(No Model.) 3 Sheets—Sheet 1.

# J. S. WOODCOCK.

## GRINDING MILL.

No. 419,394. Patented Jan. 14, 1890.

Fig: 1.

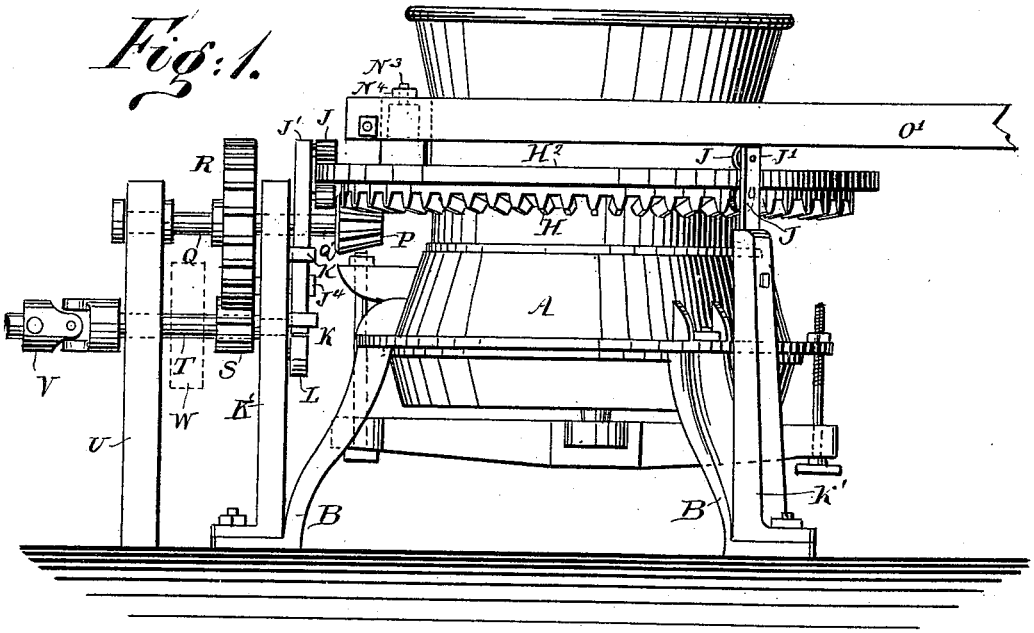
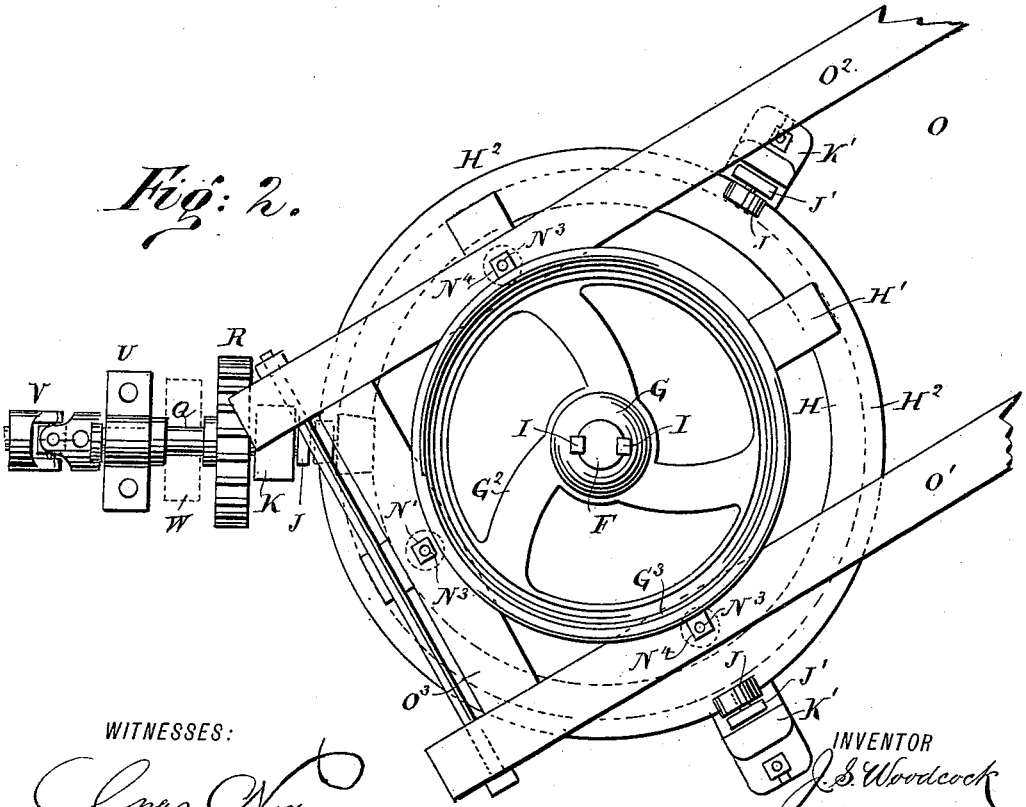



