No. 639,717. Patented Dec. 26, 1899.

J. DAIN, JR.

MILL.

(Application filed Apr. 22, 1898.)

(No Model.) 2 Sheets—Sheet 1.

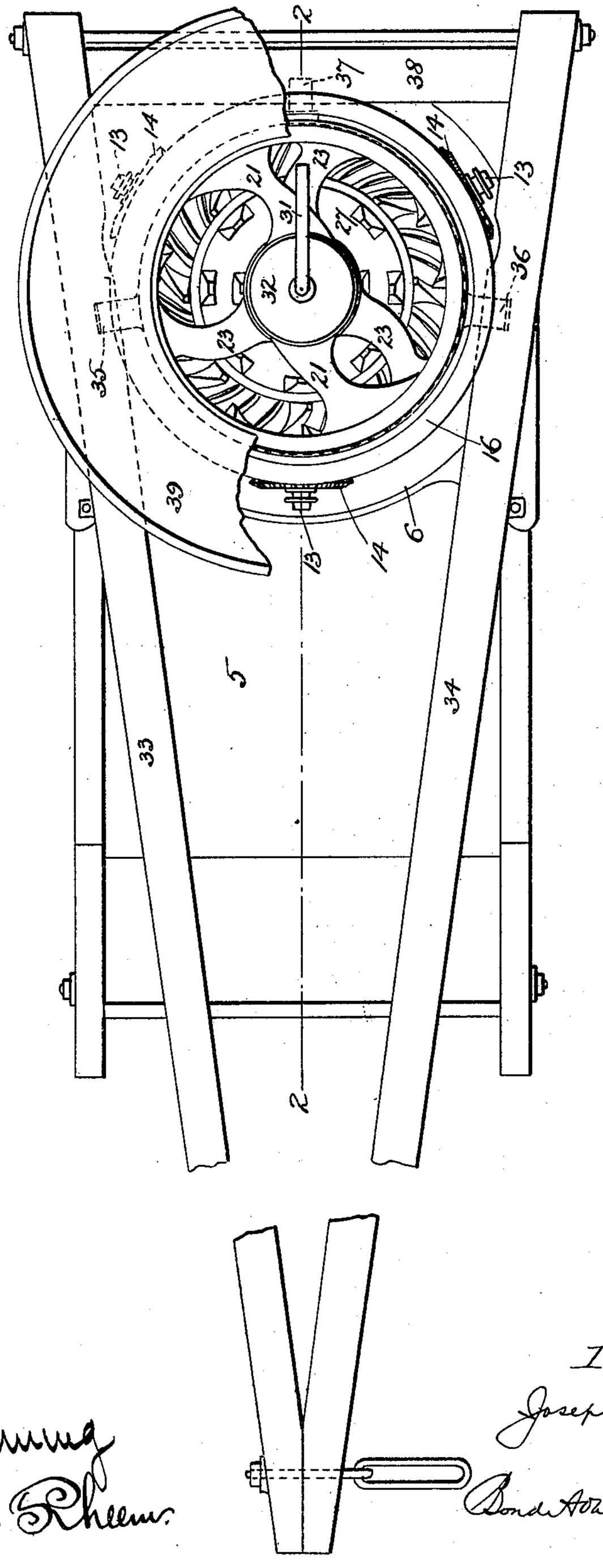

Fig. 1.

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Fig. 2.

