J. B. BARTHOLOMEW.

STRAW BRUISER.

APPLICATION FILED NOV. 13, 1909. RENEWED FEB. 23, 1915.

1,159,822.

Patented Nov. 9, 1915.

2 SHEETS—SHEET 1.

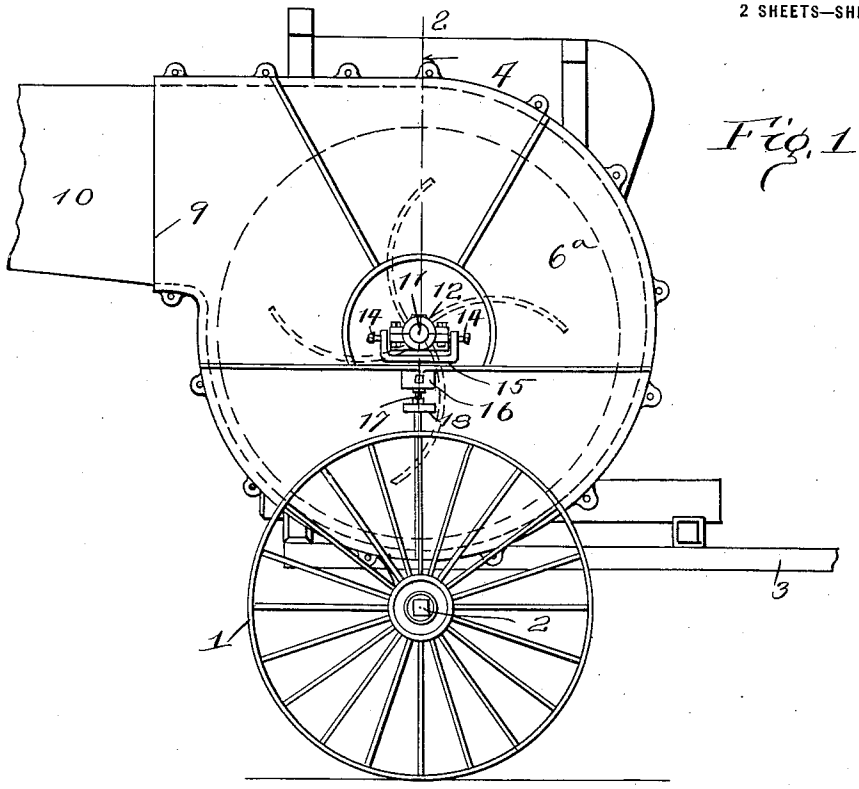


Fig. 1.

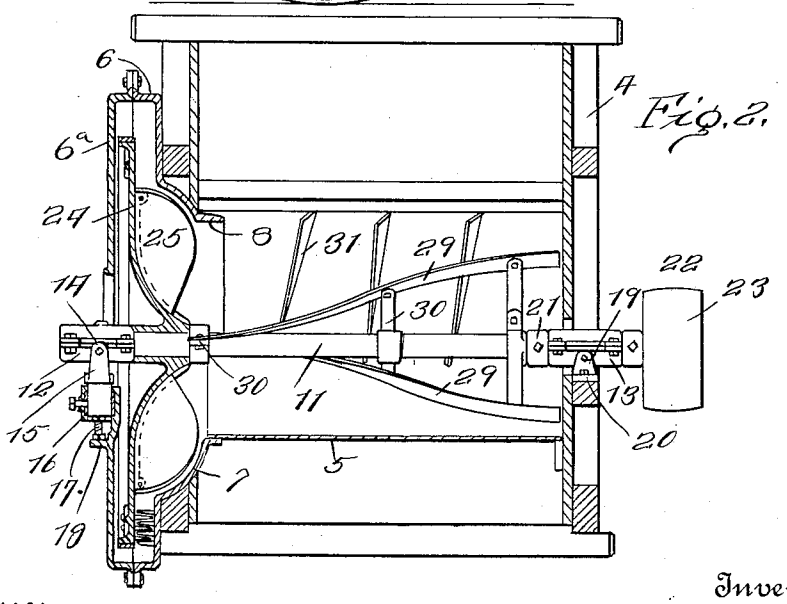


Fig. 2.