Fig: 2.

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(No Model.) 3 Sheets—Sheet 2.

# J. S. WOODCOCK.

## GRINDING MILL.

No. 419,394. Patented Jan. 14, 1890.

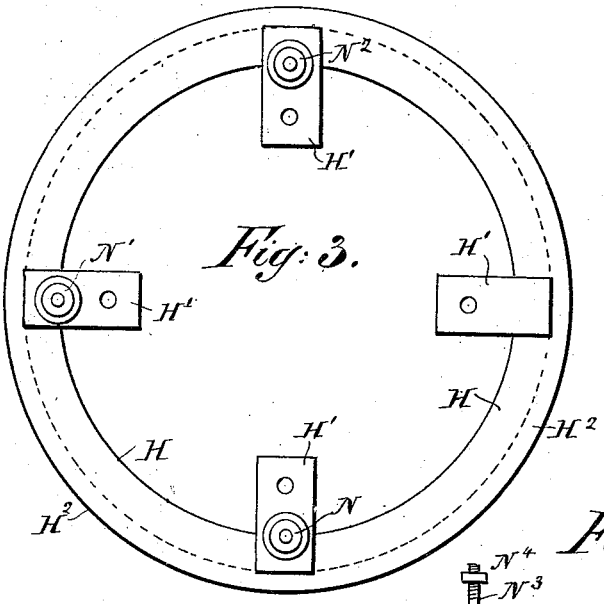



Fig: 3.

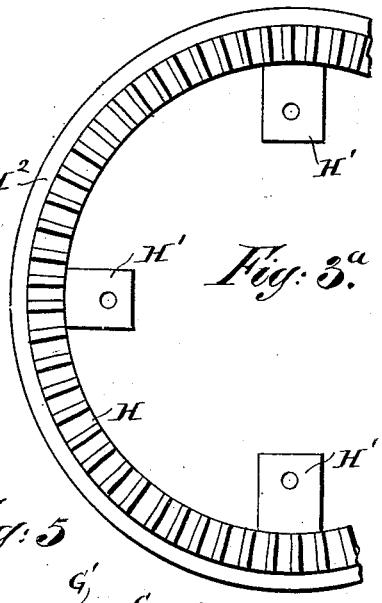



Fig: 3a.

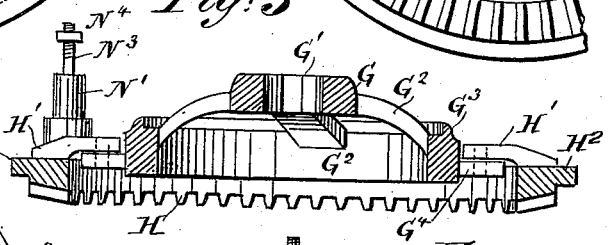



Fig: 5

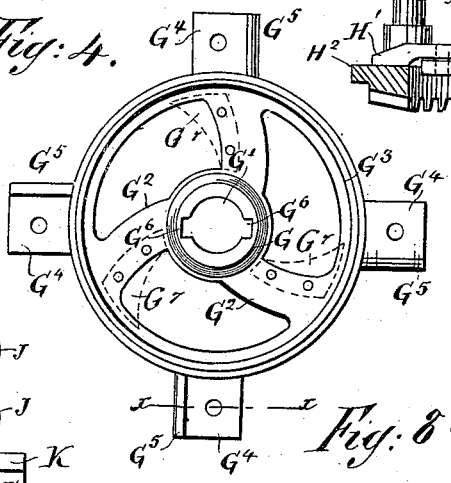



Fig: 4.

