

July 16, 1929.

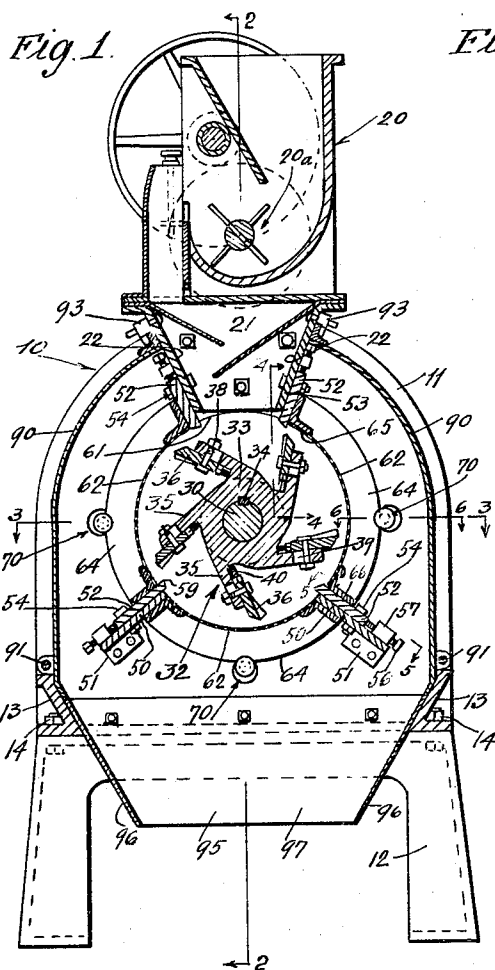
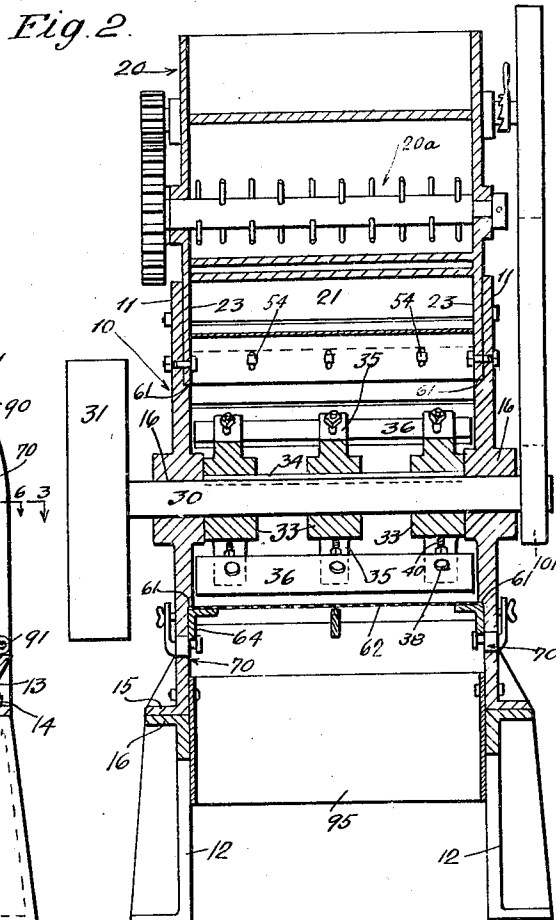
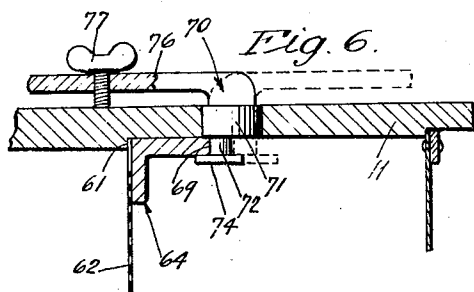
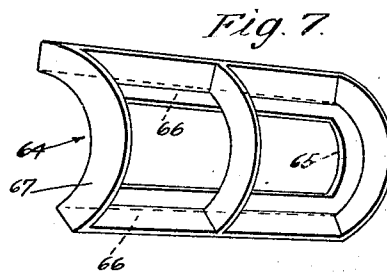
E. McKAIN

1,721,183

GRAIN CUTTER

Filed Oct. 10, 1927

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig 3.

