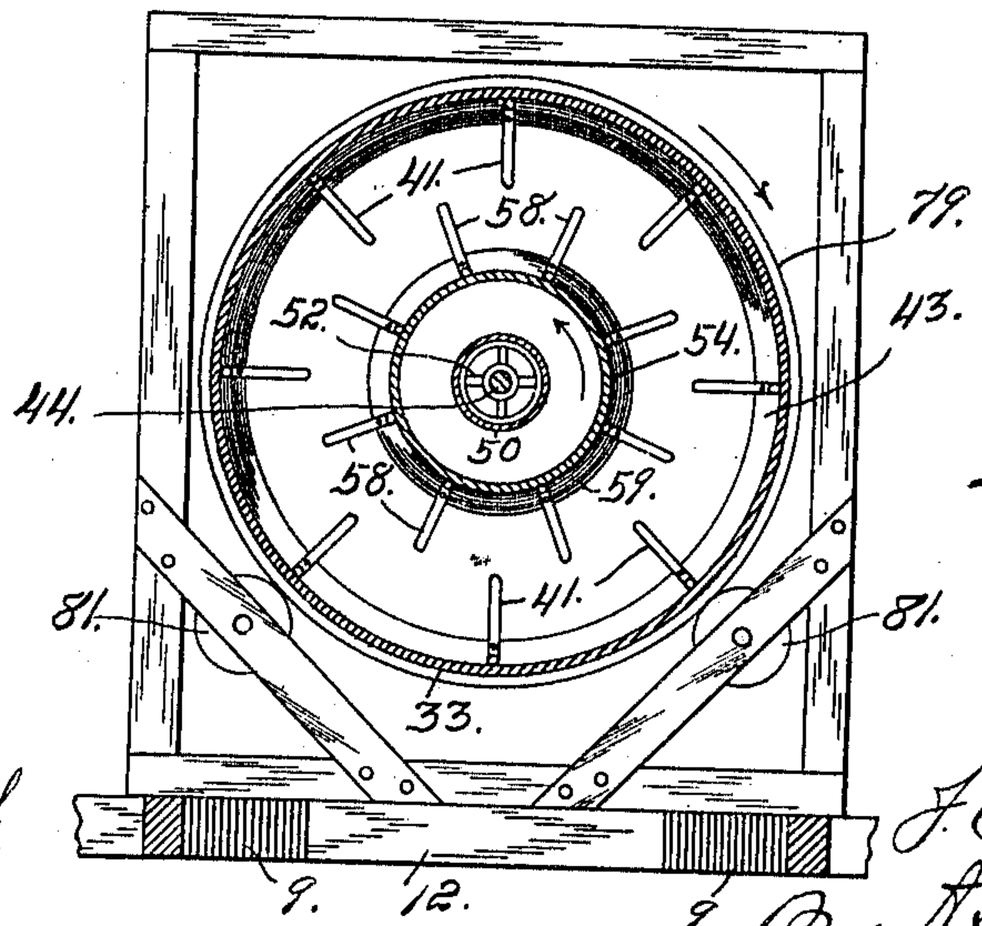



Fig. 6.




Witnesses

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# UNITED STATES PATENT OFFICE.

JOHN E. MILLER, OF DENVER, COLORADO.

## THRESHING-MACHINE.

990,284. Specification of Letters Patent. **Patented Apr. 25, 1911.**

Application filed April 14, 1908. Serial No. 426,979.

*To all whom it may concern:*

Be it known that I, JOHN E. MILLER, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Threshing-Machines; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in threshing machines, my object being to provide a construction which shall be comparatively simple and therefore economical to manufacture and which shall be at the same time exceedingly efficient both in separating the grain from the straw and chaff and also in getting rid of the latter which is carried through the machine by an air blast generated at the forward extremity thereof. This blast serves a double purpose or function since it facilitates the separation of the straw and chaff from the grain and also acts upon the straw whereby the latter is carried to the stack. In other words the same air current which performs the separating function also performs the stacking operation.

My improved construction is cone-shaped, the cylinder being located at the base or larger extremity of the cone and the air blast being delivered into a stationary chamber at the base of the cone and in communication with the latter. The body of this cone-shaped structure is composed of an inner and an outer member and these two members are made to rotate in opposite directions each being provided with fingers arranged exteriorly upon one of the members and interiorly upon the other, whereby the two sets of fingers coöperate to separate the straw and chaff from the grain while the grain which is not immediately separated in the vicinity of the cylinder, is caused to move forwardly or travel in a direction opposite that in which the straw and chaff are traveling by virtue of a spirally arranged shoulder formed on the outer cone, the latter being rotated in a direction to return the grain carried over with the straw, and separated at points farther rearwardly than the initial separation in the vicinity of the cylinder. The outer cone is provided with a spirally arranged shoulder behind which or in the rear of which the grain which is separated from the straw during the travel of the latter between the cones, lodges and the outer cone is revolved in a direction to cause the said grain to travel forwardly whereby it is finally discharged at the forward extremity of the machine in the vicinity of the cylinder but below the same.

