

J. E. GOODHUE.
 FEED GRINDING MECHANISM.
 APPLICATION FILED JULY 6, 1915.

1,166,899.

Patented Jan. 4, 1916.
 4 SHEETS—SHEET 1.

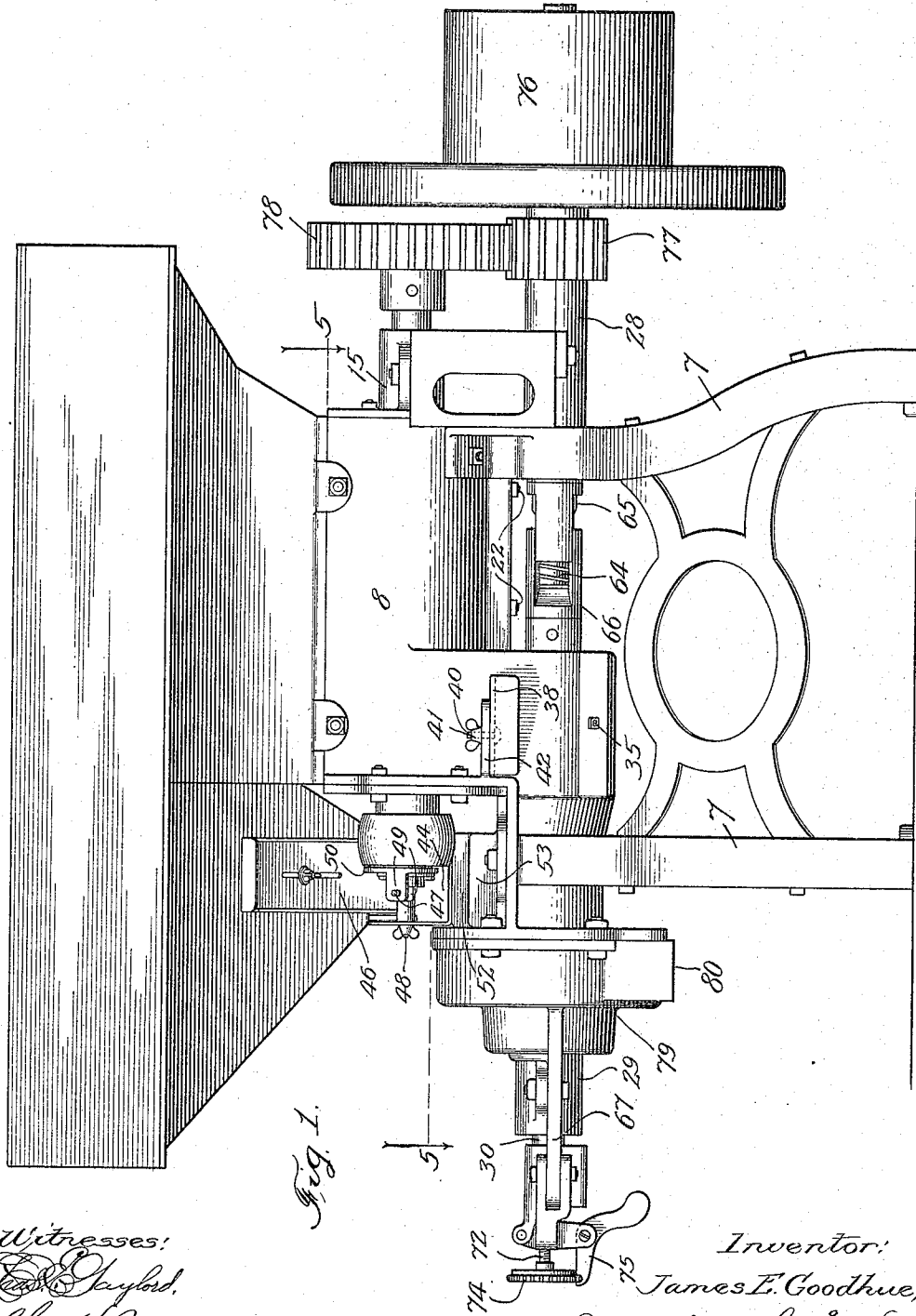


Fig. 1.

