J. H. FREEZE.

THRESHING MACHINE.

APPLICATION FILED APR. 23, 1909.

963,887.

Patented July 12, 1910.

2 SHEETS—SHEET 1.

FIG 1

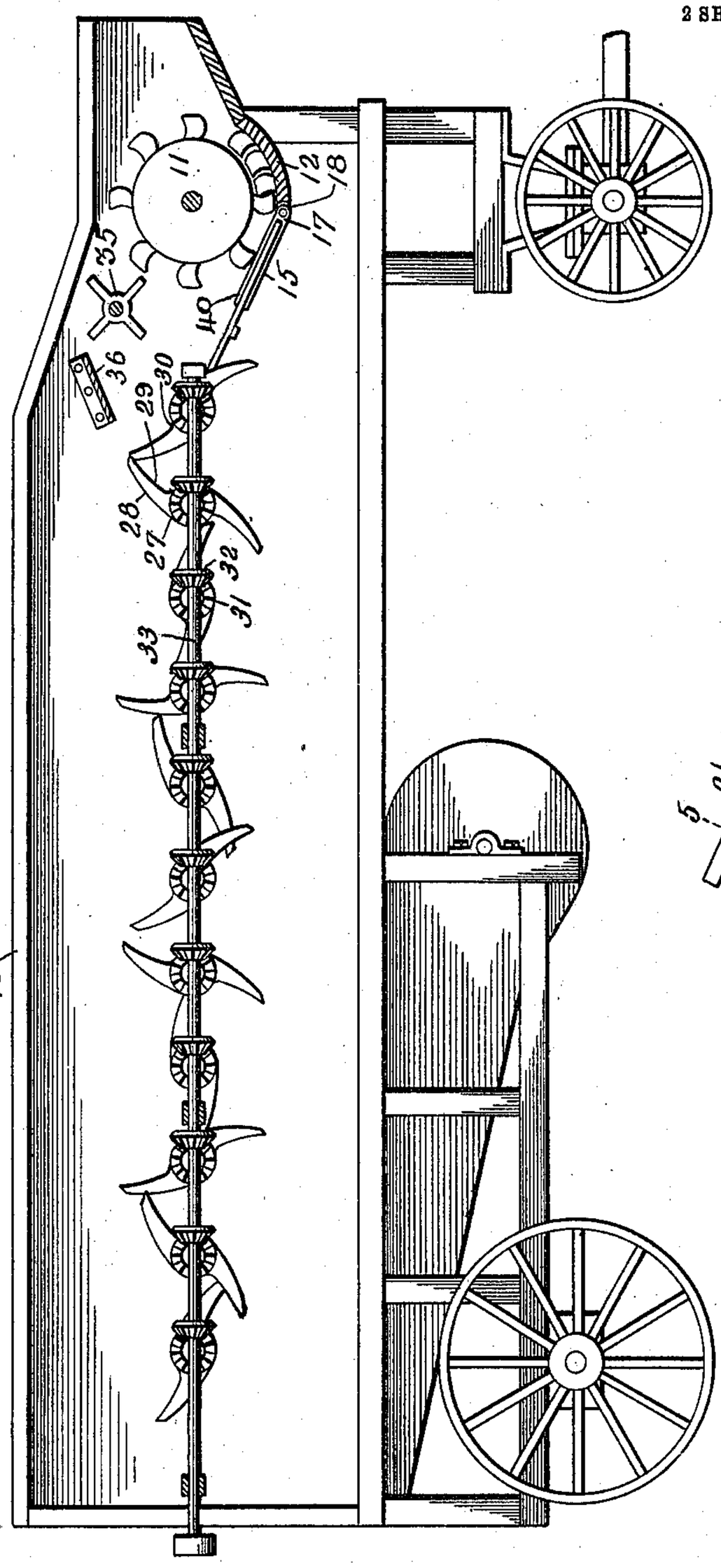

