W. W. BROWER.

THRESHING MACHINE.

APPLICATION FILED DEC. 26, 1901. RENEWED JUNE 7, 1905.

1,054,170.

Patented Feb. 25, 1913.

2 SHEETS—SHEET 1.

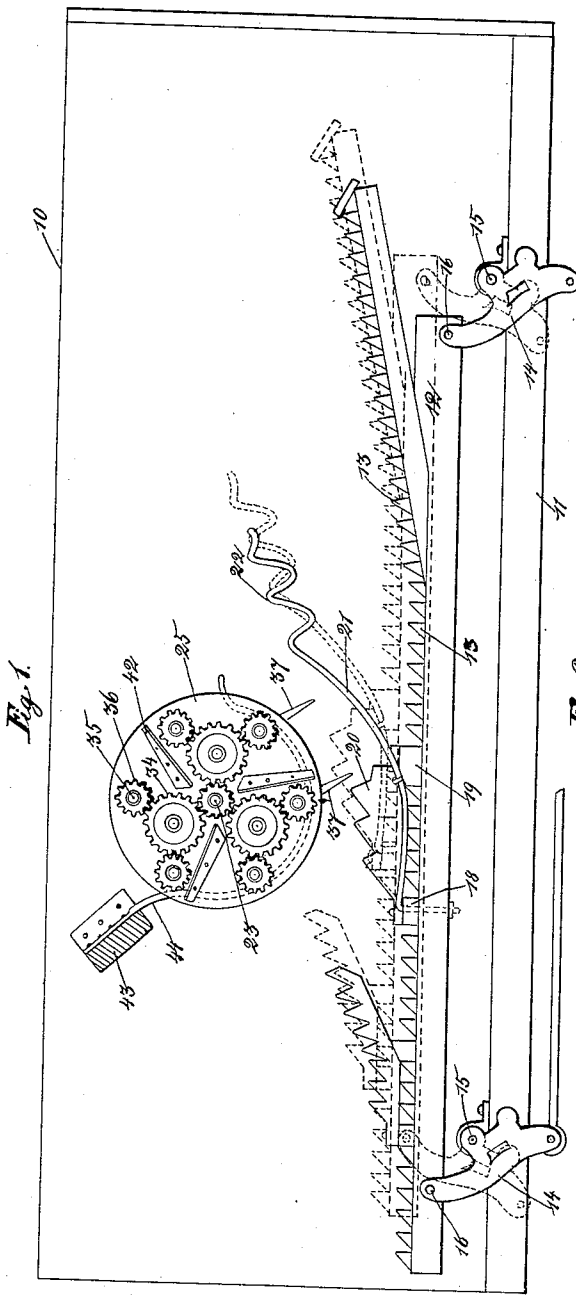

Fig. 1.