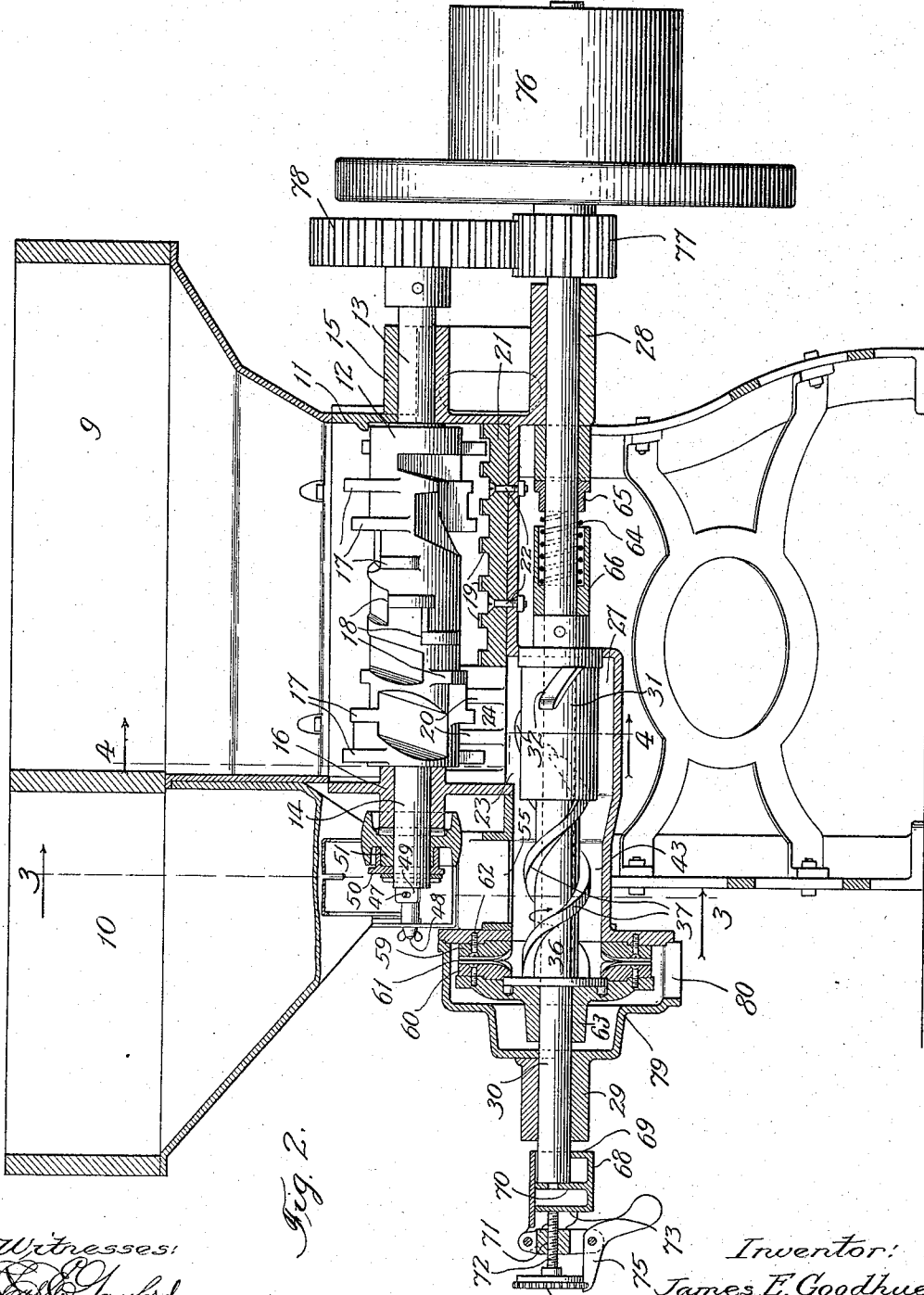
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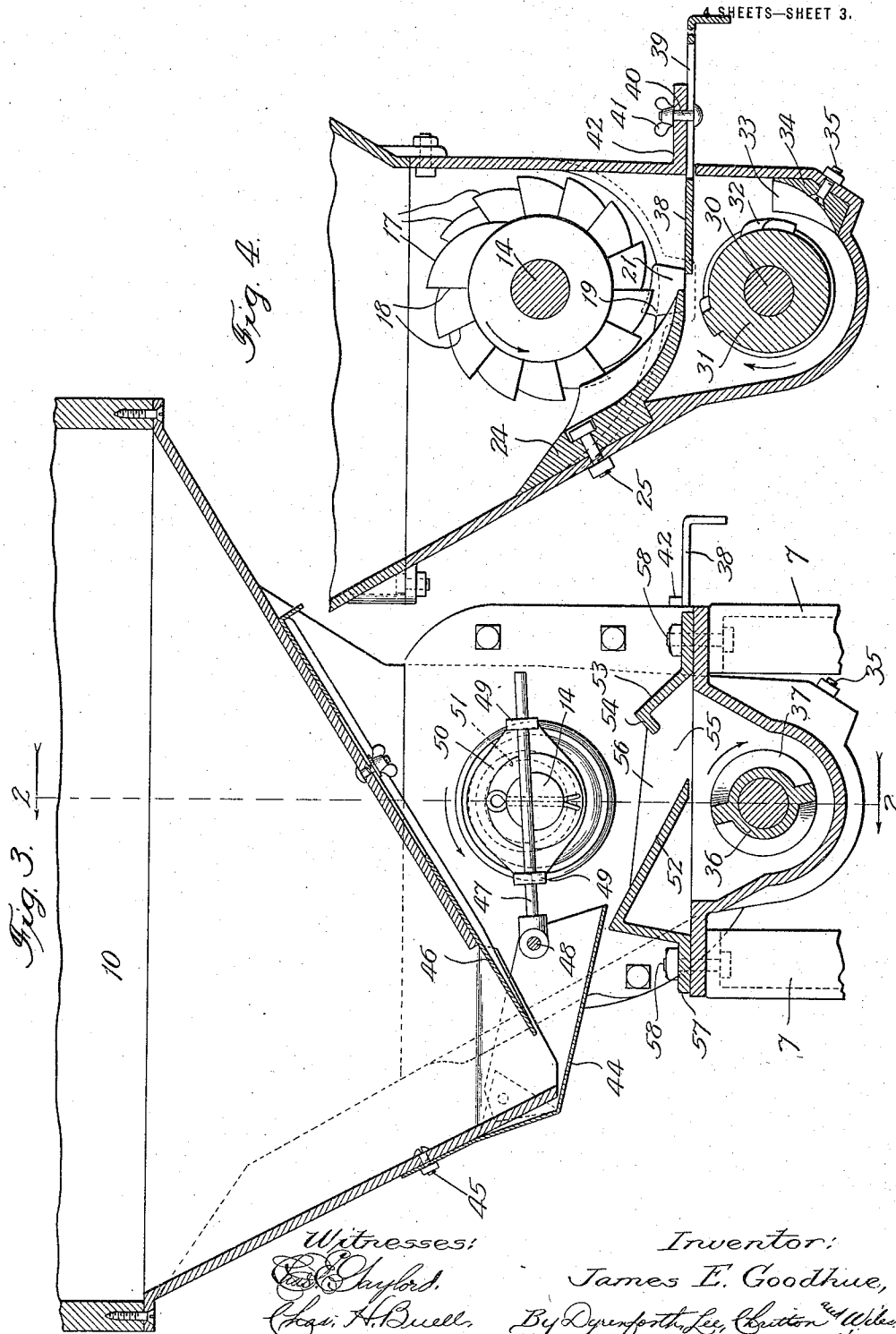
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4 SHEETS—SHEET 3.