Having briefly outlined my improved construction I will proceed to describe the same in detail reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a top plan view of my improved thresher. Fig. 2 is a vertical longitudinal section taken through the same approximately on the line 1—1 Fig. 3. Fig. 3 is a front end elevation of my improved machine. Fig. 4 is a fragmentary side elevation of the same illustrating the stacker connection with the rear extremity of the machine proper, the stacker construction being shown partly in section. Fig. 5 is a section taken on the line 5—5 Fig. 2 looking forwardly or in the direction of the arrow. Fig. 6 is a section taken on the line 6—6 Fig. 2 looking rearwardly or in the direction of the arrow.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a frame work mounted upon ground wheels 6 which are journaled upon forward and rearwardly located axles 7 and 8. The frame work is suitably connected with these axles and includes longitudinally disposed side bars 9 connected by a forwardly located transverse bar 10 and rearwardly located connecting bars 12. A stationary forwardly located drum 13 is mounted upon the transverse bar 10 whose central portion 14 is curved downwardly to harmonize with the exterior of the drum which is circular in shape.

Mounted on the forward face of the drum 13, are two blowers 15 having casings 16 within which are located fans 17 mounted upon shafts 18, the latter being journaled in suitable bearings mounted on the forward end of the drum. Passing through the lower part of the drum and projecting exteriorly therefrom on both sides is a shaft 19 upon which is mounted and made fast a cylinder 20 provided with teeth 21. This cylinder may be of ordinary construction and access

is gained thereto through an opening 22 formed in the face of the drum. The chamber 23 in which the cylinder is located, is separated from the body of the drum, being provided with top and bottom housings 24 and 25 and end walls 26. This chamber is open in front to receive the grain to be threshed and in the rear to allow the material to pass into a frustum-shaped grizzly 27 whose bars are secured in front to a ring 28 and in the rear to an outwardly flared plate 29. This plate is provided with rearwardly projecting fingers 3. The grizzly is in communication with the drum by means of openings 30 through which the air delivered to the drums by the blowers passes freely. The drum is provided exteriorly with a circumferential plate 31 which projects rearwardly as shown at 32 and overlaps the forward and larger extremity of the outer cone 33. The ring 28 to which the grizzly bars are attached as aforesaid, is connected with the forward extremity of the cone by angle arms 34. These angle arms also serve as a support for the forward extremities of two circumferential screens 35 and 36. The screen 36 is connected at its inner extremity with a ring 37 and is provided with transversely arranged reinforcing ribs 38. These screens surround the grizzly and are of varying mesh, that is to say the screen 36 adjacent the grizzly is coarser than the outer screen 35, the material being first screened by the grizzly where the coarser chaff and straw are separated from the grain which after passing through the two screens 36 and 35, is completely cleaned. It will be understood that during the separation of the grain from the straw and chaff, the material is subjected to the action of the air blast from the blowers which drives the straw and chaff rearwardly, but allows the grain to pass through the grizzly and the two screens, whence it is directed downwardly by the incline of the outer cone and discharged therefrom into a spout 39 which is in communication with the open forward extremity of the cone. A portion of the grain which passes rearwardly beyond the screens and grizzly with the chaff and straw, is caught by an outwardly and forwardly flared frustum-shaped drum 40 which carries the grain forwardly whereby it is delivered to the forward portion of the cone and passes thence into the spout 39. The drum 40 is secured to the inner surface of the cone 33 by means of blocks 4 suitably spaced and interposed between the drum and the cone, the said blocks being fashioned to fit both of the said surfaces. The drum is secured to the cone by means of suitable fastening devices 45 passed through the blocks 4 together with the walls of the cone and drum. The cone 33 is provided with rearwardly and inwardly projecting fingers 41 which are secured to spirally arranged ribs 42 triangular in cross section and made fast to the inner surface of the cone. These fingers are arranged at suitable intervals around the cone and also longitudinally thereof. The ribs 42 whose rear edges are thickest, form a spirally arranged offset or shoulder 43 in the rear of which the grain is caught or lodges and the outer cone is rotated in a direction to cause this grain to move forwardly and finally pass downwardly into the spout 39 as heretofore explained.