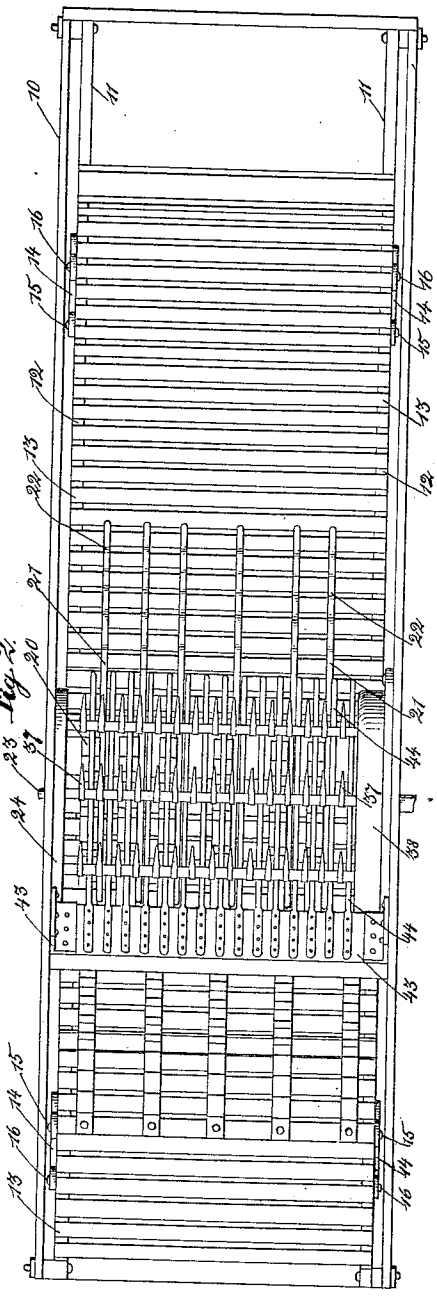

Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

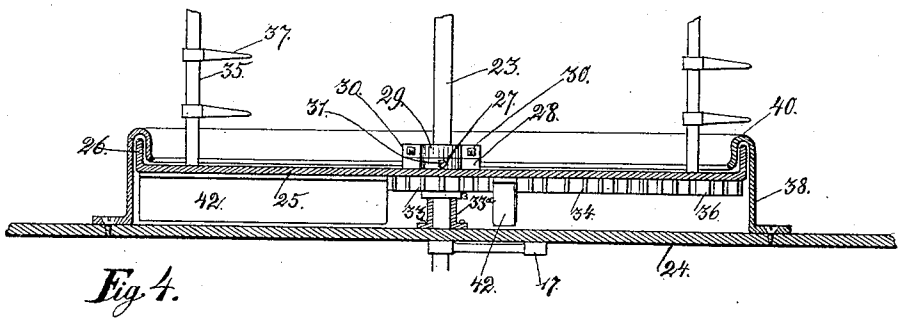


Fig. 4.

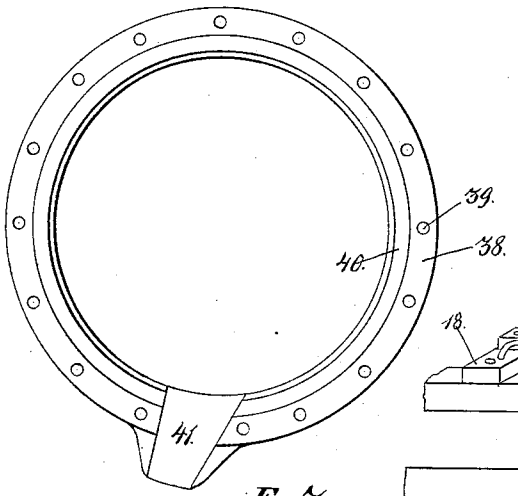


Fig. 5.

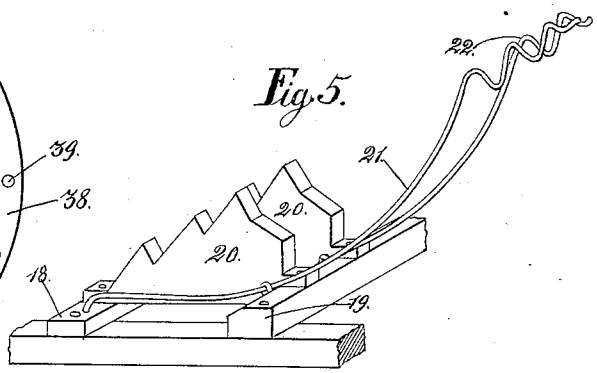


Fig. 6.