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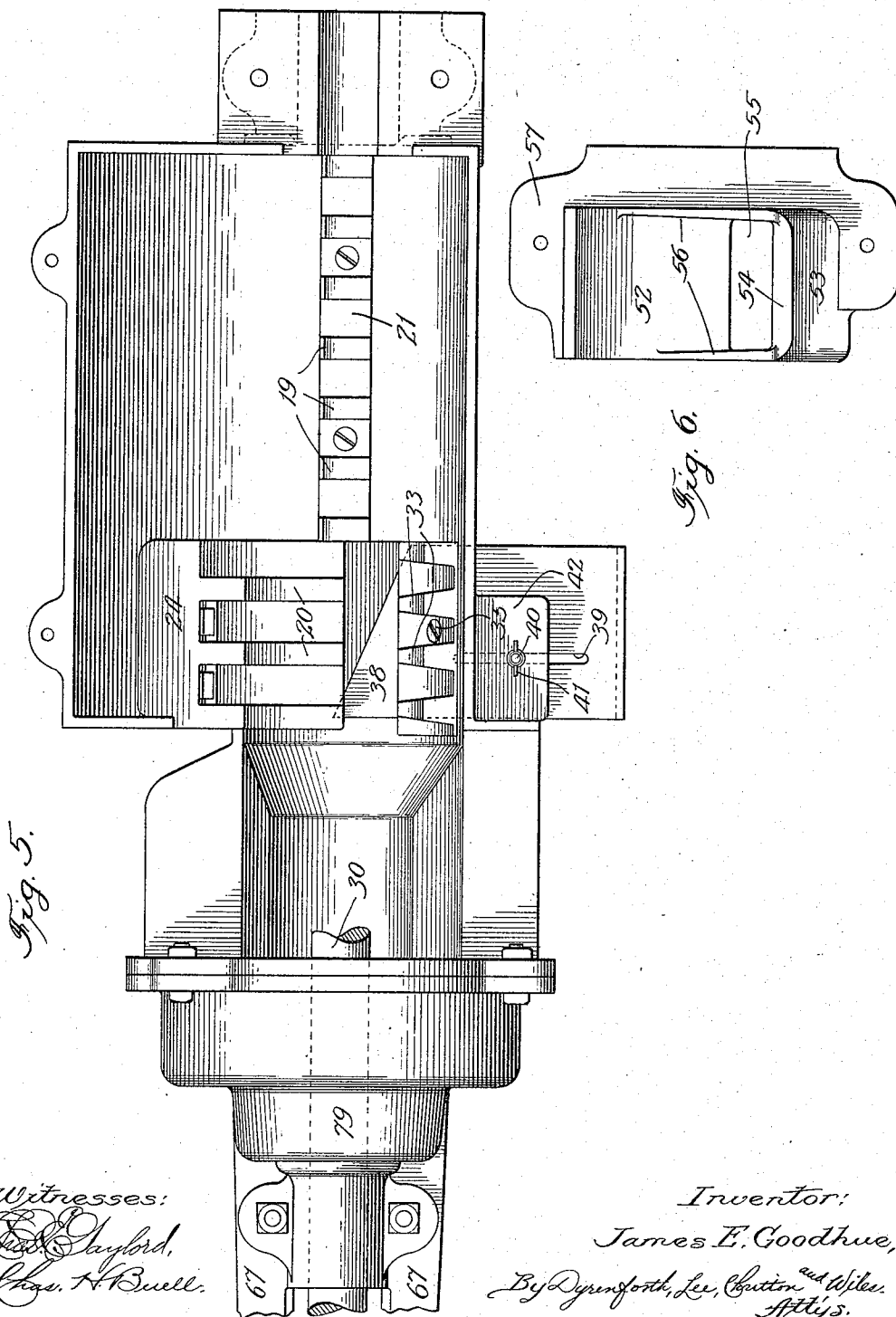
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