FIG 4

FIG 5

Witnesses

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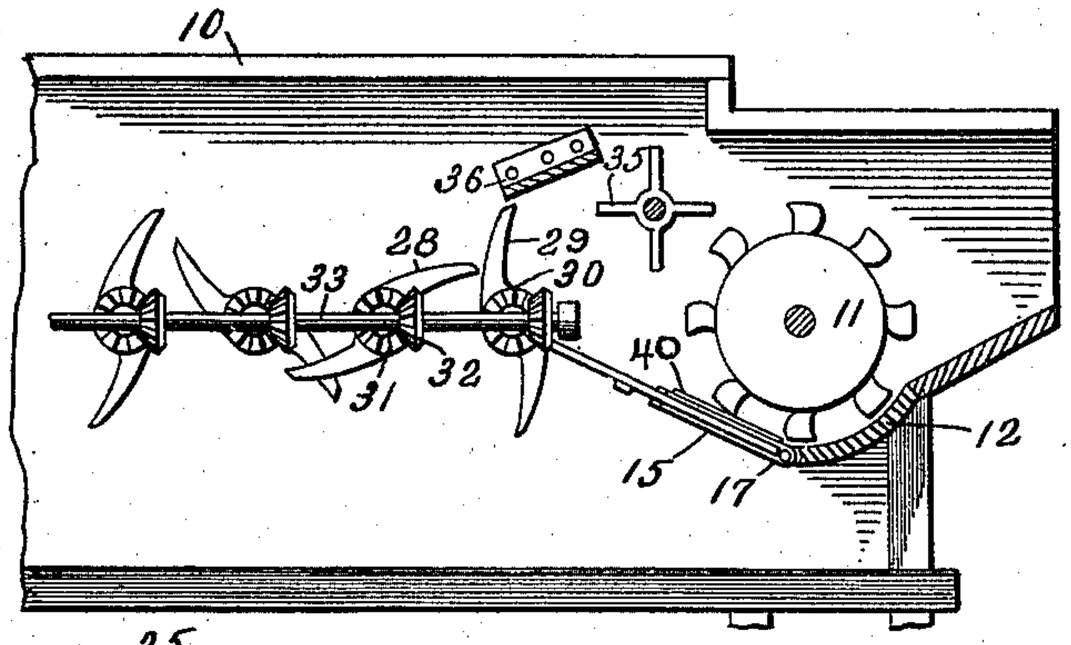
2 SHEETS—SHEET 2.