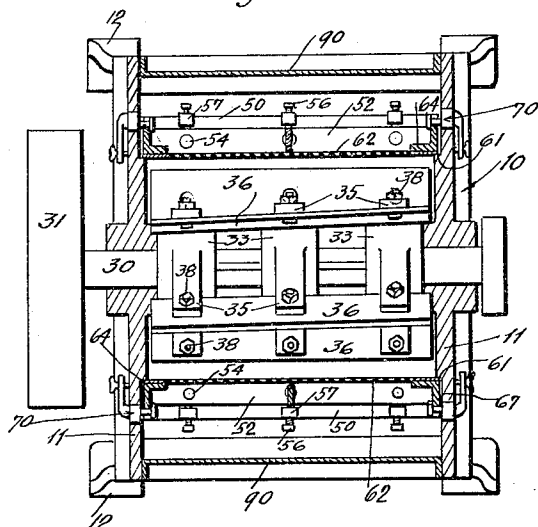


Fig. 4.

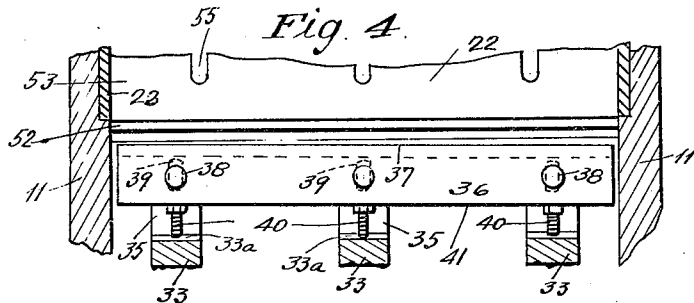


Fig. 5.

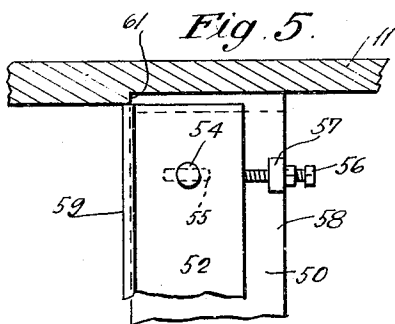
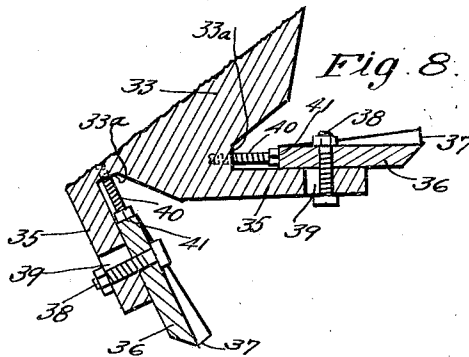


Fig. 8.



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1,721,183

UNITED STATES PATENT OFFICE.

EDWARD McKAIN, OF LOS ANGELES, CALIFORNIA.

GRAIN CUTTER.

Application filed October 10, 1927. Serial No. 225,370.

This invention has to do with cutters for grain and the like, and the main object is the provision of a simple, sturdy and easily accessible machine for cutting grain and similar materials. While the present specific embodiment of the invention is particularly applicable to the cutting of grain and the invention is hereinafter described in that connection, it is to be understood that its use is not limited thereby, as the invention is equally applicable to the cutting of many other materials.

The cutter herein described comprises generally a perforated cutting chamber which receives the grain from the feeder, and which houses a system of rotating and stationary knives so that when the grain is finely enough cut it will be thrown out through the perforations and fall out of the machine.

Objects and features of the invention will be best understood from the following detailed description of a present preferred form, wherein I have reference to the accompanying drawings, in which—

Fig. 1 is a sectional end view of my cutter;

Fig. 2 is a section taken on line 2—2 of Fig. 1;

Fig. 3 is a plan view in section taken on line 3—3 of Fig. 1;

Fig. 4 is a fragmentary view taken on line 4—4 of Fig. 1, showing a stationary and a moving knife in cutting relation;

Fig. 5 is a fragmentary view on line 5—5 of Fig. 1 showing the manner of shifting and clamping the stationary knives;

Fig. 6 is a fragmentary view taken on line 6—6 of Fig. 1 showing the method of clamping the sieve assembly in position;

Fig. 7 is a perspective view of a screen frame;

Fig. 8 is a fragmentary sectional view of the knife assembly.

In the drawings the numeral 10 designates generally the external frame structure, consisting of end plates 11, supporting standards 12, and longitudinal cross ties 13. End plates 11 and supporting standards 12 are rigidly connected by means of bolts 14 which pass through corresponding adjacent brackets 15 and 16 provided on end plates 11 and supporting standards 12, respectively. Cross ties 13 extend longitudinally on each side between the lower portions of the end plates 11 and are rigidly bolted thereto.