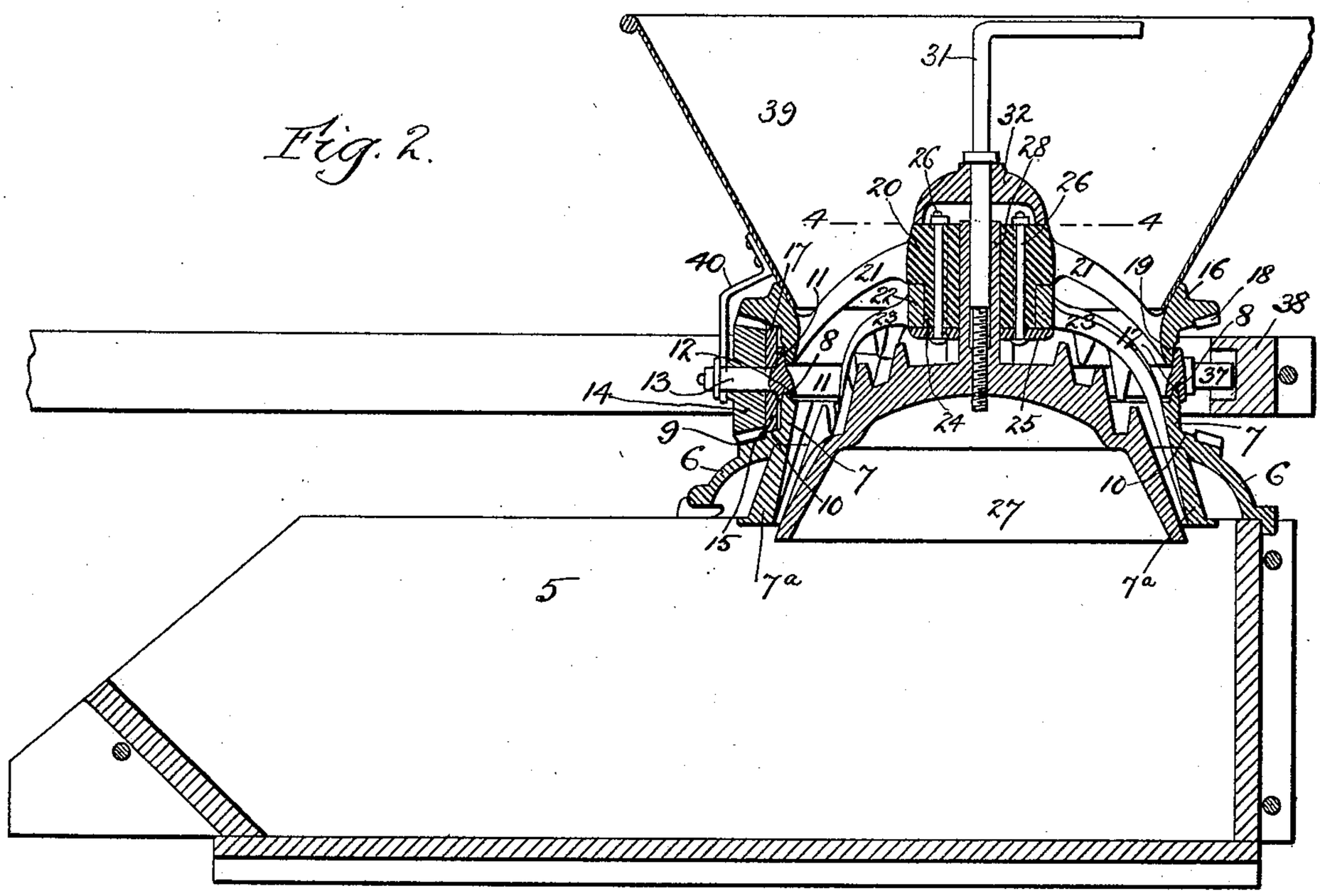


Fig 3

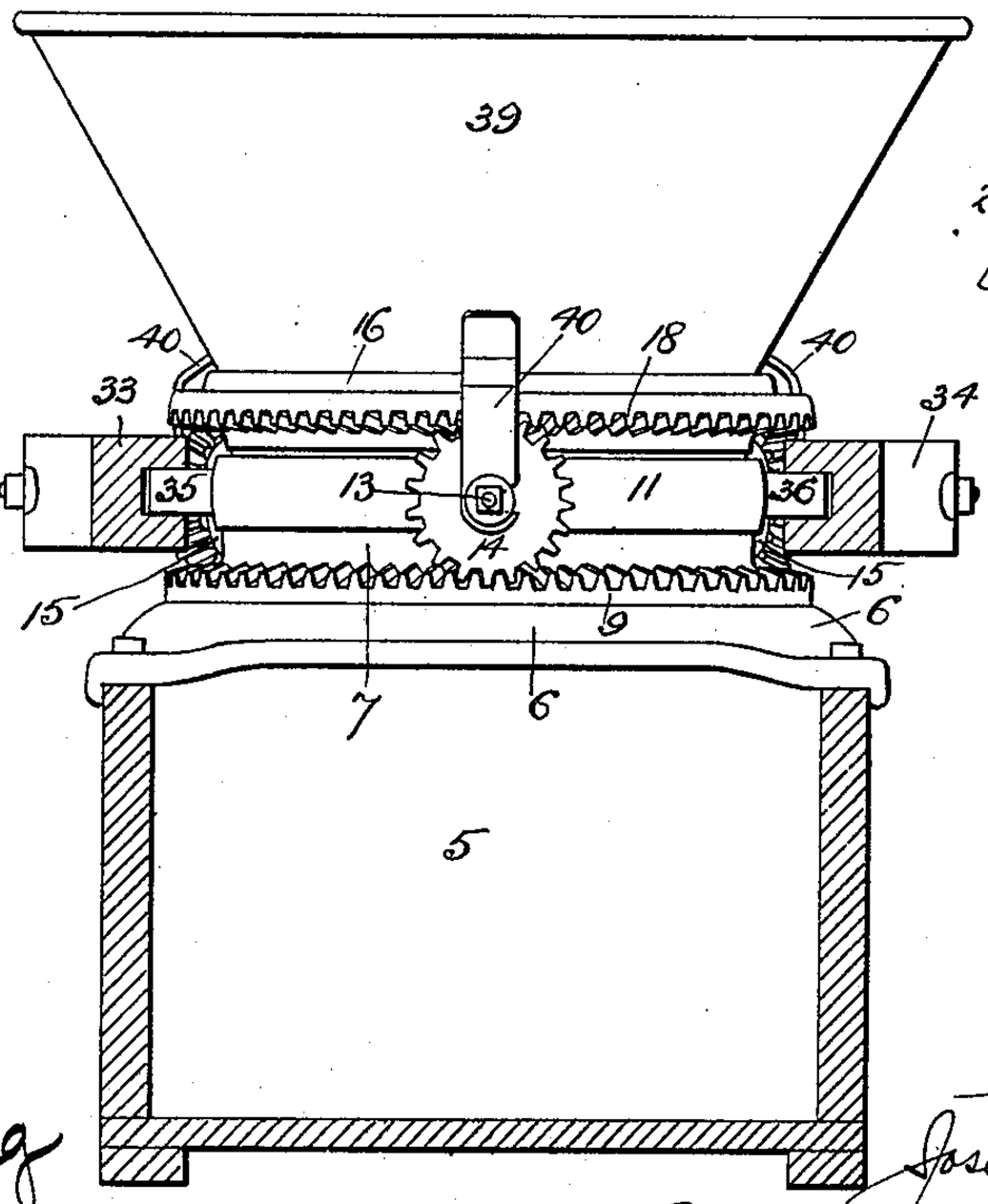
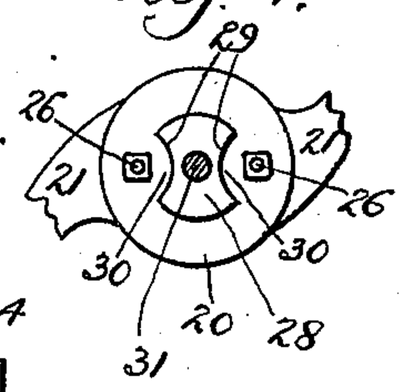


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOSEPH DAIN, JR., OF CARROLLTON, MISSOURI.

MILL.

SPECIFICATION forming part of Letters Patent No. 639,717, dated December 26, 1899.

Application filed April 22, 1898. Serial No. 678,467. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH DAIN, Jr., a citizen of the United States, residing at Carrollton, in the county of Carroll and State of Missouri, have invented certain new and useful Improvements in Mills, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to mills, particularly of the type used by stockmen to grind feed from corn, corn and cob, corn and oats, or any feeding-grain, although the improvements herein described and claimed are applicable to mills used for various other purposes.

My improvements consist in mechanism by which one of the members of the grinding devices is caused to rotate at a greater speed than that of the team or equivalent operating power, thereby greatly increasing the grinding effect, and also in providing means whereby the hopper rotates at a slower rate than the moving member of the grinding devices, thereby preventing the hanging up or clogging of the ears of corn in the hopper, as frequently happens in mills at present in use.

My invention also consists in certain other features which will be hereinafter fully pointed out.

In the drawings, Figure 1 is a plan view, some parts being broken away. Fig. 2 is a vertical section on line 2 2 of Fig. 1. Fig. 3 is a side elevation, some parts being in section; and Fig. 4 is a horizontal section on line 4 4 of Fig. 2.

Referring to the drawings, wherein my improvements are illustrated as applied to a horse-power grinding-mill for grinding feed, 5 indicates a receiver adapted to receive the ground material and of suitable shape to support the parts of the mill.