A shaft 44 coinciding with the position of the longitudinal axis of the cone 33, is journaled at its forward extremity in the front wall of the air drum 13 as shown at 46, its rear extremity being journaled in a bearing 47 projecting upwardly from the bottom of a stationary cone member 48, the latter being supported by a suitable frame work 49 mounted upon the general frame work of the structure. Upon this shaft 44 is mounted a conduit 50, the latter being connected with the shaft by spider arms 51 and 52 respectively. This conduit is open at both ends communicating at one extremity with the drum 13 and at its opposite extremity with the rear portion of the cone 33.

Mounted exteriorly upon the conduit 50 is a conical structure 53 composed of two cone members 54 and 55, the member 55 being forwardly located and the member 54 rearwardly located. The bases of these cones are joined at 56, the one cone tapering rearwardly to the rear extremity of the conduit and the other forwardly to the outer wall of the conduit in the rear of its forward extremity as shown at 57. This interior cone rotates with the conduit 50 in a direction opposite the rotary movement of the cone 33. It is also provided with fingers 58 which project outwardly and rearwardly from the surface of the cone, the said fingers being secured to spirally arranged ribs 59 which are triangular in cross section, their outer surfaces being inclined to give the said ribs their proper inclination and direction. These fingers 58 coöperate with the fingers 41 of the outer cone in performing the function of separating the grain from the straw and chaff, that is to say the portion of the grain remaining in the straw after it has passed to a position between the two cones.

For the purpose of transmitting power to the machine, the cylinder shaft 19 is provided at one of its exposed extremities with fast and loose pulleys 60 which may be connected by means of a belt (not shown) with an engine or motor of any suitable kind. The rotation of this shaft operates a larger pulley 61 on the opposite extremity thereof. A belt 62 connects the pulley 61 with a relatively small pulley 63 fast on the

shaft 18 which operates the blowers whereby air is delivered into the drum 30. Upon the shaft 18 is made fast a beveled gear 64 which meshes with a similar gear 65 fast on a shaft 66 journaled in an angle bracket 67 and a plate 68 both of which are secured to the front face of the drum. Also mounted and made fast on the shaft 66 is a gear 69 which meshes with a gear 70 fast on the forward extremity of the shaft 44. It will thus be observed that if the cylinder shaft is operated, power will be transmitted to the cylinder, from the cylinder shaft to the blower shaft and thence to the shaft 44 whereby the inner cone 53 will be rotated. The rear extremity of the cone shaft 44 is provided with a sprocket wheel 71 which is connected by means of a chain 72 with a larger sprocket 73 fast on a shaft 74 journaled in bearings 75 and 76 suitably mounted on the frame work. The shaft 74 is provided with a relatively small gear 77 meshing with a larger gear 78 surrounding the rear extremity of the exterior cone 33 whereby motion is transmitted to the latter in a direction opposite the rotation of the interior cone.

The cone 33 is provided with circumferential exteriorly located tracks 79 and 80 which engage rollers 81 mounted on the frame work. These rollers are not indicated in connection with the track 80 but as they are substantially the same as those engaged by the track 79, their omission is not believed material particularly in view of the fact that this is an ordinary means for supporting a rotary device of cone-shaped or cylindrical form.

The rear extremity of the stationary cone member 48 is exteriorly reinforced to form a spherical bearing 95 which is engaged exteriorly by a shell 82 forming the forward extremity of a conduit 83 into which the straw passes from the rear extremity of the machine. The parts 95 and 82 form a universal joint connection between the stacker conduit and the body of the machine, whereby the said conduit may be moved upwardly or downwardly or turned in either direction according to the location where the straw is to be delivered. The shell 82 is provided with a lug 84 pivotally connected as shown at 85 with a lug 86 fast on a nut 87 engaging a screw 88 pivotally connected as shown at 89 with one side of a worm wheel 90 engaging a worm 91 provided with a hand crank 92. By turning the nut 87 which is provided with a hand wheel 93 for the purpose, the stacker may be raised or lowered; while by turning the worm wheel through the instrumentality of the worm, the stacker may be thrown to one side or the other as may be desired by virtue of the connection of the stacker with the worm wheel as just explained.