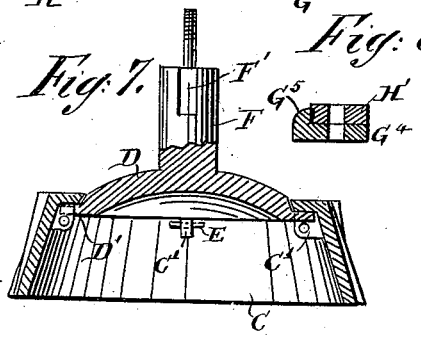



Fig: 7.

Fig: 6

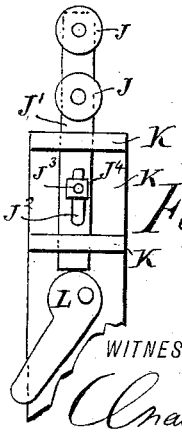
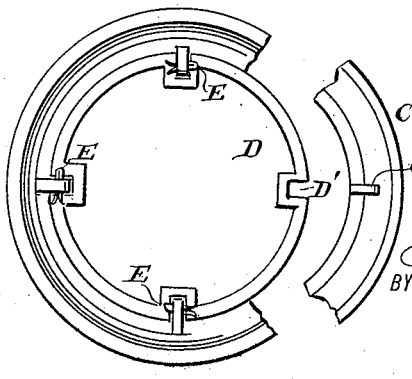



Fig: 9.

Fig: 8

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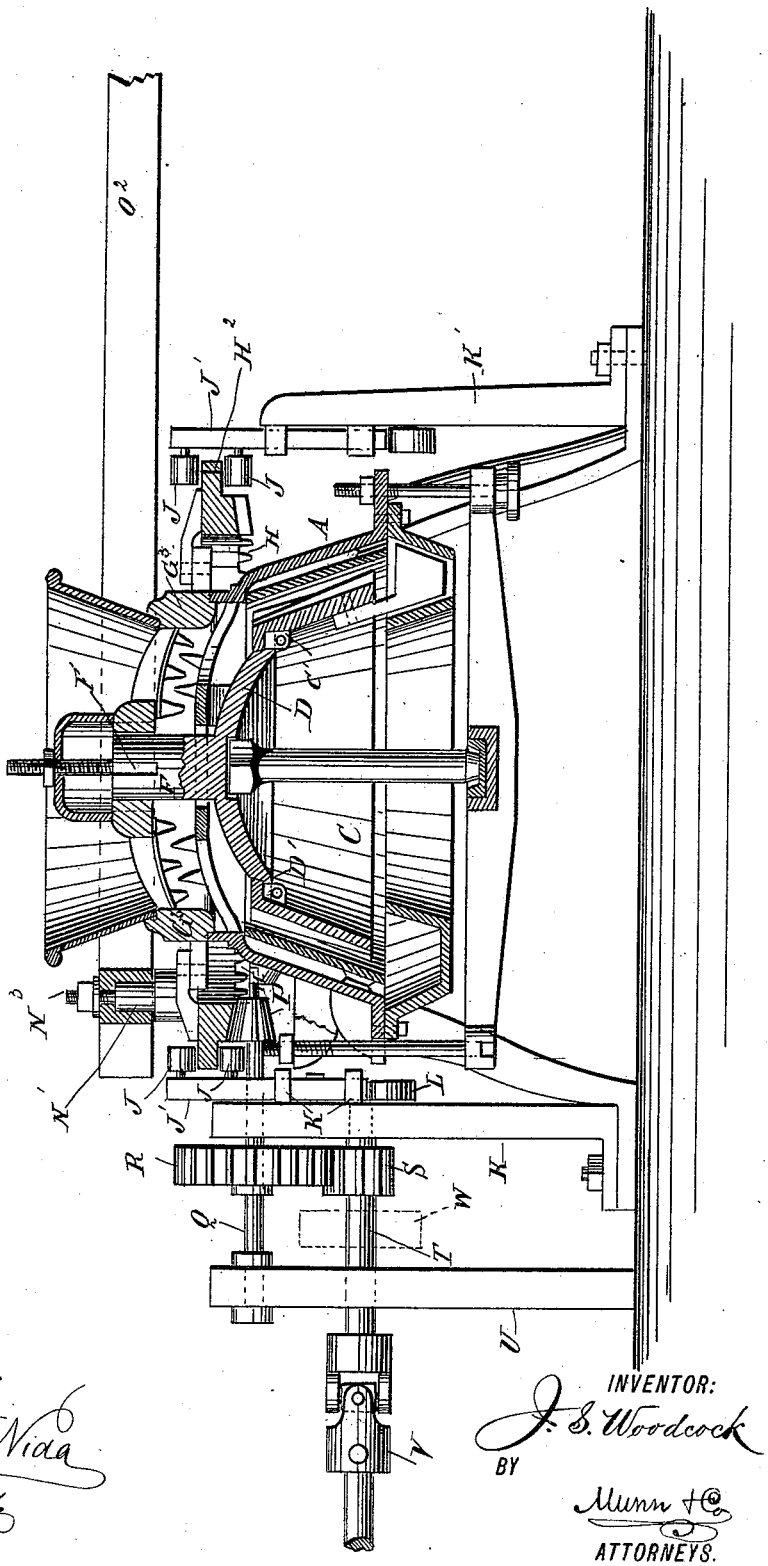
(No Model.) 3 Sheets—Sheet 3.