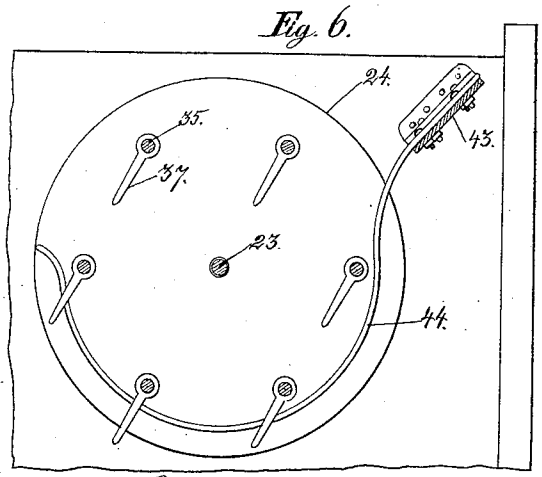
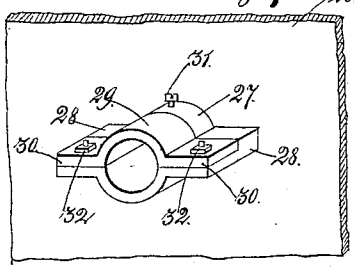


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM W. BROWER, OF MESERVEY, IOWA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE SATTLEY STACKER COMPANY, OF INDIANAPOLIS, INDIANA, A CORPORATION OF MAINE.

THRESHING-MACHINE.

1,054,170. Specification of Letters Patent. Patented Feb. 25, 1913.

Application filed December 26, 1901, Serial No. 87,268. Renewed June 7, 1905. Serial No. 264,168.

To all whom it may concern:

Be it known that I, WILLIAM W. BROWER, a citizen of the United States, residing at Meservey, in the county of Cerro Gordo and State of Iowa, have invented certain new and useful Improvements in Threshing-Machines, of which the following is a specification.

My invention relates more particularly to improved separating devices, designed to be mounted in the rear of the thresher cylinder and adapted to effect the separation of the threshed grain from the straw.

The prime object of my invention is to provide a practical and effective apparatus adapted to separate the stream or mass of straw discharged by the thresher cylinder into many small portions, thus facilitating and insuring the separation of the grain berries.

Other objects more or less anciliary to this one prime object, also the means which I employ for attaining all of the various objects, will appear in the following description in connection with the accompanying drawings which illustrate a preferred embodiment of the invention.

Figure 1 shows in side elevation a part of a threshing machine with one of the wooden sides of the machine removed and the dust guard removed to show the operative mechanism on the interior thereof, the position of the straw tables being illustrated by dotted lines at one limit of its movement and by solid lines at the other limit. Fig. 2 is a top or plan view of the same portion of a threshing machine with the top removed. Fig. 3 is an enlarged detail, sectional view of one of the disks for supporting the shafts having teeth and illustrating the means for excluding dust from the gearing device. Fig. 4 is an enlarged, detail side view of the dust excluding guard detached. Fig. 5 shows in perspective a portion of the frame of the straw table with two of the upright toothed ribs in position thereon and two of the spring metal separating rods adjacent thereto. Fig. 6 is a vertical, sectional view illustrating the fender or guards and the shaft having teeth adjacent thereto to illustrate their respective positions, and Fig. 7 is a perspective view of a portion of one of the disks and the means for clamping said disk to its shaft.

Referring to the accompanying drawings I have used the reference numeral 10 to indicate the sides of the threshing machine frame and 11 indicates the stationary, longitudinal braces thereof. Mounted between the sides of the machine frame is a straw table 12 of ordinary construction having the trinagular cross pieces 13 fixed thereto with spaces between them to permit the passage of grain. This table is supported at its ends upon levers or rocker arms 14 which are pivoted at 15 to suitable stationary supports, as the braces 11, and at 16 are pivoted to the straw table.

I have provided a device to be applied to the central portion of the straw table for the purpose of aiding in the separation of the grain as follows: The reference numerals 18 and 19 indicate two cross pieces fixed to the sides of the straw table in lieu of the two triangular cross pieces 13, and fixed to these cross pieces 18 and 19, at regular intervals throughout their length, are the toothed ribs 20. These ribs are materially higher at their rear ends than at their front ends for purposes hereinafter made clear. Between each pair of ribs is a spring rod 21 fixed to the cross pieces 18 and 19 and curved upwardly and rearwardly and provided with serrations 22 at their upper end portions.