Witnesses

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Fig. 3.

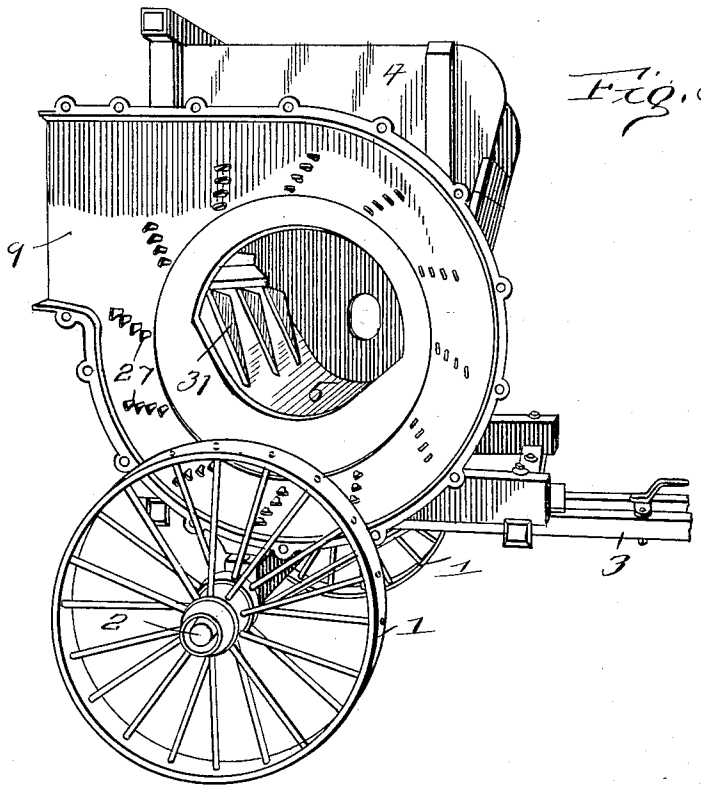
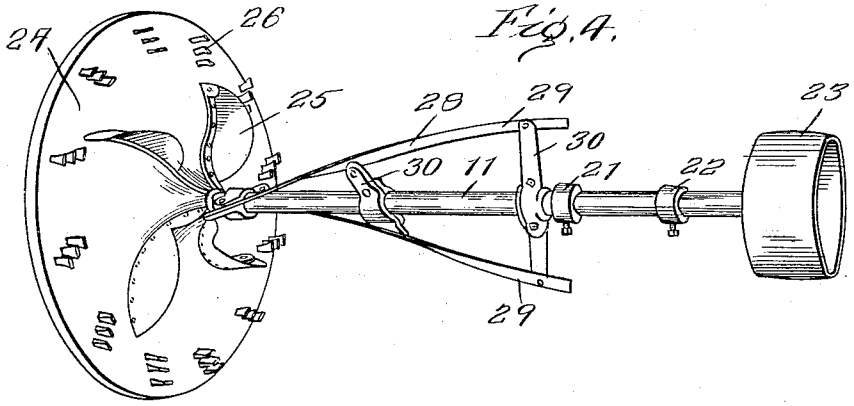


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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STRAW-BRUISER.

1,159,822. Specification of Letters Patent. Patented Nov. 9, 1915.

Application filed November 13, 1909, Serial No. 527,870. Renewed February 23, 1915. Serial No. 10,125.

To all whom it may concern:

Be it known that I, JOHN B. BARTHOLOMEW, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Straw-Bruisers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in machines for bruising or disintegrating straw. In many cases, especially when the straw is of a coarse and hard texture, it is desirable that it be crushed and broken up before being used for feed. It is for accomplishing this work of breaking up and crushing the straw that machines embodying my invention are adapted.

One object of my invention is to provide a machine having improved means for feeding the straw from a hopper or receptacle to the bruising or disintegrating mechanism.

Another object is to provide an improved mechanism partly dependent upon air currents and partly dependent upon centrifugal action for receiving the straw from the conveying means, bruising and disintegrating it and throwing it tangentially outward away from the machine.

