

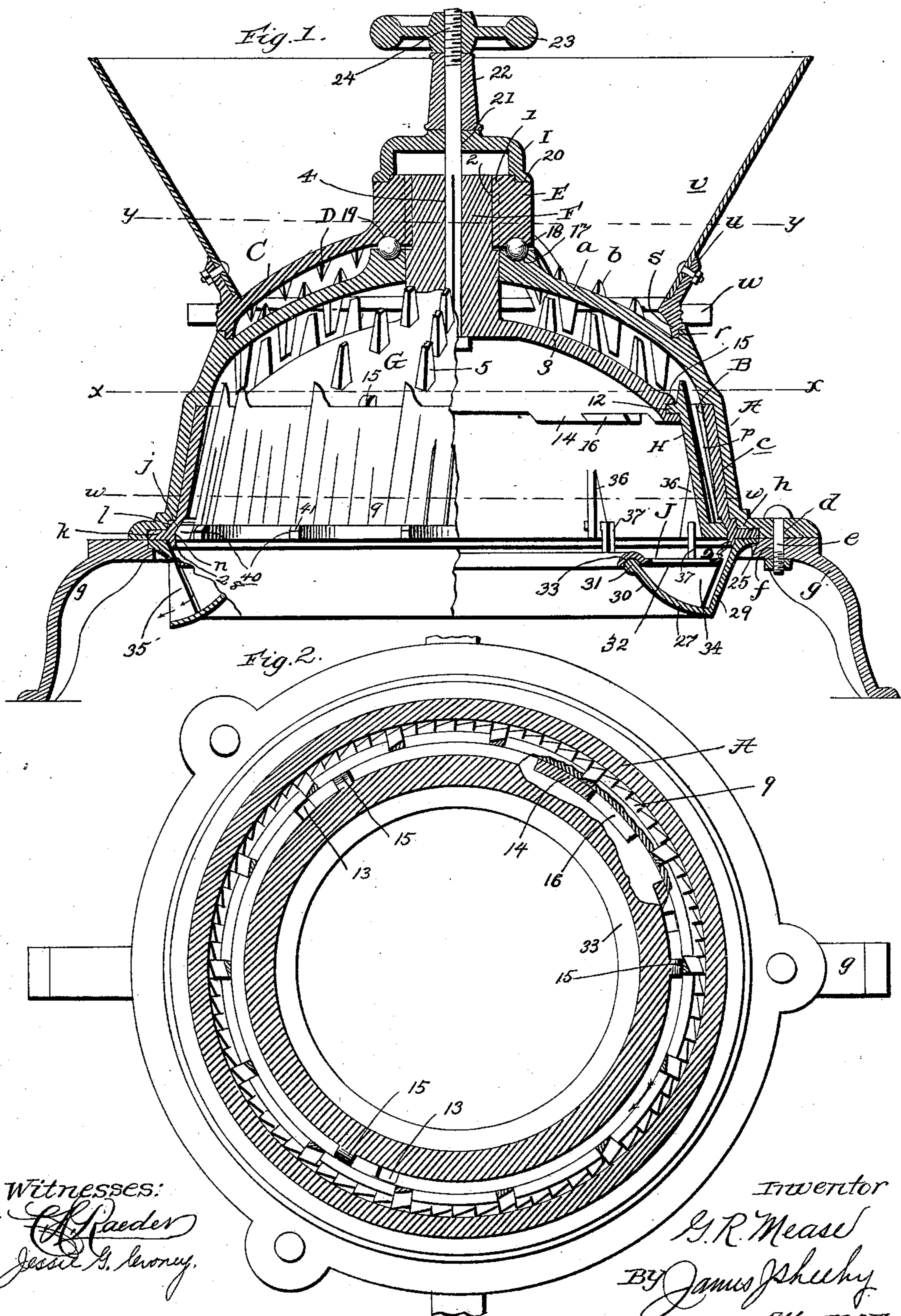
(No Model.)

2 Sheets—Sheet 1.

G. R. MEASE.  
GRINDING MILL.

No. 594,352.

Patented Nov. 23, 1897.