6 indicates the base of the mill, which is mounted upon the edges of the receiver 5, as illustrated in Figs. 2 and 3, and is suitably secured thereupon. As shown in Fig. 2, the base 6 is somewhat conical in shape and is provided with an upwardly-extending annular flange 7, which is roughened and forms the upper part of the outer member or bur 7^a of the grinding devices. As shown in Fig. 2, the upper edge of the flange 7 is beveled, forming a tongue 8 for a purpose which will be hereinafter explained. 9 indicates an annular rack carried by the base 6 outside of the annular flange 7, as shown in Figs. 2 and 3.

10 indicates an annular track between the rack 9 and the flange 7.

11 indicates a ring which is provided with a suitable grooved recess 12 in its lower edge, which groove is adapted to receive the tongue 8 of the flange 7, as shown in Fig. 2. By this construction the material fed into the mill is prevented from working in between the ring 11 and the flange 7, thereby preventing clogging of the machine. As shown in Figs. 1 and 2, the ring 11 carries a series of pintles 13, spaced an equal distance apart and preferably three in number, although a greater or less number may be used.

14 indicates traveling pinions which are mounted upon the pintles 13 and are adapted to mesh with the teeth of the rack 9, as shown in Figs. 2 and 3.

15 indicates rollers which are mounted upon the pintles 13, between the pinions 14 and the ring 11, as shown in Fig. 2, and rest upon the track 10. The rollers 15 serve to carry the weight of the superincumbent parts of the apparatus and prevent the pinions 14 from entering too far into mesh with the rack 9. By this means when the burs are tightened, as will be hereinafter described, the pressure is received upon the rollers 15 and not upon the pinions 14, as would otherwise be the case.

16 indicates a rotary grinding-frame which is mounted over the ring 11 and rests upon the upper surfaces of the rollers 15, as illustrated in Fig. 2, it being provided with a suitable track 17 to receive the rollers. The grinding-frame 16 is also provided with an annular rack 18, which meshes with the pinions 14, as illustrated in Figs. 2 and 3.

19 indicates an annular flange which projects downward from the body of the grinding-frame 16 and somewhat beyond the upper inner edge of the ring 11, thereby forming a close connection and preventing any material under treatment from working out of the mill. The grinding-frame 16 is also provided with a hub 20, centrally located and secured by arms 21, which are connected to the grinding-frame 16. The hub 20 is fitted upon a stationary hub 22, secured to the main frame 6 by arms 23, as shown in Fig.

2. The rotary hub 20 is provided with a sleeve 24, which extends down through the hub 22 and carries at its lower end a cap-plate 25, which is secured in place by bolts 26, thus binding the two hubs together and preventing access of dust or small particles of the material under treatment.

27 indicates the movable bur, which is conical in form and is adapted to coöperate with the stationary bur to effect the grinding of the material. The movable bur 27 is provided with an upwardly-extending sleeve 28, which extends through the hub 20 and is vertically movable therein. In order that the bur 27 may be keyed to and rotated with the hub 20, it is provided with grooves 29, adapted to receive internally-projecting ribs 30, carried by the hub 20, as shown in Fig. 4. The bur 27 is adjusted vertically to regulate the grinding by an adjusting-rod 31, the lower end of which is screw-threaded and screws into a socket in the sleeve 28, its upper end being fitted in a cap 32, which rests upon the upper end of the hub 20, as shown in Fig. 2. By this construction the degree of fineness of the grinding may be readily adjusted by simply rotating the rod 31 in the proper direction.

In the apparatus illustrated the ring 11 is rotated to operate the mill by a forked lever consisting of arms 33 34, which are connected by pins 35 36 to said ring, and by a pin 37, which projects into a cross-bar 38, connected at its ends to the rear ends of the arms 33 34, as illustrated in Fig. 1.

39 indicates the hopper, which is mounted above the grinding-frame 16 and is adapted to discharge into the mill in the usual manner. The hopper 39 is mounted upon standards 40, supported upon the pintles 13 of the ring 11, so that the hopper moves with said ring.

The operation of my improved apparatus is as follows: The team being hitched to the arms 33 34, said arms are rotated, thereby rotating the ring 11. The rotation of said ring causes the pinions 14 to rotate by reason of their engagement with the annular rack 9 on the stationary frame 6, and the rotation of said pinions thereby effected imparts a rotation to the grinding-frame 16 through the engagement of said pinions with the annular rack 18, carried by said grinding-frame. The result is that each complete rotation of the operating-lever carries the pinions 14 once around with it and effects their rotation upon their axes to such an extent as to give an additional rotation to the grinding-frame 16. The grinding-frame therefore rotates twice for each rotation of the ring 11 and the operating-lever, thereby greatly increasing the capacity of the machine. The hopper 39 being supported upon the pintles 13 of the ring 11 rotates with said ring, and consequently moves only half as fast as the grinding-frame 16, and this difference in movement serves to prevent the hanging up of the ears of corn or other material. The movable arms 21 and the stationary arms 23 together coöperate to break up cobs and large pieces of material to be ground.