Mounted in the sides of the machine frame above the ribs 20 is a shaft 23, and fixed to the end portions of this shaft between the sides of the machine frame are the disks 24 and 25. These disks are of similar construction except that the disk 25 has an inwardly projecting flange 26. Each disk is provided with a device whereby it may be clamped to the shaft 23, which device is clearly illustrated in Fig. 7. This device comprises a cylindrical extension 27 formed integral with the disk and projecting inwardly. At the sides of the cylinder 27 are the laterally projecting plates 28. Near the outer end portion of the cylinder 27 the upper half of the cylinder 27 and the plate 28 is removed, and in place thereof is a semicylindrical part 29 having laterally projecting plates 30 at its ends, said

parts being so shaped that when in position they will form a continuation of the cylinder 27 and the plates 28.

The numeral 31 indicates a set screw passed through the cylinder 27, and 32 indicates bolts for connecting the plates 30 with the plates 28. In manufacture, the disks are firmly fixed and then the interior of the cylinder 27 is bored out at exactly right angles to the disk. Then the part 29 and 30 is formed, and the disk is placed on the shaft with the shaft projecting through the cylinder 27. Obviously when the set screw 31 is screwed tight against the shaft the disk will necessarily assume a position exactly at right angles to the shaft, then the part 29 and 30 may be placed in position and the bolts 32 provided to firmly clamp the shaft therein to prevent its rotation relative to the disk. This construction is designed as a substitute for the ordinary method of keying said disks to the shaft and has a considerable advantage over the common method, in that greater accuracy is possible in connecting the disk at right angles to the shaft and the parts may be more readily detached.

I have mounted upon the shaft 23 near the outer face of the disk 25 a loose sleeve 33ª, one end of which is fixed to the machine frame and the other to a pinion 33, and rotatably mounted on the outer surface of the disk are three pinions 34 in mesh with the pinion 33. I have passed through the disks 24 and 25 a series of shafts 35, and fixed to these shafts 35 at points adjacent to the outer face of the disk 25 are the pinions 36 in mesh with the pinions 34. At their other ends the said shafts are rotatably mounted in the disk 24, and intermediate their ends these shafts 35 carry teeth or fingers 37. With this construction it is clear that a rotation of the shaft 23 will cause the disk to rotate and the shaft 35 will be carried by the disks around a common center, the teeth 37 meanwhile being maintained in downwardly extending positions at a substantially constant angle to the horizontal.

I have provided means whereby the heavy dust which always appears in the interior of the threshing machine may be prevented, to a certain extent, from entering the space where the pinions are contained and for removing any particles of dust which may enter this space, so as to prevent the dust from lodging in the teeth of the pinions, as follows: The reference numeral 38 indicates a rim provided with the openings 39 by which it may be secured to the side of the machine frame. This rim is provided with a part 40 to project inwardly around the flange 26 of the disk 25, said part being curved to overlap both sides of said flange and to extend as close to the flange as is possible without interfering with the movement of the flange in the rim. Near the bottom of the said rim 38 is an opening 41 for purposes hereinafter made clear, and attached to the outer face of the disk 25 is a series of fans or blades 42 extending from a point near the periphery of the disk 25 to a point near the central pinion 33, said fans or blades being arranged between the pinions and being large enough to project outwardly to a point near the side of the frame. The function of these fans or blades is to strike any particles of dust that may enter the space in which the pinions are inclosed, and when these particles have accumulated on the flat surface of the fans to any considerable extent they are forced downwardly with a current of air through the opening 41 and are thereby discharged and prevented from entering between the teeth of the pinions.

Obviously the rim 38 and the part 40 thereof which overlaps the flange 26 of the disk 25 will prevent any considerable amount of dust from entering the space in which the pinions are contained. However, it is practically impossible to exclude all particles of dust, and I have found that in a device of this class dust will accumulate on the central pinion to such an extent as to quickly render it inoperative unless some means are provided for preventing the dust from settling upon said pinions. I have found that by providing the fans or blades 42 and the opening 41 that all of the particles of dust will be carried by said fans or blades downwardly through the openings 41 and the operation of the pinions will not be affected thereby.