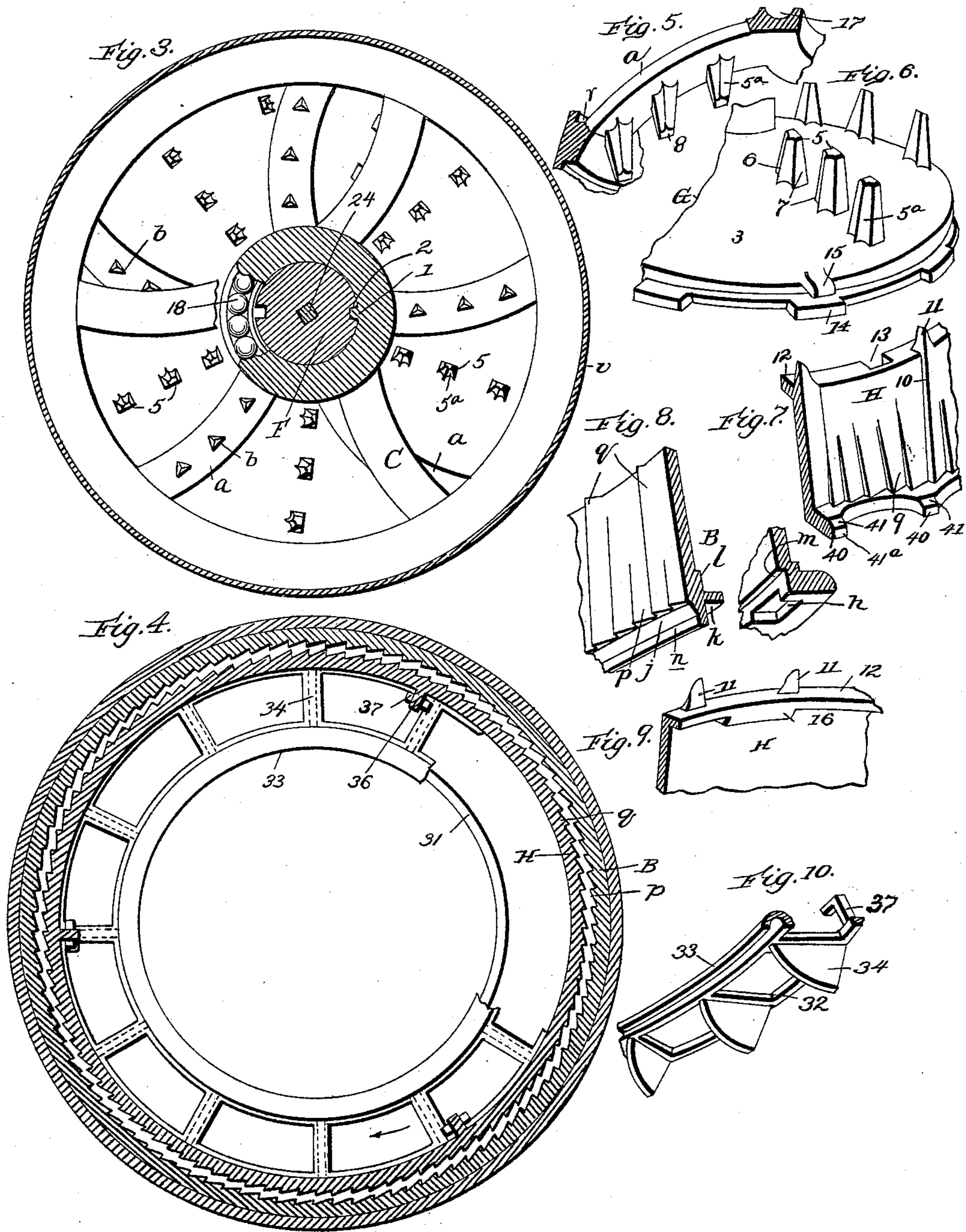
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Witnesses:

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# UNITED STATES PATENT OFFICE.

GEORGE R. MEASE, OF MARION, OHIO, ASSIGNOR OF ONE-HALF TO JOHN KENDALL, OF SAME PLACE.

## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 594,352, dated November 23, 1897.

Application filed May 24, 1897. Serial No. 637,957. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE R. MEASE, a citizen of the United States, residing at Marion, in the county of Marion and State of Ohio, have invented certain new and useful Improvements in Grinding-Mills; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in grinding-mills designed for use in grinding feed for stock or domestic purposes, and the novelty and many advantages will appear from the following description and claims when taken in connection with the annexed drawings, in which—

Figure 1 is a vertical sectional view of my improved mill with parts broken away. Fig. 2 is a sectional view taken on the line *x x* of Fig. 1 with parts omitted and parts broken away. Fig. 3 is a sectional view taken in the plane indicated by the dotted line *y y* of Fig. 1. Fig. 4 is a sectional view taken in the plane indicated by the dotted line *w w* of Fig. 1 with parts omitted and parts broken away. Fig. 5 is a perspective sectional detail view of the stationary spider or dome. Fig. 6 is a similar view of the runner or cone. Fig. 7 is a similar view of the rubber. Fig. 8 is a perspective sectional detail view of the casing and the shell, illustrating the manner of connection. Fig. 9 is a detail sectional perspective view of the rubber, taken from the opposite side of Fig. 7; and Fig. 10 is a perspective detail sectional view of the conveyor.