I have described my improvements in detail in order that the construction illustrated may be fully understood; but, as hereinbefore suggested, I do not restrict myself to the details of construction illustrated and described, as my invention includes such changes and adaptations of my improvements as would suggest themselves to a skilled mechanic.

That which I claim as my invention, and desire to secure by Letters Patent, is—

1. In a grinding-mill, the combination of coacting burs, a rotatable annular rack connected with one of said burs, a pinion meshing with said rack, means for driving said pinion, and a stationary annular rack with which said pinion meshes, substantially as described.

2. In a grinding-mill, the combination of a stationary frame having an annular rack, a stationary bur, a driving-ring mounted on said frame, a rotary grinding-frame, an annular rack carried thereby, a rotatable bur connected with the latter rack and arranged to coöperate with said stationary bur, and one or more pinions carried by said ring and meshing with said annular racks, substantially as described.

3. In a grinding-mill, the combination of coacting inner and outer burs, said inner bur being rotatable, an externally-arranged annular frame connected with said inner bur, means for rotating said annular frame, traveling rollers supporting said annular frame, and a track for said rollers, substantially as described.

4. In a grinding-mill, the combination of coacting burs, one of said burs being rotatable, an externally-arranged annular frame connected with said rotatable bur, traveling rollers supporting said annular frame, a track for said rollers, one or more pinions in juxtaposition to one or more of said rollers, an annular rack carried by said annular frame and meshing with said pinion or pinions, means for driving said pinions, and a stationary annular rack below and in mesh with said pinion or pinions, substantially as described.

5. In a grinding-mill, the combination of coacting burs, an external annular frame connected with one of said burs for rotating it, traveling pinions upon the peripheries of which said frame rotates, said pinions being arranged to revolve about said burs, means for revolving said pinions, and a hopper which travels with said pinions, substantially as described.

6. In a grinding-mill, the combination of a stationary frame having an annular rack, and a track concentric with and adjacent to said rack, a stationary bur, a driving-ring mounted on said frame, a rotary frame, a bur connected with said rotary frame and arranged to coact with said stationary bur, an annu-

lar rack and a track carried by said rotary frame and arranged opposite, respectively, to the rack and track of said stationary frame, and one or more pinions and a plurality of rollers carried by said ring and running respectively upon said racks and tracks, substantially as described.

7. In a grinding-mill, the combination of lower and upper frames, upper and lower co-acting burs connected with said frames the lower bur being connected with the upper frame, driving mechanism arranged between said frames, and means for relieving said driving mechanism from grinding pressure, substantially as described.

8. In a grinding-mill, the combination of a stationary frame, having an annular rack, a bur, a driving-ring mounted on said frame, a rotary grinding-frame above said ring, a rotary bur connected therewith, an annular rack carried by said rotary frame, one or more pinions carried by said ring and meshing with said racks, and a hopper mounted on and rotating with said ring, substantially as described.

9. In a grinding-mill, the combination of a stationary frame having a hub, a rotary frame having a hub adapted to rest above said stationary hub, said rotary hub having a sleeve which fits into said stationary hub, a bur carried by said rotary frame, and a cap fitted over the lower end of said sleeve and the stationary hub, substantially as described.

10. In a grinding-mill, the combination of a stationary frame having a hub, a rotary frame having a hub adapted to rest above said stationary hub, said rotary hub having a sleeve which fits into said stationary hub, a bur carried by said rotary frame, and a cap fitted over the lower end of said sleeve and the stationary hub and secured to said rotary hub, substantially as described.

11. In a grinding-mill, the combination with a stationary frame, having an annular rack, of a driving-ring mounted upon said frame, said ring and frame having a tongue-and-grooved connection, one or more pinions carried by said ring, a rotary grinding-frame, an annular rack carried thereby and meshing with said pinions, and a bur carried by said rotary frame, substantially as described.

12. In a grinding-mill, the combination of grinding devices, two annular racks spaced apart, one of said racks being connected with a movable member of the grinding devices, a pinion between and meshing with said racks, and a rotatable ring supporting said pinion, substantially as described.

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