Fig 3



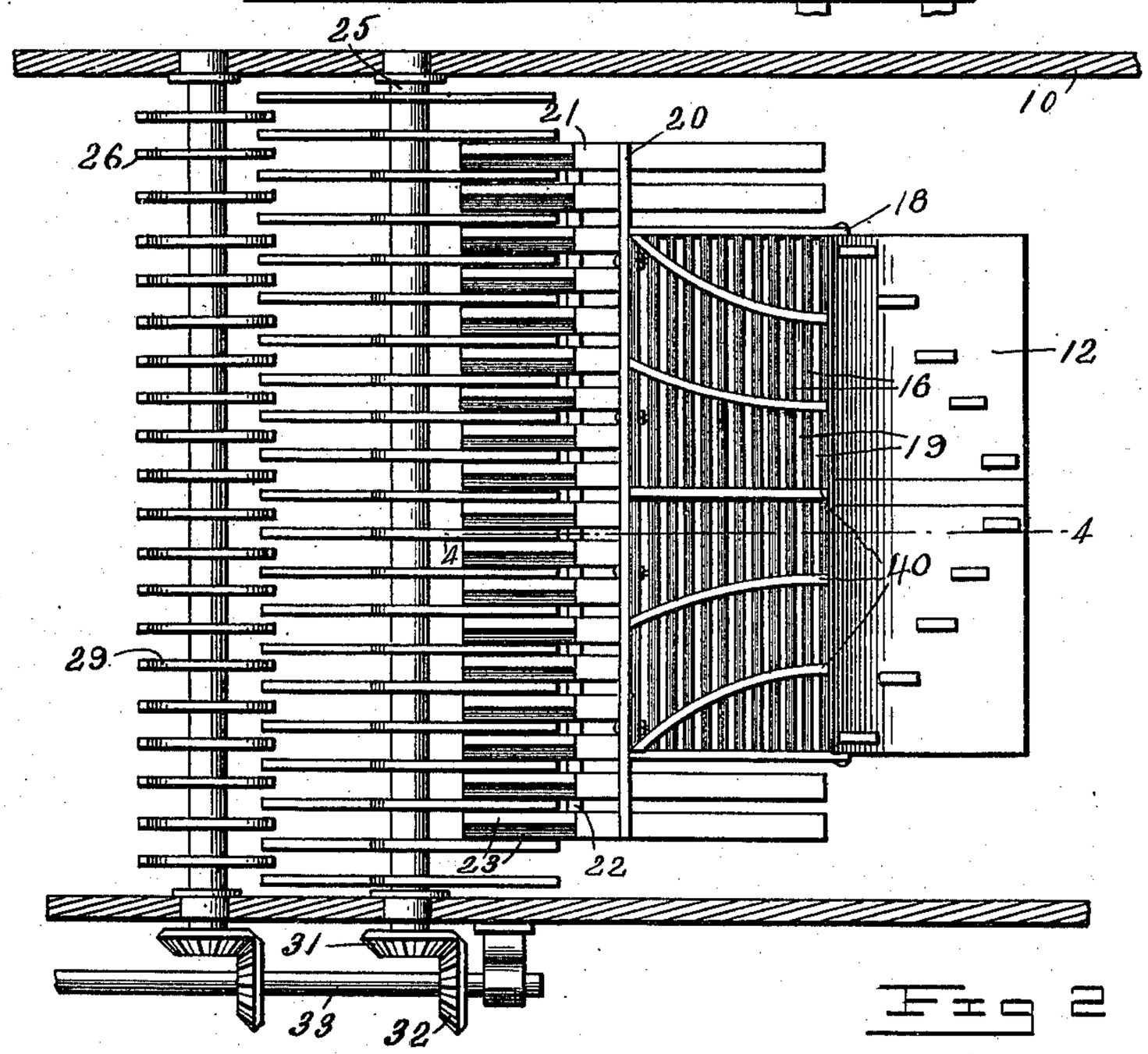


Fig 2

Witnesses

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UNITED STATES PATENT OFFICE.

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THRESHING-MACHINE.

963,887. Specification of Letters Patent. **Patented July 12, 1910.**

Application filed April 23, 1909. Serial No. 491,859.

To all whom it may concern:

Be it known that I, JOHN HENRY FREEZE, a citizen of the United States, residing at Cape Girardeau, in the county of Cape Girardeau and State of Missouri, have invented new and useful Improvements in Threshing-Machines, of which the following is a specification.

My invention relates to improvements in threshing machines, and has particular relation to the means for separating the straw and grain.

The object of my invention is to provide a threshing machine in which the threshed material will be given such movements as will insure a thorough separation of the grain from the threshed straw.

A further object is to provide a separating means for a thresher which is simple and efficient in operation, durable in construction, composed of a minimum number of parts and which is of comparative low cost of manufacture.

To these and other ends, the nature of which will be readily understood as the invention is hereinafter disclosed, said invention consists in the improved construction and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings, in which similar reference characters indicate similar parts in each of the views, Figure 1 is a side elevation of a conventional form of threshing machine and separator having my improved construction mounted therein, one side of the machine being omitted to more clearly illustrate the conveyer. Fig. 2 is a plan view of a portion of my improved construction, the top of the frame of the threshing machine being omitted. Fig. 3 is a fragmentary view similar to Fig. 1 and showing the fingers of the conveyer in a different position. Fig. 4 is a sectional view taken on line 4—4 of Fig. 2. Fig. 5 is a sectional view taken on line 5—5 of Fig. 4 on an enlarged scale.

10 designates the frame of a threshing machine of any preferred form, the particular form being immaterial provided the same includes an interior space through which the threshed material passes of sufficient size to permit of the mounting therein of the separating mechanism hereinafter described.

As the invention does not pertain to any portion of the construction of a threshing machine other than that providing the separating of the grain and straw, the usual shakers, screen, etc., are omitted, it being understood, of course, that such of these parts as may be required in the general threshing operation will be provided, these parts being located below the separating mechanism described.