# J. S. WOODCOCK.

## GRINDING MILL.

No. 419,394. Patented Jan. 14, 1890.

Fig: 10.

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# UNITED STATES PATENT OFFICE.

JAMES S. WOODCOCK, OF NEW LEXINGTON, OHIO.

## GRINDING-MILL.

SPECIFICATION forming part of Letters Patent No. 419,394, dated January 14, 1890.

Application filed March 19, 1889. Serial No. 303,851. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES S. WOODCOCK, of New Lexington, in the county of Perry and State of Ohio, have invented certain new and useful Improvements in Grinding-Mills, of which the following is a full, clear, and exact description.

The invention relates to grinding-mills such as shown and described in Letters Patent No. 382,202, granted to me May 1, 1888.

The object of the invention is to provide certain new and useful improvements in grinding-mills, whereby the mill can be used either as an independent power for running other machinery or as a combined power for other machinery and a grinding-mill, or as a grinding-mill alone.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a plan view of the same with the hood of the casing removed. Fig. 3 is a plan view of the main bevel gear-wheel. Fig. $3^a$ is an inverted plan view of the same. Fig. 4 is a plan view of the gear-wheel ring. Fig. 5 is a sectional side elevation of the gear-wheel ring and gear-wheel as connected with each other. Fig. 6 is a sectional side elevation of one of the lugs of the ring on the line $x\ x$ of Fig. 4. Fig. 7 is a sectional side elevation of the cone and the dome-plate. Fig. 8 is an inverted plan view of the same with parts of the cone broken off, and Fig. 9 is an enlarged face view of the guide-rollers. Fig. 10 is a vertical central section of the mill.

The improved grinding-mill is provided with a casing A, supported on legs B, and is of similar construction to the mill shown in the patent above referred to. On the inside of the casing A is held the stationary shell, also similar to the one shown in the patent mentioned, and within this shell operates the cone C, provided on its inside with lugs C′, extending into corresponding notches D′, formed in the periphery of the dome-plate D. In the lugs C′ are apertures located directly below the dome-plate, so that when the dome-plate is placed in position on the cone spring-keys E are inserted in the aperture of each lug C′, so as to lock the dome-plate securely in place on the cone. This simple connection of the cone and the dome-plate permits of quickly disconnecting the two parts whenever desired for convenient replacing of the cone whenever necessary.