Mounted on the machine is any ordinary

feeder, designated generally by the numeral 20. The feeder shown in the drawings is similar to the one completely described in my copending application entitled "Feeder", Serial No. 221,641, filed September 24, 1927, and will not, therefore, be described in detail in this specification. However, any other feeder than the one shown may be utilized. It may be desirable to substitute a magnetic separator for the purpose of separating out nails, or the like, or a simple hopper may serve the purpose, for the form of the feeder is no limitation on the present invention. However, it is advantageous and I prefer to employ ordinarily a feeder of the type shown so that a uniform flow of grain into the cutter will be insured. The feeder terminates in a hopper 21 having sloping side walls 22 and end walls 23. End walls 23 are bolted rigidly to end plates 11, thus supporting the feeder mechanism from the main frame parts 10.

Located centrally in end plates 11 are bearings 16, and journaled in these bearings is a shaft 30 driven by pulley 31. Mounted upon the shaft is the rotating knife assembly designated generally by the numeral 32. Spiders 33, fastened to shaft 30 by means of keys 34, are provided with knife-carrying lugs 35. Carried on lugs 35 are rotating knives 36 having cutting edges 37. There are preferably, though not necessarily, five rotating knives, the advantage of this number being hereinafter explained. Bolts 38 fasten the knives 36 in position on lugs 35. Bolt holes 39 through lugs 35 are elongated to allow inward or outward shifting of the knives. Set screws 40 thread into shoulders 33* on spiders 33, and have their heads in abutment with the rear edge 41 of the knife blade 36 for the purpose of accurately shifting the position of its cutting edge and holding it up to the cutting position.

Extending longitudinally between end plates 11, in a plane substantially radial to shaft 30, and extending radially to within a small clearance of rotating knives 36 are frame members or lower stationary knife supporting brackets 51 which are bolted securely to end plates 11 so that the lower knife supporting members 50 become a rigid part of the main frame.

Side walls 22 of hopper 21 and lower stationary knife supporting members 50 support the stationary knives 52, and both will be hereinafter referred to as upper and

lower knife supporting members 53 and 50, respectively. Bolts 54 fasten the knives to their supporting members and elongated bolt holes 55 in supporting members 50 and 53 allow shifting of the forward edges of the stationary knives, as will be clearly understood from reference to Fig. 5. Set screws 56 thread through lugs 57 provided on the rear edge of face 58 of knife supporting members 50 and 53, and abut against the rear edges of stationary knives 52 for the purpose of accurately shifting the position of their cutting edge and holding them up to the rotating knives. The stationary knives 52 are sharpened to give the knives a cutting edge 59.

The spiders 33 are so positioned upon the shaft 30 that the rotating knives 36 are carried at a shearing angle with the stationary knives, as may be seen in Fig. 3. The rotating knives are not positioned radially with respect to the shaft 30 as are the stationary knives 52, the spider 33 being so formed that the rear edge of the rotating knife is displaced somewhat backward, as may be seen in Fig. 1, thus giving a chisel effect to the cutting process and reducing the strain of cutting to a minimum. Both the rotating and the stationary knives may be shifted to adjust the clearance between the cutting edges or to regulate the clearance of the line of cutting from the screens.

The end plates 11 are provided with outwardly facing annular shoulders 61 which are concentric with shaft 30 and of a radius slightly greater than the radius of the plane of cutting. The knife supporting members 50 and 53 abut against this shoulder, as shown most clearly in Fig. 5. Three perforated plate or screen members 62 resting on shoulders 61, extending longitudinally between end plates 11, and disposed between the knife supporting members enclose a cutting chamber around the rotating knives. These screen members are perforated with holes of a size to allow cut grain of a given desired fineness to pass through. It is obvious that a series of such screens with various sizes of perforations may easily be provided whereby the machine can be made to cut grain to any desired degree of fineness by using screens with the proper size of holes.

Screen frames 64 fit over screens 62, and have faces 65 pressing the screens against seat 61, faces 66 adjacent to the knife supporting members, and faces 67 adjacent to end plates 11. The frames hold the screens in place and back them up, by merely resting against them. Preferably the screens are not secured to the frames.