11 designates a threshing cylinder, and 12 the concave, the latter preferably being of less width than the general form of concave, the rear edge thereof being located adjacent to and in rear of a line drawn vertically through the axis of the cylinder. The cylinder and concave are provided with teeth arranged in any preferred manner to provide the threshing of the material.

The present invention contemplates the use of a separating conveyer spaced from the path of movement of the cylinder, a stationary guide for the threshed material, said guide being formed to provide for the passage of loose grain, and means, carried by the guide, for spreading the threshed material as it passes from the cylinder and concave.

15 designates a rectangular frame composed of a plurality of bars 16 extending laterally of the machine, said bars having their ends connected to a suitable plate 17 mounted at each end of the frame, said end plates having forwardly extending ears 18 adapted to be pivotedly connected to the concave at its rear. The bars 16 are spaced apart to form passage-ways 19 having a width sufficient to permit of the passage of the grain, each passage-way being continuous from one end plate to the other thereby providing a passage-way having its direction of length extending parallel with the axis of the cylinder and at direct right angles to the path of movement of the threshed straw.

20 designates a bar bolted or otherwise secured to the rear of frame 15, said bar carrying a plurality of fingers 21 extending rearwardly and being seated on a bar 22 extending from one side to the other of the threshing machine frame, each finger being preferably nailed to the bar 22. The fingers 21 have their forward ends preferably flat (providing a substantially square configuration in cross-section) while the rear

ends are triangularly shaped in cross-section, the apex of the triangle being at the top of the finger, this construction providing the lower surface of the finger of substantial equal width throughout the length of the finger, but having its upper surface leading from a flat condition to one having inclined sides leading from a line approximate the longitudinal center of the finger, said inclined faces, designated as 23, tending to cause the grain to pass toward the spaces formed between adjacent fingers.

The frame 15 and fingers 21 are preferably arranged at an incline, as shown in Figs. 1 and 3, the bar 22 being positioned in the machine frame in a manner to provide for this inclination. By so inclining these parts, the threshed material is thrown onto the surface of the frame 15 (which serves as a screen frame) and, owing to the relatively narrow width of the passage-ways 19, the movement of the straw is practically unimpeded, with the result that it passes over the frame 15 onto the fingers without liability of choking up at this point. Inasmuch as the freeing of the grain kernels from the straw during the passage of the material by the cylinder and concave, causes many of the grain kernels to become loose from the straw, the presence of the frame 15 provides for their immediate elimination and restricting the amount of flying kernels.

The separating carrier or conveyer comprises a plurality of rows of rotating carrying agitators having their axes parallel with the axis of the cylinder. Each row of agitators is formed of a shaft 25 having its ends supported by the sides of the thresher frame, and provided with a plurality of fingers 26 extending from opposite diametrical sides of hubs 27 carried by the shaft 25, said fingers each having a convex surface 28 and concave surface 29 to provide a finger decreasing in width toward its outer end, the surface 29 having its inner portion curved to meet the lines of curvature of the hub; said surface 29 and the portion of the hub onto which it leads form what may be termed a pocket 30. The fingers of each hub are of similar configuration and are in direct opposition to each other, the particular curvature of the faces 28 and 29 serving a particular function in the operation of the carrier or conveyer.

For the purpose of distinguishing the parts, each pair of fingers and the hub by which they are carried are designated as an agitator member, the series of members carried by one shaft forming what I term an agitator. The fingers of the agitator members of any one shaft are arranged with their faces in alinement, thereby providing a structure extending from one side to the other of the machine and having a series of spaced rotating surfaces adapted to receive and carry the straw successively from one agitator to the next throughout the length of the carrier.