In connection with the rotary toothed shafts I provide a straw deflecting device or guard having a peculiar coöperative relation with the toothed shafts and the adjacent straw table parts. This device comprises a cross piece 43 fixed to the sides of the machine frame, and curved rods 44 which are secured to this cross piece. These rods extend downwardly and rearwardly and then upwardly around the lower part of the rotary separator mechanism and are so spaced in relation to the teeth 37 on the shafts 35 that the teeth in their downward movement pass freely between them, as shown in Figs. 1, 2 and 6. It will be seen that the rods 44 serve as guards or fenders which prevent straw from rising and becoming entangled with the rotary shafts. But these rods 44 act also as a barrier which positively deflects or presses the straw downward upon the straw table at points adjacent the rotary separator device. This latter function of the rods 44 will be explained more fully in connection with the operation of the machine.

The straw table 12 is given an oscillatory

movement on its lever supports (see full and dotted line showing of the table in Fig. 1) by any suitable driving connections at such velocity as has been found in threshing machine practice to be suitable. As is well understood, the construction of the table and its movement are such that the rearward travel of the table is more effective on the straw than its forward travel so that the straw is gradually fed rearward through the machine.

For the rotation of the rotary separator mechanism any suitable driving connections may be provided which are adapted to drive the mechanism at the desired speed. This speed, while not definitely fixed, should be relatively much greater than that of the straw table. It has been found that good results are secured when the linear travel per minute of the separator fingers is ten or twelve times the rearward travel per minute of the straw table.

In the operation of a threshing machine made in accordance with my invention, the straw, coming from the thresher cylinder, is delivered upon the oscillating table 12 where it settles or is shaken down into a tangled mat. This matted straw carries many grain berries which fail to separate at the thresher cylinder, and because of the matted and compact condition of the straw as it advances over the table, it is difficult to effect their separation. In fact, a large part of these grain berries pass from the machine with the straw and are lost, in the case of ordinary threshing machines having no special separating mechanism. But in my improved machine the straw, as it advances in a matted stream, encounters the barrier bars 44 and tends to crowd downward and rearward into the throat or constricted passage formed by said bars and the straw table. And as the straw enters this throat, a set of fingers 37 is driven downward into and through the stream. The fingers penetrate to the very bottom of the mat of straw because the latter is held up off the bottom of the table by the toothed ribs 20. Then the series of teeth with its clean bite into the straw moves rapidly rearward at a relatively high speed, and as the main mass is held back by the combined action of the barrier bars 44 and the notched ribs 20, the fingers 37 effect a clean separation of a relatively small wisp of the straw and whisk it upward and rearward over the table bars 21, from which it falls to the table proper. The small wisp of straw thus separated from the main mass is so completely opened up that any contained grain berries are free, during the movement from the restricted throat to and over the near ends of the bars 21, to fall to and through the shaking straw table so that they can be recovered. This operation, which has been followed in detail, is repeated with tremendous rapidity by each succeeding set of fingers so that the entire mass of straw passing through the machine is so thoroughly opened up that all the grain berries carried in it are quite free to fall away from the straw so that they can be recovered.

It will be observed that between the series of curved bars 44 above and near the cylinder, and the devices 20 and 21 below and near the straw support, there is formed a relatively narrow passage for the straw which extends rearward and finally upward in a curved direction, and that the cylinder teeth pass at certain places completely across said passageway and to the bottom thereof so as to engage the extreme bottom layer of straws, and move rearwardly through the passageway at a practically constant inclination to the horizontal and in position approximating always to the vertical. Because the teeth 37 are thus maintained in a downward extending position, the straw carried by them would be discharged rearwardly and horizontally except for the fact that it encounters the upwardly inclined bars 21 by which it is deflected upward away from the direction the grain berries tend to pursue under the action of gravity, thus facilitating the separation of said berries. As the teeth finally rise past the bars or guards 44 their maintenance in a constantly downward pointing position causes them to be drawn across the guards in the direction of the length of the teeth, stripping the straw with ease and certainty. The ribs 20 increase in height toward the rear with the effect of lifting the straw web so that first the top part or layer of the front edge of the web, then the intermediate layer, and finally the extreme layer is raised above the top plane of the straw support or table and brought within the range of the described action of the cylinder teeth or forks.