Referring by letters and numerals to the said drawings, A indicates the casing, which has its dome *a* of a spider or skeleton form, comprising ribs or branches, as shown, having upon their upper sides teeth *b*, which coöperate with teeth on a rotatable spider, as will be hereinafter described, in effecting the initial grinding of the stock. The casing is provided on its underside and extending a sufficient distance from its base upwardly with an annular recess *c* and is provided at its base with an external flange having lug-eyes *d* to receive bolts *e*, which take into eyes *f* in legs *g*. The casing is furthermore provided in the under

side of its base with recesses *h* to receive lugs *k* on the shell, as will be presently described.

B indicates the shell. (Better shown in Fig. 8 of the drawings.) This shell, which is of an annular form, is designed to be received snugly within the recess *c* and is provided on its outside, at its lower end, with lugs *k* to take into recesses *h*, formed in the casing, as shown. The shell also has a shoulder *l* on its outer side to bear in a recess *m* of said casing and is provided on its inner side with teeth *p*, which are of a form substantially as shown, having between each series long teeth or rubbers *q*, which extend the entire width of said shell. The shell is furthermore provided at its lower end and on its inner side with a recess having a perpendicular or straight wall *n* and a pitched or oblique wall *j*, for a purpose which will presently appear.

The casing is provided externally at a suitable altitude with a grooved shoulder *r*, which is designed to receive a depending flange *s* on a casting *t*, which casting has a flange *u* for the attachment of a hopper *v*, which is secured thereto by means of bolts and nuts or other suitable fastening devices, and this casting may be also formed with projecting arms *w*, by which horse-power may be applied. Formed integral with or secured to said casting is the rotatable spider C, which has its curved branches provided with depending teeth D. This rotatable spider has a hub E, whose central bore is provided with one or more splines 1 to take into a groove or grooves 2 in the hub F of the runner or cone G. The runner or cone G is in substantially the shape of a frustum of a cone, comprising the dome or top 3, with the hub F rising centrally therefrom and provided with a central vertical aperture 4. On the upper side of this runner or cone I provide cob-crushing teeth of a peculiar construction. These teeth 5, as better shown in Fig. 6 of the drawings, have three cutting edges and taper from their bases upwardly, the central cutting edge 6 being well in advance of the lateral cutting edges 7, and all of such edges are on the face side and are designed to coöperate with similar teeth 8, which depend from the branches of the stationary spider *a*, in acting upon the material as it leaves the primary teeth in its passage down the mill.

As will be readily seen by reference to Figs. 5 and 6, the three cutting edges are formed on the faces of the teeth 5 and 8 by providing said teeth in their faces at opposite sides of the vertical centers thereof with grooves 5<sup>a</sup> of concave form in cross-section. It will also be observed that the edges of the teeth thus formed are all adapted to cut in the same direction, which materially increases the efficiency in cutting and crushing corncobs and the like.

H indicates a rubber or annulus. This annulus is provided on its outer side with a series of teeth or rubbers 9, which may be of the shape of saw-teeth in cross-section, and each series is divided by guides 10, which extend throughout the height of the annulus and a sufficient distance above the same, as indicated by 11, for a purpose which will presently appear. This annulus or rubber is provided on its inner upper side with a flange 12, which is provided at suitable points in its edge with notches 13. The base of the runner or cone G is provided with outwardly-directed lugs 14, designed to take beneath the flange 12 of the annulus H, and is furthermore provided with a plurality of short arms or lugs 15, designed to pass through the slots 13 and take over the flange 12 when the parts have been turned in the proper direction, the flange 12 being preferably provided on its under side at points to the right of the notches 13 with shoulders 16 to abut against the lugs 14 of the runner and limit the movement of the two parts with respect to each other.