The screen frames are clamped tightly in place by means of eccentric cam clamps 70, shown best in Fig. 6. Clamp 70 consists of a cylindrical part 71 rotatably mounted

in a drill hole extending through end plate 11, with an eccentric cam 72 at one end operatively engaging edge 69 of screen frame 64, an enlarged cylindrical part or head 74 on the cam 72 overhanging the frame edge 69 of screen frame 64, thus preventing the clamp from being withdrawn when in clamped position, as shown in full lines in Fig. 6. On the other end of cylindrical part 70 is a handle 76 by which the cylindrical part 71 may be rotated and the eccentric cam brought into or out of contact with edge 69 of the screen frame 64. With the clamp in the position shown in full lines in Fig. 6 the screen frame is clamped tightly in place, but with the clamp rotated to the position shown in dotted lines in the same figure, the eccentric cam and its head are removed from engagement with edge 69, so that the clamp may be withdrawn from the end plate 11 and the screen frame and screen lifted out. A wing head set screw 77 threaded through handle 76 and engaging the outside surface of end plate 11 prevents accidental rotation of the eccentric clamp when it is set. Swinging side doors 90 extend longitudinally between end plates 11, and are trunnioned to end plates 11 at 91 so that they may be swung down and open for the purpose of exposing the interior of the machine. These doors form the enclosing side walls of the machine, and confine the cut grain which is thrown through the screens 62. Clamps 93 secured to feeder hopper 21 are adapted to fasten the side doors tightly in their closed position.

Below and in continuation of the side doors 90 and end plates 11 is a grain chute 95 having inclined side walls 96, and end walls 97 which are bolted to end plates 11. Shaft 30 may be provided with a pulley 101 which drives the feeder mechanism 20^a.

The operation of the machine is as follows: Grain is placed in the top of the feeder 20 which causes it to flow into the hopper 21 at any desired uniform rate of flow. After passing down through the hopper it falls into the cutting chamber. The rotating knives are driven at a high rate of speed by any convenient source of power belted to the drive pulley 31. The cutting edges of the knives are located at a small clearance from the screens so that the rotating knives plow up and keep in constant agitation substantially all of the grain in the cutting chamber. The rotating and stationary knives 36 and 52, respectively, coact to shear the grain as it comes between them, and when the particles of cut grain become finely enough cut they are thrown out through the screens 62 and either drop directly into and through the grain chute 95, or hit against the side walls and then drop out through the grain chute 95. A bin may be provided beneath the chute to catch the cut grain as it leaves the machine.

The stationary knives are located with the upper knives more closely together than the lower knives, the exact distances being so regulated that by using a rotating knife assembly having five equally spaced knives, only one pair of rotating and stationary knives will be cutting at a time. Further, by having the rotating knife advancing at a shearing angle to the stationary knife, cutting will be taking place at any instant at only one point of the two knives which are passing at that time. The cutting process thus takes place at only one point at a time and is practically continuous, the point of cutting moving along a pair of blades as they pass, and then shifting to another pair which are just coming into cutting relation. This feature of cutting at any instant taking place at only one point of one pair of knives, combined with the previously mentioned backward displacement of the inner edge of the rotating knives reduces the strain of cutting to an absolute minimum.

A very important feature of my invention is the new and improved structure by which the interior mechanism is made very accessible. By merely letting down the side walls, removing the eccentric cam clamps, and removing the screen frames and screens the interior mechanism is completely exposed so that the knives may be sharpened or adjusted with a minimum of labor. The structure and assembly of the screens, screen frames, eccentric clamps and swinging side doors thus comprise important improvements in the construction of grain cutters.

I claim:

1. A grain cutter or the like comprising a frame having spaced end plates, an outward-

ly facing annular shoulder provided on the inner face of each end plate, removable screen members longitudinally disposed between the end plates, seated on the annular shoulder and enclosing a cylindric cutting chamber, screen frames removably placed over the screens, means for releasably fastening the screen frames in place, a rotating shaft carried by the end plates and concentric with the annular shoulder and the cylindric cutting chamber, rotating knives mounted on the shaft, upper and lower stationary knife supporting members in the frame longitudinally disposed between the end plates and in planes substantially radial to the rotating shaft, stationary knives adjustably mounted on the knife supporting members and extending into the cutting chamber in cutting relation to the rotating knives, and swinging side doors carried between the end plates.

2. A grain cutter or the like comprising a frame having spaced end plates, screens enclosing a perforate cutting chamber carried in the frame, a driven rotating shaft carried by the end plates, five rotating knives evenly spaced and mounted upon the shaft, four stationary knives positioned in cutting relation to the rotating knives and carried in the frame, there being only one rotating knife in cutting relation to a stationary knife at a time, and the rotating knives being mounted at a shearing angle to the stationary knives so that only one point of the rotating knife is in cutting relation to the stationary knife at a time.

In witness that I claim the foregoing I have hereunto subscribed my name this 24th day of September, 1927.

EDWARD McKAIN.