Other objects will be apparent from the following specification and claims.

In the drawings I have shown a machine embodying my invention mounted on separate supporting wheels. It will be found desirable, however, in many cases, to construct the machine as an integral part of a threshing machine. I do not wish to be limited to the exact detailed construction which I have shown in the drawings and it will be understood that various changes may be made within the scope of my invention.

Of the drawings, Figure 1, is a side elevation of a machine embodying my invention. Fig. 2 is a cross sectional view of the upper part of the machine, the supporting wheels and axle being omitted. Fig. 3 is a perspective view, the casing cover and the rotating parts being removed. Fig. 4 is a perspective view of the rotating parts of the machine.

Referring to the drawings, 1, 1, are the supporting wheels mounted on the axle 2.

3 is a draft-tongue suitably connected to the axle.

4 is a hopper mounted upon the axle and the draft-tongue. This hopper is preferably substantially rectangular in form and the side walls and framework thereof may be constructed of wood. The top of the hopper is left open for the reception of straw either from a thresher or from any other desired source. The hopper is provided with a sheet metal bottom 5, a portion of which forms a segment of a cylinder. From each side of this cylindrical segment the metal extends diagonally upward and joins the front and back walls of the hopper.

On one side of the hopper is mounted a flat casing 6. This casing is preferably formed of cast iron and is provided with a removable cover 6^a. The side of the casing adjacent the hopper is provided with an extension 7 which projects through a suitable aperture in the wall of the hopper. The extension 7 is provided with an aperture 8 which provides communication between the hopper and the casing. The lower edge of the aperture 8 is in substantial alinement with the sheet metal bottom 5 of the hopper. The casing is provided with a discharge trunk 9, which extends in a direction tangential to the outer periphery of the casing. To this trunk 9 may be connected a pipe 10 through which straw may be conducted to any desired point. The radius of the casing 6 gradually increases from the lower side of the discharge trunk 10 around to the opposite upper side thereof, thus forming a spiral peripheral wall.

11 is a shaft extending through the hopper and through the center of the casing. This shaft 11 is mounted in the two bearings 12 and 13. The box of the bearing 12 is supported on the two screws 14, 14, which pass through the yoke 15. By turning these screws 14, 14, the position of the shaft may be adjusted laterally. The yoke 15 is pivotally mounted in the bracket 16 formed on the casing cover. It is supported by means of the tap bolt 17, the head of which rests on the lug 18 formed on the casing cover. By turning this tap bolt the position of the shaft may be adjusted vertically. The box of the bearing 13 is supported on the screws 19, which pass through the ears of the bracket 20. Secured to the shaft at each side of the box of the bearing 13 are located the two thrust collars 21 and 22. A belt pulley 23 is attached to the end of the shaft for driving it.

24 is a runner formed preferably of cast iron and suitably fastened to the shaft to rotate within the casing. The main part of this runner extends radially at right angles to the shaft. Near the shaft however the runner is curved toward the hopper, the radius of curvature being such that the curve, if extended, would meet the shaft substantially tangentially. On the side of the runner which is curved laterally and which is adjacent the hopper, are provided a series of vanes or blades 25. In the drawings I have shown these vanes as separate pieces of sheet metal riveted to suitable ribs on the runner. If preferred, however, the vanes may be cast integral with the runner. Any suitable number of vanes may be used and they may be of any one of a variety of shapes to meet the conditions under which the machine is designed to operate. In the drawings I have shown four of these vanes, each approximately semi-circular in form and each curved backward relative to the direction of rotation.

On the side of the runner on which the vanes are located, but outside of their outer circle of rotation, are located a series of bruising or disintegrating teeth 26. These are arranged in a plurality of rows, the rows being preferably equally spaced about the runner and lying at a slight angle to radii passing through the teeth, the inner end of each row being slightly in advance of the outer end. For purposes of illustration I have shown three teeth in each row. These teeth are equally spaced and the teeth of each row are located similarly to the teeth of each other row. The cross sectional shape of each tooth in a radial plane is that of a truncated wedge.