I am aware that it has been proposed, as in Patent No. 179,064, to L. C. Royer, dated June 20, 1876, to operate on threshed material passing over a toothed straw table or shaker, by a rotary rake having radial teeth held in fixed relation to the axis of rotation, which, in operation, were to pass below the top plane of the shaker, and I do not wish to be understood as claiming as my invention any of the features of structure or mode of operation incident to such a mechanism. On the contrary, I employ separating teeth which are not so immovably held, but which are so moved relative to their rotating carrying shaft or cylinder as to be maintained at a constant angle to the horizontal. The operation of teeth so maintained at a constant angle to the horizontal is to force the threshed material rearward in a direction substantially parallel with the straw support without that lifting action

which is incident to teeth that turn upward at a constantly lessening angle to the horizontal until they become horizontal and then begin to point more and more upward.

Having thus described my invention, what I claim is—

1. In a grain advancing and separating device for threshing machines, the combination of a rotatable shaft mounted in the sides of the machine frame, disks fixed to the end portions of said shaft, a series of toothed shafts mounted in the disks and extended parallel with the rotatable shaft and rotating with the disks around the rotatable shaft, means for operating the toothed shafts to hold the teeth in a downwardly extending position through their entire revolution, a straw table, a series of notched ribs fixed to the straw table and inclined upwardly and rearwardly directly beneath the disks, so as to co-act with the toothed shafts in elevating and loosening the layer of straw, and a series of spring bars extending rearwardly and upwardly from a point in the rear of the notched bars and fixed to the straw table, said spring bars co-acting with the toothed shafts and the notched bars in separating the grain from the layer of straw, for the purposes stated.

2. In a grain advancing and separating device for threshing machines, the combination of a rotatable shaft mounted in the sides of the machine frame, disks fixed to the end portions of said shaft, a series of toothed shafts mounted in the disks and extended parallel with the rotatable shaft and rotating with the disks around the rotatable shaft, a series of pinions fixed to said shafts, a stationary central pinion meshed with the pinions on the shaft, said teeth on the shafts standing at a downwardly and rearwardly inclined angle throughout their entire revolution, a straw table, a series of notched ribs fixed to the straw table and inclined upwardly and rearwardly directly beneath the disks, so as to co-act with the toothed shafts in elevating and loosening the layer of straw, and a series of spring bars extending rearwardly and upwardly from a point in the rear of the notched bars and fixed to the straw table, said spring bars co-acting with the toothed shafts and the notched bars in separating the grain from the layer of straw, for the purposes stated.

3. In a grain advancing and separating device for threshing machines, the combination of a rotatable shaft mounted in the sides of the machine frame, disks fixed to the end portions of the said shaft, a series of toothed shafts mounted in the disks and extended parallel with the rotatable shaft and arranged to rotate with the disks around the rotatable shaft, a series of pinions arranged to operate said toothed shafts, a dust guard having an opening therein and inclosing said pinions, and air propelling means arranged to blow the dust within the guard out through the opening, for the purposes stated.

4. In a device of the class described, the combination of a rotatable disk, an integral hub on the disk, said hub having its portion adjacent to the disk forming a complete cylinder to receive a shaft and its outer portion forming a half cylinder and provided with radial plates, a set screw in the cylindrical portion for centering the shaft mounted in the cylindrical portion, and a detachable semi-cylindrical portion provided with radial plates bolted to the outer end portion of the hub, for the purposes stated.