From the center of the dome-plate D projects upward a spindle F, provided near its upper end with recesses F′, and fitting into an aperture G′ in a hub G, supported on the arms $G^2$, projecting from the inside of the ring $G^3$, provided in its periphery with outwardly-extending lugs $G^4$, each having an upwardly-turned flange $G^5$. The ring $G^3$, the arms $G^2$, and the hub G form the gear-ring. On the arms $G^2$ may be secured knives $G^7$, (shown in dotted lines in Fig. 4,) serving to cut the husk on the ear of corn, so that it will grind through the mill. On the lugs $G^4$ are secured the lugs H′, projecting inward from the top of the main bevel-wheel H, having its bevel-teeth on the under side.

In the hub G are formed key-slots $G^6$, corresponding to the slots F′ in the spindle F and adapted to register with the same, so as to permit of inserting keys I to fasten the said spindle F to the hub G. When the keys I are inserted and the wheel H is turned, the cone C is rotated inside of the casing A and operates in conjunction with the shell in order to grind in the usual manner.

It will of course be understood that the keys I are keys only in the sense that they prevent the hub and the spindle from turning one on the other, for they do not interfere at all with the vertical movement of the spindle through the hub when the cone requires vertical adjustment by the screw on its upper end.

The main bevel gear-wheel H is provided with an outwardly-extending annular flange $H^2$, adapted to travel between sets of guide-rollers J one above the other, one guide-roller of each set being on top of the annular flange $H^2$ and the other roller of the same set on the under side of the said annular flange. (See Fig. 1.) Each set of guide-rollers J is mounted to turn on a vertical arm J′, mounted to slide in suitable guideways K, fastened

on posts K′, preferably secured to the legs B or to the frame on which the mill sets. From the lower end of each arm J′ operates a cam-lever L, fulcrumed on the respective post K′ and adapted to raise or lower the arm J′, so as to raise or lower the gear-wheel H and its connections, for the purposes hereinafter more fully described. In the arm J′ is a slot $J^2$, through which passes a bolt $J^3$, held in the post K′. On the bolt $J^3$ screws a nut $J^4$, which, when screwed up, serves to lock the arm J′ in any desired position after being raised or lowered by the cam-lever L. (See Fig. 9.)

From three of the lugs H′ of the gear-wheel H project upward the studs N, N′, and $N^2$, respectively, each having a central bolt $N^3$, projecting upward and adapted to receive a nut $N^4$. The studs N and $N^2$ and their bolts $N^3$ are adapted to pass into corresponding apertures formed in the side beams O′ and $O^2$ of the power-frame O, connected with each other by the transverse beam $O^3$, into which passes the stud N′ and its bolt $N^3$, as is plainly shown in Fig. 2.

When the power-frame O is placed on the studs, the nuts $N^4$ are screwed on the bolts $N^3$ against the tops of the beams O′, $O^2$, and $O^3$, so as to secure the power-frame O firmly to the top of the gear-wheel H. The animal is hitched to the outer end of the power-frame O, in the usual manner, for turning the mill.

Into the main bevel gear-wheel H is adapted to mesh a pinion P, secured on the inner end of a shaft Q, mounted to turn in suitable bearings held in one of the posts K′ and in a standard U, secured on the floor on which the mill rests. The pinion P is provided with a key-slot, into which fits the key Q′ on the shaft Q, so as to carry the pinion around and at the same time permit a sliding motion of the said pinion, in order to disconnect it from the gear-wheel H whenever desired.

On the shaft Q is fastened a gear-wheel R, meshing into a pinion S, secured on the shaft T, mounted to turn in the post K′ and the standard U, and adapted to be connected by a universal joint V with other machinery. A pulley W is also placed on the said shaft, and is adapted to be connected by a belt with other machinery to be driven. As the other parts of the machine are substantially similar to the corresponding ones shown in the patent above referred to, a further description is deemed superfluous.

The operation is as follows: When the operator desires to use the machine as a grinding-mill only, he moves the pinion P outward on the shaft Q, so as to disengage the pinion from the main gear-wheel H. When the animal attached to the power-frame O now sets the latter in motion, the gear-wheel H, the ring $G^3$, connected with said gear-wheel, and the hub G, connected with the said ring, rotate simultaneously, and by means of the keys I, the spindle F, and the dome-plate D are carried around, so that the cone C, fastened to the said dome-plate, also rotates inside of the casing on the shell in order to grind.