In the casing, on the wall which is adjacent the hopper, is located a series of teeth 27, similar to the teeth on the runner. These teeth are arranged in a plurality of equally spaced rows lying at the same angles to the radii as do the rows of teeth on the runner. The teeth of each row are equally spaced and are arranged to interlace with the teeth on the runner when the runner is rotated. This action is best shown in Fig. 2. As the angles of the two groups of rows are the same, the teeth of any two rows in passing will at one instant lie in alinement, the alined teeth being attached alternately to the casing and to the runner. As the rows of teeth 27, 27 are arranged at equal distances from the axis there is provided outside of them, between them and the peripheral wall, a passage which gradually increases in width.

28 is a spiral conveyer attached to the shaft and located within the hopper. As shown in the drawings it comprises two opposite spirally bent metal strips 29 which are connected to the shaft by means of the arms 30, 30. This conveyer is adapted to operate in close proximity to the segmentary cylindrical part of the hopper bottom to convey material into the aperture to the casing.

31, 31, are guide plates preferably formed of sheet metal and attached to the metal bottom of the hopper. They are inclined toward the intake opening of the casing and thus coöperate with the conveyer to move the straw in that direction.

The operation of this machine is as follows: The machine is located preferably at the rear end of a threshing machine whereby a constant supply of straw may be deposited in the hopper. The shaft is rotated by means of a belt on the pulley wheel 23 preferably at a speed of about one thousand revolutions per minute. The spiral conveyer coöperating with the plates 31, serves to move the straw laterally in the hopper into the intake opening 8 of the casing. The runner with its attached blades 25 acts as a centrifugal fan and creates a strong air draft through the hopper into the casing. This air draft serves as an auxiliary to the conveyer in moving the material toward the casing. In fact in many cases this air draft alone would be sufficient to move the straw and the conveyer could be dispensed with. The straw as soon as it enters the casing is caught by the vanes 25 and rapidly rotated. This rotative movement tends to immediately throw the straw outward by centrifugal force. The tendency of the straw to move outwardly is also greatly augmented by the strong draft of air which is also moving outward and in which the straw is partially suspended.

As soon as the straw has moved outward into alinement with the teeth, it is at once caught by the rapidly moving teeth of the runner which instantly force it and draw it through between the teeth of the casing. In this way each piece of the straw is crushed and shredded and pulled apart. In fact each piece of straw may pass between several rows of teeth before it is finally disengaged. In passing from any one row of teeth of the casing to the next there is a constant tendency for the particles of straw to be moved radially outward on account of the outward moving air currents. And in this way after passing between the teeth of possibly several rows the straw at last reaches the annular space in the casing outside of the teeth. Here it is caught by the current of air passing toward the discharge trunk 9 and is in this way removed from the casing. This space or passageway, as before stated, gradually increases in width and cross area in the direction of movement of the hay and the straw, thus providing sufficient room for the passage of the straw which gradually increases in quantity

around the periphery. The pipe 10 which is attached to the trunk 9 serves to carry the disintegrated or bruised straw to any desired point of deposit. It will be understood that when a machine of this type is constructed as an integral part of a threshing machine that it takes the place of the ordinary wind stacker such as is commonly used.

The adjustable features of the bearing 12 permit the runner to be adjusted so that the teeth will properly mesh and coöperate with the teeth of the casing. The teeth are subjected to considerable wear on account of their constant contact with the tough hard straw and on this account occasional readjustment may be found necessary. Longitudinal adjustment of the runner and shaft may be made if desired by changing the position of the thrust collars which are adjacent the bearing 13.

What I claim is:—

1. In a machine of the class specified, the combination of a shaft, a circular radially extending runner secured to the shaft, one surface of the runner being curved laterally to form a truncated conoid concentric with the shaft, a series of vanes secured to the runner adjacent the conoid and extending toward the outer periphery, a series of teeth perpendicularly disposed on the runner beyond the vanes but on the same side therewith, a casing inclosing the runner and having an intake aperture in alinement with the shaft and adjacent the side of the runner on which the vanes and teeth are located, the said casing also having a discharge opening in tangential alinement with the periphery of the runner, and a series of teeth on the casing adapted to coöperate with the teeth on the runner to disintegrate the straw, a circumferential channel being left within the casing and outside of the said teeth for the passage of material to the said discharge opening, substantially as set forth.