5. In a threshing and separating machine, the combination with the table which receives the straw and advances it at a relatively slow speed, of a rotary separator having a series of sets of fingers held continuously at substantially the same angles to the horizontal and adapted to travel endwise and downward across the path of the straw and then in the path of the same at a relatively high speed, the rotary separator being arranged to form a narrow throat for the passage of the straw between the separator and the top of the table, and the table being provided with notched ribs in said throat and between the paths of the fingers of the separator, and the guards or fenders adapted to prevent the straw from rising as it advances under the separator and having passages for the downward movement of the said fingers and extending upward at the points where the said fingers have a rising movement, substantially as set forth.

6. In a threshing and separating machine, the combination with the table which receives the straw coming from the threshing cylinder and advances said straw in a matted stream at a relatively slow speed, of a rotary mechanism arranged above said table and having a set of fingers extending substantially across said table and held continuously in downwardly extending positions and adapted to travel endwise and downward across the path of the stream and then in said path at a relatively high speed, and straw-deflecting means disposed adjacent the front side of the rotary mechanism and extending downward and rearward toward the table to form in conjunction with said table a constricted, restraining passage into which the straw advances and from which it is drawn bit by bit by the rapidly moving fingers of the rotary mechanism.

7. In a threshing and separating machine, the combination with the table which receives the staw coming from the threshing cylinder and advances said straw in a matted stream at a relatively slow speed,

of a rotary mechanism arranged above said table and having a set of fingers extending substantially across said table and held continuously in downwardly extending positions and adapted to travel endwise and downward across the path of the stream and then in said path at a relatively high speed, guards extending around the rotary mechanism and having between them passages for the downward movement of the said fingers, and longitudinally disposed upstanding serrated members mounted on the table beneath the rotary mechanism, the said rotary mechanism and guards being disposed so as to form in conjunction with the table and upstanding serrated members a constricted, restraining passage into which the straw advances and from which it is drawn bit by bit by the rapidly moving fingers of the rotary mechanism.

8. In a threshing and separating machine, the combination with the table which receives the straw coming from the threshing cylinder and advances said straw in a matted stream at a relatively slow speed, of a rotary mechanism arranged above said table and having a set of fingers extending substantially across said table and held continuously in downwardly extending positions and adapted to travel endwise and downward across the path of the stream and then in said path at a relatively high speed, straw-deflecting means disposed adjacent the front side of the rotary mechanism and extending downward and rearward toward the straw table, and upstanding members mounted on the table beneath the rotary mechanism and adjacent the lower part of the said straw-deflecting means, the rotary mechanism and straw-deflecting means being disposed so as to form in conjunction with the table and the upstanding members a constricted, restraining passage into which the straw advances and from which it is drawn bit by bit by the rapidly moving fingers of the rotary mechanism.

9. In a separating mechanism for threshing machines, the combination with a straw separating and advancing cylinder and straw table, of the series of notched ribs inclined relative to the horizontal, and the series of spring bars inclined relative to the horizontal the said ribs and bars being situated within the range of action of said cylinder, acting upwardly on the straw at points above the paths of the points of the cylinder teeth and coöperating with said cylinder to separate the grain from the straw.

10. In a separating mechanism for a threshing machine, the combination of the rotating separating cylinder carrying downwardly extending teeth, means for maintaining said teeth during the rotation of the cylinder at a constant angle to the horizontal, straw supporting means having downward passages for the grain and arranged beneath said cylinder, upwardly and rearwardly extending spring bars arranged for coöperation with the cylinder teeth, ribs on the straw table in front of the spring bars and within the paths of the cylinder teeth, and means for causing the upward and downward movement of said spring bars during the rotation of said cylinder.

11. In a threshing machine, the combination of a rotary cylinder at the rear of the threshing mechanism, a straw supporting means below the cylinder and having downward passages for the grain, an upper series of bars or guards near the cylinder, a lower series of straw guiding devices near the said straw supporting means, said upper and lower series forming a passageway for the straw, and said upper series of bars and lower series of guiding devices being curved and approximately parallel to form an upwardly curved passageway, and teeth or forks carried by the cylinder and moving, by the rotation of the cylinder, rearwardly through said passageway.

Des Moines, Iowa, October 26, 1901.

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