Each shaft 25 has one of its ends provided with a bevel gear wheel 31, adapted to mesh with a similar wheel 32 carried by a suitably driven shaft 33 extending longitudinally of the machine in a single plane and having its ends mounted in bearings carried by the frame of the machine, said shaft 33 imparting movement to each of the shafts 25 simultaneously and at equal speed. The plane of the axis of the shaft 33 is above that of the point of exit of the threshed material from the concave, viz, the point where the rearmost concave teeth are located. The particular distance above the plane of such point may vary according to circumstances, the essential feature being that the agitators will have an operating path of movement which will place the row or rows of fingers in the path of movement of the threshed material as it leaves the cylinder and concave without the necessity of providing a retarding means other than a single beater, and thereby leaving substantially the entire space above the conveyer free from any elements which would act to direct the material toward any of the agitators in rear of the first row. For instance, in the drawings, the axis of the shaft 33 is shown as being approximately the same as the plane of the axis of the shaft for the cylinder 11 and these planes correspond with the planes of the axis of the shafts 25. The actual location of the planes of the two parts (the axis of the cylinder 11 and the axis of the shaft 33) in the position shown in the drawings, may be varied to place the axis of shaft 33 above or below the plane of the axis of the cylinder 11, this variation, however, being limited to a point below the cylinder-axis plane where the entire length of the finger will be brought into the path of movement of the threshed material as it is discharged from the cylinder concave. By arranging the axis of the shafts 25 on a single plane, it will be understood that a single shaft 33 may be used.

The agitators are spaced apart a distance sufficient to permit of the free rotation of the fingers of the agitator members, but the path of movement of the upper ends of the fingers extend in close proximity to the hub of the agitator members of the adjacent agitators, thereby eliminating any liability of the formation of a permanent space of any considerable size between adjacent agitators. In order that this result may be obtained the agitator members of adjacent agitators have their fingers out of alinement, the fingers of the agitators having paths of movements extending into the spaces between the fingers of the adjacent agitator, the arrangement being such that alternate agi-

tator members have their fingers in alinement longitudinally of the machine. The points of opposing fingers forming an agitator member are located on a line extending diametrically through the hub of the member, and for the purpose of explanation I term this line the "agitator diametric" line.

As shown, in the drawings, the agitator diametric lines of adjacent agitators are at angles opposed to each other, the angles being arranged to provide for a meeting of the points of the fingers of adjacent agitators approximately, as shown by the pair of agitators at the right in Fig. 1 of the drawings. In this position the fingers of the second agitator located above the plane of the axes of the agitators are passing out of the path of movement of the fingers of the first agitator, leaving the latter fingers to retain the threshed material during the movement of the agitators until the lower fingers of the second agitator pass to a position where they will begin to raise the material from the fingers; as shown by other pairs of agitators in said figure, the point where the lower fingers begin operation on the material is spaced below the plane of the axes of the agitators, so that the material as it passes from one agitator to the next is moved to points on both sides of the plane of the axes of the agitators. Inasmuch as the material at its lowest point is carried by the fingers of the two agitators, the raising fingers having the surface 28, there is a tendency for the material to be moved toward the pocket formed by the surface 29, the movement of the raising fingers forcing the material by the hub of the preceding agitator and thereby tending to affect the condition of the material being carried, the continuation of the raising movement of the fingers carrying the material upward until it reaches a point where it will pass from the raising fingers onto the opposite fingers of the agitator by its weight, the operation being continued from one agitator to the next. It will also be seen from an examination of Fig. 1, that alternate agitators have their agitator diametric lines approximately parallel with each other but not in actual parallelism, the construction being such that the line of the succeeding alternate agitator is advanced to some extent relative to the line of the preceding alternate agitator. This provides a construction by means of which adjacent agitators cannot have their diametric lines at direct right angles to each other, thereby not only providing for movement of the threshed material to a point below the plane of the axes of the shafts 25, but in addition provides for a successive positioning of diametric lines in a vertical direction, thereby insuring the presence of at least one row of fingers above the plane of the shafts 25 having the face 29 approximately vertical and in the path of movement of any flying material such as straw.