From the foregoing description the use and operation of my improved machine will be readily understood. Assuming that the apparatus is in motion as heretofore explained, the grain to be threshed is fed into the cylinder 20 which performs the ordinary function of a cylinder thresher consisting in removing the kernels or berries of grain from the chaff and straw which are carried beyond the cylinder into the grizzly 27 which rotates with the cone 33 by virtue of the construction and connection of the parts heretofore described. Within the grizzly a large part of the grain is separated from the straw and passes through the grizzly bars, coming first in contact with the screen 36 and afterward in contact with the screen 35 whereby the grain is completely separated from the chaff and straw. This separation is greatly facilitated by virtue of the air blast directed into the grizzly and screens, passing from the air drum 13 through openings 30. The upper set of openings 30 is located directly in front of the rotating grizzly while the lower openings 30 communicate with the outer screen and the space within the cone 33 beyond the screen, thus subjecting the grain to a blast of air just before it passes into the spout 39, and finally removing therefrom any chaff or dirt that may have passed through the screens. The straw and chaff together with some of the grain, are carried beyond the grizzly and screens by virtue of the air blast, and are caused to pass through the space between the cones 33 and 53. By virtue of the fingers 41 and 58 with which these cones are provided, the straw is agitated and beaten, sufficiently to separate therefrom the remaining kernels or berries of grain.

It will be observed that by virtue of the spiral arrangement of the fingers 58 and the fingers 41, these two sets of fingers have a tendency to carry the straw in opposite directions since the two cones rotate in different directions. The outer cone rotates in a direction adapted to cause the grain separated from the straw and which lodges in the rear of the spiral offset or shoulder 43, to move forwardly until it is finally discharged into the lower part of the cone and passes downwardly into the spout 39; while the cone 53, rotating in the opposite direction has a tendency to carry the the straw forwardly. These two opposing motions facilitate the agitation and beating of the straw whereby all of the grain is separated therefrom. At the same time the air current serves to carry the straw rearwardly between the two cones, the same being delivered to the stationary cone member 48 and thence into the stacker conduit 83 as heretofore explained. As the air blast passes from the larger toward the smaller extremity of the cone-shaped casing or mem-

ber, it is continually accelerated by virtue of the diminishing diameter of the structure. By adjusting the stacker, in the manner heretofore explained, it is evident that the straw may be delivered in any direction from the rear extremity of the machine. It may be stated that the fingers 3 attached to the outwardly flared member 29 which rotates with the grizzly and the cone 33 as heretofore explained, coöperate with the fingers of the cone 53, to agitate the straw and chaff for grain-separating purposes.

Attention is called to the fact that the outwardly-flared part 29 connected with the smaller extremity of the frustum-shaped grizzly 27, serves as a stop to deflect the grain which passes through the grizzly bars and which would have a tendency to move rearwardly with the straw, whereby the grain is deflected against the outwardly and forwardly flared member 40, and is caused to move forwardly down the incline of the outer cone to the discharge spout 39. It may also be stated that the spiral offset, shoulder or riffle 43, protects the grain which lodges in the rear of the same, from the action of the air current which passes through the apparatus as heretofore explained.

Having thus described my invention, what I claim is:

1. A threshing machine comprising a hollow, cone-shaped receptacle mounted to rotate, a second cone arranged within the first named cone and mounted to rotate in the opposite direction, a threshing cylinder located at the forward extremity of the said cone-shaped receptacle, the cylinder chamber communicating with the cone-shaped receptacle, means located within the cone-shaped receptacle for screening the grain from the straw and chaff, and means for introducing an air blast into the forward extremity or base of the receptacle, whereby the straw is caused to travel therethrough and discharge at the smaller extremity thereof, substantially as described.

2. A threshing machine comprising a cone-shaped receptacle, a second cone centrally arranged within the first named cone, a frustum shaped grizzly located in the larger extremity of the first named cone and provided with an outwardly flared member connected with the rearward and smaller extremity of the grizzly, to form a stop to prevent the grain passing through the grizzly from mingling with the straw, and means for causing the straw and chaff to travel through the cone-shaped receptacle, substantially as described.

3. A threshing machine, comprising a hollow rotary cone, an interiorly located coöperating cone rotating in a direction opposite the outer cone, means for loosening the kernels of grain from their natural condition and delivering the straw and grain into the larger extremity of the outer cone, means located within the outer cone for screening the grain from the straw and chaff, and means for introducing a blast of air into the outer cone, whereby the straw is caused to travel rearwardly between the two cones and coöperating fingers with which the cones are provided for the purpose set forth.

4. A threshing machine comprising an outer hollow rotary cone, a centrally arranged interiorly located rotary cone, means located at the larger extremity of the outer cone for removing the grain from its natural condition in the straw and delivering the same into the base of the outer cone, means for delivering a blast of air into the larger extremity of the outer cone whereby the grain and chaff are caused to travel rearwardly between the two cones, and means for rotating the two cones in opposite directions for the purpose set forth.