JAMES E. GOODHUE, OF ST. CHARLES, ILLINOIS, ASSIGNOR TO UNITED STATES WIND ENGINE & PUMP COMPANY, OF BATAVIA, ILLINOIS, A CORPORATION OF ILLINOIS.

FEED-GRINDING MECHANISM.

1,166,899.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JAMES E. GOODHUE, a citizen of the United States, residing at St. Charles, in the county of Kane and State of Illinois, have invented a new and useful Feed-Grinding Mechanism, of which the following is a specification.

My invention relates to improvements in means for producing a mixture of corn-cob, corn, and fine grain, as for example, oats, barley or spelts, suitable for feeding stock and poultry.

It is important in producing feed mixtures that the several materials of which the mixtures are composed, be properly proportioned and intimately and uniformly mixed; and one of the objects of my invention is to provide a comparatively simple and inexpensive construction of machine whereby uniform mixtures of different substances in the desired proportions may be produced in a highly economic manner.

One of the most common forms of feed mixtures is composed of crushed corn-cob, corn and other fine grain, and it is for the production of a mixture including the above stated substances that I have more particularly devised my improvements, though it will be manifest from the following description that it may be utilized for the production of other mixtures.

Referring to the accompanying drawings—Figure 1 is a view in front elevation of a machine constructed in accordance with my invention. Fig. 2 is a view in front sectional elevation of the machine illustrated in Fig. 1, the section being taken at the line 2 on Fig. 3, and viewed in the direction of the arrow. Fig. 3 is an enlarged section taken at the line 3 on Fig. 2 and viewed in the direction of the arrow, portions of the machine being broken away. Fig. 4 is a similar view taken at the line 4 on Fig. 2 and viewed in the direction of the arrow. Fig. 5 is a section taken at the irregular line 5—5 on Fig. 1 and viewed in the direction of the arrows; and Fig. 6 is a plan view of the apertured cover device for the mixing-throat of the machine through which fine grain is introduced into the latter.