In connecting the runner or cone G and the rubber H the lugs 15 of the cone G are passed upwardly through the notches 13 in the flange 12 of the rubber H, so that the lugs 15 will rest above the flange 12 and the lugs 14 below the said flange. The cone or runner G is then turned to the right until its lugs 15 abut against the edges of the lugs 16 at the under side of the flange 12 of the rubber. With this done it will be seen that the runner H will be held against movement up or down with respect to the cone or runner G. It will also be seen that inasmuch as the cone or runner G is turned toward the right its lugs 14, engaging those of the rubber H, will enable the cone or runner to turn the rubber. It will further be appreciated that this connection between the cone or runner G and the rubber H does not entail the employment of bolts or other connecting devices and that it permits of the cone and rubber being readily connected and disconnected when desired without the employment of skilled labor or implements. When the parts are thus connected without the aid of screws or bolts, as heretofore found so objectionable, it will be seen that the upper ends 11 of the guide 10 project a sufficient distance above the dome of the runner to serve as guides in directing the partly-ground material to the series of teeth 9.

The rubber or annulus H is provided at its

lower end or base and on its outer side with lugs 40, (see Figs. 1 and 7,) which have an inclined surface 41 and a vertical end surface 41<sup>a</sup>, the former surface being designed to engage the inclined surface *j* in the recess of the shell B and the latter to engage the vertical surface *n* in said recess. The inclined surfaces 41 and *j* are parallel to the cutting edges of the teeth *p* 9 of the shell B and rubber H, which edges of the teeth *p* 9 are parallel to each other, as shown. Consequently it will be observed that the surfaces 41 of the lugs 40, engaging the surface *j* in the recess of the shell B, will hold the teeth 9 and *p* in corresponding positions and will effectually prevent said teeth from cutting or damaging each other, even when the rubber H is raised too far by careless adjustment. The contacting vertical surfaces 41<sup>a</sup> and *n* are always in contact, and they serve to hold the rubber H central when it is adjusted to grind coarse as well as when it is adjusted to reduce the material being ground to a fine state. This renders my improved mill superior to those in which the rubber "wabbles" and grinds fine on one side and coarse on the other, just as it happens to feed itself more or less unequally.

The stationary spider or dome of the casing is provided around its central aperture with a semicircular groove or raceway 17, within which are placed antifriction balls or rollers 18, and the hub E is provided on its under side with a similar groove or way 19 to receive the upper sides of the balls and furnish the roller bearing between the two parts. By this means a great saving in power is effected, which is an important desideratum in machines of this character.

The hub E is provided on its upper side with an annular groove 20, and a cap I is mounted on said hub and bears in said groove. This cap has a central aperture 21, and arranged above and bearing upon said cap is a sleeve 22 to furnish a bearing for a hand-wheel 23. The hand-wheel is provided with a central aperture and receives a vertically-disposed rod 24, which is headed at its lower end and takes through the central aperture in the hub F of the runner, the aperture in the cap, and also takes through the sleeve, its upper end being externally threaded to receive internal threads on the hand-wheel, whereby the rotatable spider and the cone or runner may be connected and adjustably secured to the casing without the employment of a bridge-tree or other support, which has been heretofore found so indispensable, yet so objectionable and expensive.

The legs *g*, which support the entire mill and are connected to the shell or casing by bolts and nuts, are also provided on their inner upper sides with a rabbet or groove to receive an outwardly-directed flange 26 of a conveyer-trough 27. This conveyer-trough, with its flange resting upon the rabbeted or recessed part of the legs, is secured in posi-

tion, with the lugs  $k$  of the shell B bearing thereon, so that bolts and the like are also dispensed with in securing such parts together. It will be observed that the lower under edge of the shell B projects sufficiently into the conveyer-trough, as better shown at 28, to guide the material as it leaves the grinders or teeth in passing between the runner or annulus H and the shell B. The conveyer-trough is of a form substantially as shown, assuming a position within and at the base of the mill, having an inwardly-directed or oblique wall 29 and an upwardly and inwardly curved wall 30, which latter terminates at its upper edge in a rounded portion 31.

J indicates the conveyer. This conveyer covers the trough, as shown, having a horizontal portion 32, which terminates at its inner edge in a roll, forming an under groove 33, which takes over and bears on the rounded edge 31 of the trough. The horizontal portion of this conveyer has depending from it plates 34, which are of a shape corresponding to the interior of the trough and entering the same, the plates being arranged at suitable intervals apart.

The conveyer-trough is provided with a lateral discharge 35, so that the ground material may be discharged therefrom by the action of the conveyer.

The rubber or annulus H is provided at suitable points on its inner side with lugs 36, having eyes to receive angular branches 37, which rise from the conveyer, as shown, so as to connect the conveyer with the rubber or annulus and permit the same to be readily disconnected.