By reason of the location of the plane of the axes of the agitators, it will be readily seen that after the material passes from the cylinder and concave a free movement of the threshed material toward the point of exit from the machine is restrained first by the inclined stationary separator formed by the frame 15 and fingers 21, these parts requiring that the threshed material move upwardly and then by the agitator fingers which are located within the path of movement of the material. While it is possible that the action of the teeth of the cylinder might be such as to tend to throw the straw out of the path of movement of the agitators in some instances, such instances are rare owing to the fact that the concave ceases its action at a point prior to the time the teeth begin to move from the lowermost position which they assume in the movement of the cylinder, continued movement of the teeth carrying the material over the grated frame 15 which, presenting but slight obstruction permits the teeth to be readily disengaged from the straw. Should, however, the material be thrown upwardly in a manner to escape the fingers of the agitators, its course will be changed by the beater 35 which would deflect the material onto the agitator fingers. In addition, I provide a plate 36 located in rear of the beater 35 and between it and the conveyer, said plate serving to prevent liability of grain being thrown entirely over the conveyer, said plate changing the course of the grain to cause it to be thrown onto the conveyer. The agitators are positioned in such manner longitudinally of the thresher as to have the fingers of the first agitator pass within the spaces formed between adjacent fingers 21.

By this construction it will be readily understood that a free movement of the material to the point of exit from the machine is prevented without the requirement of the use of material-retarding means other than agitator fingers which serve as conveyers in the separating carrier; it will also be understood that while the material passes from one side to the other of the plane of the axes of the agitators there is no possibility of the material dropping entirely below the plane of the path of movement of the rotating fingers, while the movements of the agitators place the material under constant agitation to change the relative positions of the mass of straw, the latter not only having a raising and carrying movement onward through the conveyer, but also successive lowering and raising movements which serve to beat out the grain from the straw without liability of choking the carrier.

I preferably provide the agitators of a length greater than the cylinder and concave in order that the moving layer of material may be spread out to aid in the separation of the grain. To provide for this spreading of the material I mount on the upper face of the frame 15 a series of spreading bars 40 which extend a short distance above the top plane of the frame 15. The forward ends of the several bars are spaced at approximately equal distances along the frame 15, the rear ends of said bars also being spaced at approximately equal distances from each other the distance between the rear ends of adjacent bars being greater than at the forward ends, the bars, with the exception of the center bar, being curved outwardly toward the rear. This construction causes the material as it passes from the cylinder and concave to be spread out over the fingers 21, the latter being extended forwardly in front of the bar 20 at the ends of the frame 15, as shown in Fig. 2, this spreading movement having the effect of thinning out the layer of material before it is taken up by the separating carrier. At the same time, the thinning out of the layer of material directly after it leaves the concave, and while over the frame 15, tends to cause the grain kernels to be freed from the straw and permitted to pass through the frame and through the spaces between the fingers 21.

Having thus described my invention what I claim as new is:

1. In a threshing machine, the combination with a cylinder and concave, and a conveyer, said conveyer including a plurality of rotating agitators located in the rear of and spaced from the cylinder, of an upwardly-inclined material-supporting element positioned intermediate the concave and conveyer, and means carried by said element for spreading the material during its passage to and prior to its entrance into the travel path of the agitators, said element including a device located in rear of the spreading means and extending into the path of movement of the agitators to support the spread material in its travel from the spreading means to and into the agitator travel path.

2. In a threshing machine, the combination with a cylinder and concave, and a conveyer spaced from and located in rear thereof, said conveyer including a plurality of rotating agitators in rear of and spaced from the cylinder, of a slotted screen positioned in rear of the concave, and a plurality of rearwardly extending fingers carried by the screen, said screen and fingers combinedly forming a floor over which the threshed material passes, said floor being inclined upwardly from the concave and positioned to cause the fingers to project into the plane of the path of the rotating agitators, and spreading bars carried by the said screen and adapted to spread the threshed material during its passage over the floor, said fingers supporting the threshed material in its travel from the spreading bars to and into the agitator travel path.

3. In a threshing machine, the combination with a cylinder and concave, and a conveyer spaced from and located in rear thereof, of a plurality of spaced bars located intermediate the concave and conveyer, said bars extending parallel with the axis of the cylinder to provide passage-ways for the freed grain passing from the cylinder and concave, spreaders secured to and projecting from the top of said bars and a plurality of fingers spaced one from the other extending rearwardly from said bars, said fingers extending into the path of movement of the conveyer.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN HENRY FREEZE.

Witnesses:
MERCER D. WILSON,
THOS. M. WILLIAMS.