5. A threshing machine comprising an exteriorly located cone mounted to rotate, having its larger extremity forwardly directed, a second cone centrally arranged within the first named cone and mounted to rotate in the opposite direction, the two cones being provided with coöperating fingers arranged to act upon the straw as it is passing between the two cones, an open-ended passage extending centrally through the inner cone, and means for delivering a blast of air into the base of the outer cone and into the passage through the inner cone, whereby the straw is carried rearwardly between the two cones and discharged at the rear extremity of the outer cone.

6. A threshing machine including two cones, one mounted within the other, means for rotating the cones in opposite directions, the two cones being respectively provided with coöperating fingers, means located at the base or forward extremity of the outer cone for removing the grain from its natural condition in the straw, and feeding the straw and grain into the base of the outer cone, and means for introducing the blast of air into the base of the outer cone and directed rearwardly whereby the straw is caused to travel rearwardly between the two cones, the rear extremity of the outer cone being open for its discharge, substantially as described.

7. A threshing machine comprising an outer cone mounted to rotate, and having imperforate walls, a second cone centrally arranged within the outer cone leaving a space for the passage of straw between the two cones the inner cone being constructed to prevent the entrance of the straw, the outer cone being provided with interiorly projecting fingers and the inner cone with exteriorly projecting coöperating fingers, a

stationary air drum located at the base of the outer cone and communicating therewith, a threshing cylinder mounted at the base of the outer cone, the chamber of the cylinder being in communication with the last named cone, means for delivering an air blast into the air drum and thence into the space between the two cones, and means for simultaneously rotating the cones in opposite directions, substantially as described.

8. A threshing machine including a cone mounted to rotate and having imperforate walls, means located at the base of the cone for loosening the grain from its natural condition in connection with the straw, and delivering the same into the base of the said cone, means located at the base of the cone for screening the grain from the chaff and straw, a forwardly inclined member projecting in front of said means for directing the grain forwardly in the cone and means for introducing an air blast at the base of the cone for carrying the straw and chaff rearwardly therethrough, the rear extremity of the cone being open for the discharge of the straw, substantially as described.

9. A thresher comprising an imperforate cone open at both extremities, means located at the base of the cone for loosening the grain from its natural condition in the straw and delivering the straw and grain into the base of the cone, means for introducing an air blast at the base of the cone and directing it rearwardly whereby the straw is caused to travel therethrough, the forward extremity of the cone being equipped with means for screening the grain from the chaff and straw, an inclined member for directing the grain forwardly in the base of the cone the cone being interiorly provided with a spirally arranged shoulder or offset, and means for rotating the cone in a direction to cause the grain which catches in the rear of the said offset, to travel forwardly, substantially as described.

10. A threshing machine including a hollow imperforate cone mounted to rotate, its inner surface being provided with a spirally arranged shoulder or offset, means located at the forward extremity of the cone for loosening the grain from its natural condition in the straw, a forwardly inclined member for delivering the grain into the base of the cone, means for introducing an air blast into the base of the cone for carrying the straw and chaff therethrough, and means for rotating the cone in a direction to cause the grain which engages the spirally arranged shoulder, to travel forwardly or toward the base of the cone, substantially as described.

11. A threshing machine including a cone mounted to rotate, a threshing cylinder located at the base of the cone and by means of which the straw and grain combined are delivered into the base of the cone, an open-ended conduit centrally mounted within the cone and arranged longitudinally thereof, and means for delivering an air blast into the base of the cone and into the said conduit which terminates at the rear portion of the cone whereby the blast of air from the conduit and that passing through the cone, are mingled at the rear extremity of the latter, substantially as described.

12. A thresher comprising a casing, a cylinder located at the forward extremity of the casing for dislodging the grain from the straw, a frustum-shaped grizzly located in the rear of the cylinder, an outwardly flared member connected with the rearward and smaller extremity of the grizzly and adapted to form a stop to prevent the grain passing through the grizzly, from mingling with the straw, substantially as described.

13. A threshing machine comprising a hollow member mounted to rotate, a second member arranged within the first named member and mounted to rotate in the opposite direction, a grizzly located in one extremity of the hollow member and provided with a member adapted to form a stop to prevent the grain passing through the grizzly and from mingling with the straw and chaff, and means for causing the straw and chaff to travel through the said hollow member, substantially as described.

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

JOHN E. MILLER.

Witnesses:
A. J. O'Brien,
Dena Nelson.