From the foregoing description, taken in connection with the accompanying drawings, the operation of my invention will be obvious. It will be seen that the parts are all of a cheap and durable construction and are adapted to produce the very best results, there being no bolts or screws for securing the movable parts together. It will also be seen that the friction has been reduced to a minimum, and such wear as may be caused by use can be overcome by the employment of the central rod and hand-wheel. This construction will also permit of an adjustment of the parts in new mills, so that it is not necessary to use such great care as heretofore in constructing the parts and assembling the same.

Having thus described my invention, what I claim is—

1. In a grinding-mill, the combination with the casing having the lateral flange at its base; of the shell provided with teeth on its inner side and the angular wall at its base, and also having angular studs or lugs to take into correspondingly-shaped recesses in the casing, the rubber or annulus having teeth on its outer side and lugs beveled to correspond with and engage the angular wall of the shell, the conveyer-trough, the legs secured to the casing by bolts and adapted to also receive the flange

of the conveyer-trough, and the runner or cone having the lugs on its edge as described.

2. In a grinding-mill, the combination of the casing, the annular shell arranged in the casing and having the teeth  $p$ , on its inner side and also having the angular surface  $j$ , inclined in conformity to the inclination of the edges of the teeth  $p$ , and the vertically-adjustable and rotatable rubber or annulus having the teeth 9, on its outer side with edges inclined in conformity to those of the teeth  $p$ , and also having the lugs with surfaces 41, inclined to correspond with and engage the inclined surface  $j$ , of the shell, substantially as specified.

3. In a grinding-mill, the combination of the casing, the annular shell arranged in the casing and having the teeth  $p$ , on its inner side and also having the angular surface  $j$ , inclined in conformity to the inclination of the edges of the teeth  $p$ , and the vertically adjustable and rotatable rubber or annulus having the teeth 9, on its outer side with edges inclined in conformity to those of the teeth  $p$ , and also having the lugs with surfaces 41, inclined to correspond with and engage the inclined surface  $j$  of the shell, and further having the upwardly-extended guides 11, substantially as specified.

4. In a grinding-mill, the combination of the casing, the annular shell arranged in the casing and having the teeth  $p$ , on its inner side and also having the angular surface  $j$ , inclined in conformity to the inclination of the edges of the teeth  $p$ , and the vertical surface  $n$ , immediately below the angular surface, and the vertically adjustable and rotatable rubber or annulus having the teeth 9, on its outer side with edges inclined in conformity to those of the teeth  $p$ , and also having the lugs with surfaces 41, inclined to correspond with and engage the inclined surface  $j$ , of the shell and with vertical surfaces 41<sup>a</sup>, to engage the vertical surface  $n$ , of the shell, substantially as specified.

5. In a grinding-mill, the combination of the casing provided with the open-work or spider dome armed with teeth and having an annular groove on its upper side and also having a central opening, a rotatable, toothed spider mounted on said dome and having a hub with a central opening and an annular groove in its under side adapted to serve in conjunction with that in the casing-dome to form a raceway, balls arranged in said raceway, the cone provided with teeth and having a central hub extending through the aperture in the dome of the casing and the aperture in the hub of the spider and keyed to the latter, the removable and threaded rod passing through the aperture in the cone-hub, the threaded hand-wheel mounted on said rod, the annular shell arranged in the casing and having the teeth  $p$ , on its inner side and also having the angular surface  $j$ , inclined in conformity to the inclination of the edges of the

teeth  $p$ , and the vertical surface  $n$ , immediately below the angular surface, and the rubber or annulus connected to the cone and having the teeth 9, on its outer side with edges  
5 inclined in conformity to those of the teeth  $p$ , and also having the lugs with surfaces 41, inclined to correspond with and engage the inclined surface  $j$ , of the shell and with vertical surfaces 41<sup>a</sup>, to engage the vertical surface  
10 face  $n$ , of the shell, substantially as specified.

6. In a grinding-mill, the combination of a cone having a plurality of lugs 14, arranged in one horizontal plane and a plurality of lugs

15, arranged in a horizontal plane above that of the lugs 14, and a rubber or annulus having  
15 an inwardly-directed flange 12, with notches 13, for the passage of the lugs 15, of the cone, and also having lugs 16, on its under side for the engagement of the lugs 14, of the cone,  
20 substantially as specified.

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

GEO. R. MEASE.

Witnesses:

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CHAS. B. KEISER.