The frame of the machine upon which the operative parts hereinafter described are supported, is represented at 7. Mounted on the frame 7 is a hollow casing 8, affording the compartments or chambers hereinafter

referred to, and supported on the casing 8 are two hoppers 9 and 10, the hopper 9 being provided, in the particular, illustrated embodiment of my invention, for receiving ear corn, and the hopper 10 for receiving small grain, such as oats, barley or spelts, which in the operation of the machine is to be mixed with the corn and the cob.

The hopper 9 communicates at its lower discharge end with the upper end of a chamber 11, provided in the casing 8, this chamber containing means for engaging the ear corn and for removing the kernels from the cob and crushing the cob preferably into pieces about the size of kernels of corn. These means, in the particular machine illustrated, comprise a rotary, generally cylindrical, member 12, which extends longitudinally of the casing 11 and carries stub shafts 13 and 14 at which it is journaled in bearings 15 and 16, respectively, on the casing 11. The member 12 is provided at intervals about its periphery with ribs 17, forming breaker-bars, each presenting at its forward edge a radially disposed surface 18. The bars 17 are provided in pairs, as shown, the members of each pair being diametrically opposed and the several pairs of bars being so arranged about the member 12 as to present a generally spiral arrangement of the surfaces 18, as illustrated. The breaker-bars 17 are adapted to cooperate with stationary breaker-bars 19 and 20, the breaker-bars 19 being formed on the upper surface of a casting 21 secured against the bottom wall of the chamber 11 as by bolts 22, the bars 19 being spaced apart from center to center a distance equal substantially to the distance between the ribs 17 center to center, and so disposed that as the ribs 17 are carried into a position opposing them, these ribs will intermesh with the ribs 19, as illustrated of the rib 17, at the extreme end of the member 12 in Fig. 2. The ribs 20 which cooperate with the breaker-bars 17 at the lefthand end of the member 12 in Fig. 2, are located adjacent to an opening 23 in the bottom of the chamber 11 leading to a lower chamber or mixing-throat hereinafter explained, these bars being provided on a plate 24 secured to the inner surface of the rear wall of the chamber 11 as by bolts 25, one only of which is shown, these ribs which mesh with the cooperating ribs 17, as explained of the ribs 19, projecting forward,

together with the plate 24 on which they are carried, substantially halfway across the opening 23. The ear corn entering the chamber 11 from the hopper 9 is engaged by the breaker-bars 17 and in the crushing operation is caused, by reason of the generally spiral arrangement of the bars 17, to be moved or conveyed to the left, in Fig. 2, to the outlet 23 of the chamber 11.

The casing 8, below the chamber 11, is provided with a chamber 27, which extends lengthwise of the chamber 11, the righthand end of the chamber 27, in Fig. 2, communicating with the lefthand end of the chamber 11 in this figure, through the medium of the opening 23, whereby the kernels of corn and crushed cob are discharged from the chamber 11 into the chamber 27 for further treatment.

Journalled in bearings 28 and 29 in the casing 8, and extending longitudinally through the chamber 27, is a shaft 30, driven as hereinafter described. Carried by the shaft 30 to rotate therewith, and located in the righthand end of the chamber 27 (Fig. 2) is a sleeve 31 provided at intervals about its periphery with breaker-bars 32, which present a generally spiral arrangement about the sleeve 31 and cooperate with a series of ribs 33 spaced apart longitudinally of the chamber 27, these ribs being carried by a casting 34 bolted, or otherwise secured, to the inner surface of the front wall of the chamber 27, as by bolts 35, and cooperating with the breaker-bars 32 for crushing the particles of corn-cobs supplied to this chamber from the chamber 11, into particles about the side of the kernels of corn, the bars 32, by reason of the inclined position at which they extend about the circumference of the sleeve 31, causing the corn and crushed cobs to be conveyed from the righthand end of the chamber 27 in Fig. 2 toward the lefthand end thereof.

Adjacent the sleeve 31 is a sleeve 36 which is located within the left-hand end of the chamber 27, in Fig. 2, and is equipped with diametrically opposed spirally disposed ribs 37, which operate to advance the kernels of corn and crushed cobs to the left, in Fig. 2, and mix therewith the smaller grains discharged into this portion of the chamber 27 which, in effect, is a mixing-throat.