2. In a machine of the class described, the combination of a rotatable disk-like runner, vanes secured to one side of said runner and extending outward, a plurality of teeth perpendicularly attached to the runner beyond the vanes and arranged in a series of separated substantially radial rows, the teeth in each row being equally spaced and disposed similarly to the teeth in each other row, a casing inclosing the said runner and having an aperture in alinement with the axis of the runner and adjacent the side of the runner on which are located the vanes and teeth, the said casing also having a discharge opening in its outer peripheral wall, and a plurality of teeth secured to the casing and arranged in a series of separated substantially radial rows, the teeth in each row being equally spaced and similarly disposed to those in each other row, the teeth on the runner being arranged to pass between and interlace with the teeth on the casing as the runner is rotated, substantially as set forth.

3. In a machine of the type specified, the combination of a hopper and a casing at one side of the hopper, the said hopper and casing having communicating apertures, a conveyer in the hopper adapted to move material toward the aperture, a runner in the casing rotatable about a horizontal axis and having outward extending vanes adapted to create air currents which coöperate with the conveyer to move material toward the said aperture, the said runner also being provided with teeth beyond the vanes, teeth on the casing to coöperate with the teeth on the runner, and a discharge duct connected to the casing and tangent to the periphery of the runner, substantially as set forth.

4. In a machine of the class described, the combination of a hopper, a casing adjacent the hopper, the said hopper and casing having communicating apertures, a shaft extending through the hopper and casing and through the apertures between them, a spiral conveyer attached to the shaft and located in the hopper, the said conveyer being adapted to move material toward the aperture, guiding blades in the hopper adapted to coöperate with the conveyer to move material toward the apertures, a runner mounted on the shaft within the casing, vanes on the side of the runner adjacent the hopper, teeth on the runner outside of the vanes, teeth on the casing adapted to coöperate with the teeth on the runner, and a discharge duct connected to the casing in tangential alinement with the periphery of the runner, substantially as set forth.

5. In a machine of the type specified, the combination of a rotatable disk-like runner, one surface of the runner being curved laterally to form a truncated conoid concentric with the shaft, a series of vanes perpendicular to the main plane of the runner and adjacent to the truncated conoid, a casing closely surrounding the runner, the said casing having an annular part of less width than the part surrounding the runner, an intake opening being provided adjacent the side of the casing on which are located the vanes and straw bruising devices circumferentially distributed outside of the outer circle of rotation of the vanes in the said narrow annular part of the casing, substantially as set forth.

6. In a machine of the class described, the combination of a rotatable runner, teeth on the runner, each substantially parallel to the axis of rotation, the teeth being arranged in a series of separated outward extending rows equi-distantly distributed circumferentially, a casing, stationary teeth on the casing arranged in a series of separated outward extending rows equally distributed circumfer-

entially and adapted to interlace with the teeth on the runner, and means on the said runner whereby the straw may be passed radially outward between the interlacing teeth, substantially as set forth.

7. In a machine of the class specified, the combination of a shaft, a circular radially extending runner secured to the shaft, a series of vanes secured to the runner extending toward the outer periphery, a series of teeth perpendicularly disposed on the runner beyond the vanes but on the same side therewith, a casing inclosing the runner and having an intake aperture in alinement with the shaft and adjacent the side of the runner on which the vanes and teeth are located, the said casing also having a discharge opening in tangential alinement with the periphery of the runner, and a series of teeth on the casing adapted to coöperate with the teeth on the runner to disintegrate the straw, the casing having a spiral wall forming a gradually widening circumferential channel within the casing and outside of the said teeth for the passage of material to the said discharge opening, substantially as set forth.

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

JOHN B. BARTHOLOMEW.

Witnesses:
A. L. Gregory,
Lee W. Hazard.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."