It is preferred that some means be provided in the opening 23 whereby the rate of flow of the kernels of corn and crushed cob from the chamber 11 into the chamber 27 may be regulated. Any suitable form of mechanism may be provided for this purpose but it is preferred that that shown be employed, inasmuch as it permits of a delicate adjustment of the feed into the chamber 27 without danger of interruption of evenness of flow. The valve mechanism shown comprises a slide 38 containing a slot 39, through

which a bolt 40, having a winged nut 41, extends at its headed end, this bolt passing through a flange 42 on the casing 8. The rear edge of the slide 38, which is adapted to be projected across the opening 23, is inclined forwardly from its lefthand to its righthand edge in Fig. 5. Thus, by adjusting the slide 38 back and forth at its slotted connection with the casing 8, the rate of flow of the material from the chamber 11 into the chamber 27 may be accurately controlled.

The hopper 10 which is provided for supplying the small grain to the lefthand end of the chamber 27, which has been hereinbefore referred to as the mixing-throat, and which for purposes of explanation is designated 43, for mixture with the corn and crushed cob, is preferably provided at its lower outlet end with a shoe 44, secured at the upper end of its rear wall to the rear side of the hopper 10, as indicated at 45, the material of which this shoe is formed, being such, in accordance with common practice, that the shoe is free to be vibrated, inasmuch as it is, in effect, flexibly supported. The discharge opening of this hopper is controlled by a slide 46, preferably mounted on the forward wall of the lower end of the hopper 10, as illustrated in Fig. 3, it being readily understood that the slide 46 may be adjusted lengthwise for varying the area of the discharge opening of this hopper. In order to maintain a constant uniform feed from the hopper 10 means are provided for vibrating the shoe 44. The means shown are of a common construction and involve, generally stated, a bar 47, pivoted as indicated at 48, to the shoe, and slidably mounted in ears 49 on a sleeve 50 journalled on an eccentric 51, secured to the stub-shaft 14, whereby when this shaft is rotated action of the eccentric 51 will effect vibration of the shoe 44.

In the operation of the machine the light grain, as for example, oats, barley or spelts, introduced into the hopper 10, is discharged into the mixing-throat 43 while the material supplied thereto from the hopper 10 is being comparatively violently agitated therein. Under these conditions it is necessary that while a comparatively free opening into the mixing-throat be provided for discharging the fine grain into the latter, provision should be made for preventing the materials from being thrown therefrom. According to my invention, and as shown in the accompanying drawings, I accomplish this purpose by providing a unique form of apertured cover for the mixing-throat, which according to the preferred embodiment of my invention, comprises plates 52 and 53 disposed in generally parallel relation in a plane inclined to the horizontal, these plates inclining downwardly from the left to the right (Fig. 3) or, in other words,

from the rear toward the front of the machine, there being provided between the forward edge of the plate 52 and the rear edge of the plate 53, which latter is preferably provided with a depending flange 54, an inlet-opening 55 through which the material discharged from the shoe 44 passes into the mixing-throat 43. At opposite ends of the plates 52 and 53 are substantially vertically disposed side-walls 56, as illustrated in Fig. 6, these plates and walls being preferably formed integrally with flanges 57, at which this cover-section may be secured in place on the frame 7 of the machine, as by bolts 58. The forward edge of the plate 52 preferably projects forwardly of the center of the shaft 30, and is preferably so disposed relative to the rear edge of the plate 53 that the material in the mixing-throat under agitation by the action of the mechanism therein cannot escape through the opening 55, but will be intercepted by the plate 53 and fall back into the mixing-throat.

Located beyond the mixing-throat 43 are grinding-burs for grinding the mixed corn, particles of cob, and the fine grain. These grinding-burs, which are of common construction, are represented at 59 and 60 and are in the form of apertured disks arranged in parallel relation and provided on their opposed faces with radiating ribs 61. The disk 59 is secured at through the medium of screws 62, to the end of the casing 8, the aperture therein being of substantially the same size as the cross-sectional area of the mixing-throat 43, and positioned to extend concentric with the shaft 30. The disk 60 is of similar construction and is mounted on a flanged sleeve 63 secured to the shaft 30. It is desirable that means be provided for adjusting the disks 59 and 60 toward and away from each other for varying the fineness of the material ground thereby, a desirable form of construction for this purpose being as follows:

The shaft 30 is mounted in its bearings to slide lengthwise therein and is provided, between the sleeve 31 and the bearing 28, with a coil spring 64, which encircles the shaft, bearing at one end against a sleeve 65 on the latter and at its opposite end against the shoulder of a member 66, whereby there is a constant tendency of the shaft 30 to slide in its bearings to the left, in Fig. 2. Adjacent to the opposite end of the shaft the casing 8 is provided with a yoke 67, (Fig. 1) in which a box 68 is mounted to slide lengthwise of the shaft 30, this shaft projecting through an end wall of the box 69 and against a partition 70 therein. The cross-piece of the yoke 67 contains a threaded opening 71, in which an adjusting screw 72 operates, this screw being adapted to bear at one end against the outer end wall 73 of

the box 68, and equipped at its opposite end with a toothed wheel 74, cooperating with a dog 75 for holding the screw 72 in adjusted position. The construction just described is one which is in common use and, therefore, the general description above given will suffice. It will be understood from the foregoing that by adjusting the screw 72 inwardly it will force the box 68 and consequently the shaft 30, to the right in Fig. 2, against the action of the spring 64, and when the adjusting screw is drawn outwardly the spring 64 automatically operates to shift the shaft 30 to the left a corresponding distance. Thus, by the arrangement described the distance between the disks 59 and 60 may be adjusted to a nicety.

The shafts 13 and 14, with the member 12, and the shaft 30, may be driven in any suitable manner, it being preferred that the shaft 30 be driven at a much greater speed than the other of said rotating parts. In the arrangement illustrated, the shaft 30 carries a pulley 76, which may be belted to any suitable power device, the shafts 13 and 14, and member 12, being driven from the shaft 30 through the medium of the pinion 77 fixed on the shaft 30, and a gear 78 fixed on the shaft 13.

The operation of the machine is as follows: The ears of corn are dumped into the hopper 9, and the small grain, as for example, oats, barley or spelts, is dumped into the hopper 10. Assuming the shafts 13, 14 and 30 to be in operation, the co-action between the breaker-bars 17 and the breaker-bars 19 and 20 causes the kernels to be broken off of the cobs and the cobs to be broken up into relatively fine pieces in the chamber 11, the spiral arrangement of the breaker-bars 17, causing the material in this chamber to be gradually moved along into registration with the outlet 23, through which these particles drop into the righthand end of the chamber 27, where it is operated on by the breaker-bars 32, cooperating with the ribs 33 in this chamber for reducing the cobs to particles about the size of kernels of corn. The kernels and particles of cob are moved in the chamber 27 to the left, in Fig. 2, where they engage the spiral ribs 37, thus agitating and mixing the materials before passing to the grinding burs and carrying them through the mixing-throat 43. The material in the hopper 10 is caused, by the action of the shoe 44, as hereinbefore described, to be gradually fed through the opening 55 into the mixing-throat 43, where it becomes intimately mixed with the kernels and particles of cobs in a predetermined proportion, depending upon the adjustment of the slide 38 and the slide 46. The mixture is thence carried into the space between the grinding disks 59 and 60, where it is ground to a predetermined fineness, the ground mixture dis-

charging from the space between these disks at the outer peripheries of the latter, and into a hollow portion 79 of the casing 8, from which it discharges through an opening 80 in the bottom of said casing.

It will be understood from the foregoing that the operation of the machine is continuous, the several materials feeding into the mixing-throat 43 in the proper proportions.

While I have illustrated and described a particular embodiment of my invention I do not wish to be understood as intending to limit it thereto, as the same may be variously modified and altered without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent is:

1. In a machine of the character set forth, the combination of a chamber, and rotary means for agitating the material supplied to said chamber and tending to throw the material out of the chamber in a direction radially of said rotating means, the top wall of said chamber presenting offset plate sections, affording between their adjacent ends an

opening disposed tangentially to said rotary means and at one side of the center of said rotary means and forming an inlet to said chamber, one of said plate-sections inclining downwardly from one side of said chamber to said opening and directly above said means.

2. In a machine of the character set forth, the combination of a chamber for receiving ear-corn, means in said chamber for removing the kernels from the cobs and breaking up the cobs, a chamber located below said first-named chamber and communicating therewith, means in said second-named chamber for further breaking up the cobs to reduce them to particles about the size of kernels of corn, means for agitating the corn and particles of cob, and means for introducing smaller grain into the mixture of corn and cobs during agitation of the latter by said agitating means, for the purpose set forth.

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