When the operator desires to use the device as a grinding-mill, as above described, and at the same time as a power for driving other machinery, he moves the pinion P into mesh with the gear-wheel H, as is plainly shown in Fig. 1. When the animal now turns the power-frame O, the grinding-wheel operates as above described, and at the same time a rotary motion is imparted to the shaft Q by the bevel gear-wheel H turning the pinion P, secured on the said shaft Q. The latter by the gear-wheel R and the pinion S imparts a rotary motion to the shaft T, from which the power may be transmitted in any suitable manner to the machine to be driven.

When the operator desires to use the machine only as a power, he removes the keys I from the spindle F and the hub G, so that when the animal turns the power-frame O the gear-wheel H, the ring $G^3$, and the hub G are rotated; but the spindle F, on account of being disconnected from the hub G, remains stationary, and consequently the cone C does not turn and the mill proper is at a stand-still. The gear-wheel H, however, rotates when the power-frame is turned, and consequently transmits its motion by the bevel-pinion to the shaft Q, which latter, as above described, turns the shaft T, connected with the machinery to be driven.

Thus it will be seen that by very simple connections I am enabled to use the machine as a grinding-mill or as an independent power, or as both combined. It is to be understood that the sets of friction-rollers J support the gear-wheel H and its connections, so that the weight of the latter is raised from the main casing A, upon which it would otherwise rest, and thus cause considerable friction. This friction is usually overcome when grinding grain by means of the grain passing into the crevices between the ring $G^3$ and the casing; but when using the machine as a power only, as above described, no grain passes through the mill, and consequently it is necessary to relieve the casing A from the friction. This is done by slightly raising the gear-wheel H by the sets of rollers J, so as to make a clearance between the casing A and the ring. The raising of the friction-rollers J is accomplished by means of the cam-lever L (see Fig. 9) being moved in an uppermost position, so as to raise the arm J′, carrying the friction-rollers J. When the desired position is attained, the nut $J^4$ is screwed up, so that the arm J′ is securely locked in place on its supporting-post K′.

It is to be further understood that the flanges $G^5$ on the gear-ring lugs $G^4$ take up all lateral strain on the bolts connecting the lugs $G^4$ and H′ with each other.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a grinding-mill, the combination, with the casing, the shell and the cone therein, and a master-wheel connected with the spindle and provided with a sweep, of vertically-adjustable bars J′, each having upper and lower anti-friction wheels J J, between which the periphery of the said master-wheel extends.

2. The combination, with a grinding-mill having a horizontal master-wheel provided with a peripheral flange $H^2$ and a sweep, of the vertical posts K′ at the sides of the mill, the vertically-adjustable slotted bars J′, mounted on said posts and having clamping-bolts $J^3$, an upper and a lower anti-friction wheel on each bar, between which the said flange extends, and levers L, pivoted to the posts and bearing against the said bars to raise and lower them, substantially as set forth.

3. The combination, in a grinding-mill, with the shell, the cone therein provided with a spindle, and the master-wheel connected directly to the said spindle to rotate the cone and provided with gear-teeth on its lower face and a sweep, of the transverse power-transmitting shaft Q, provided with a sliding pinion P on said shaft and adapted to be thrown into and out of gear with the master-wheel, substantially as set forth.

4. A grinding-mill comprising the shell, the cone therein provided with an upward-extending spindle having a groove F′ extending downward from its upper end, a master-wheel having a central hub receiving said spindle and provided with a vertical groove registering with the groove in the spindle, a key readily insertible in and removable from said grooves, a sweep, and a power-transmitting shaft having a sliding pinion to be thrown into and out of gear with the master-wheel, substantially as set forth.

5. The combination, with the cone-dome having a flange around its base provided with peripheral recesses, of the cone having lugs C′ on its inner face near its upper end, passing through and below said recesses, and provided below the dome-flange with transverse apertures, and pins passed horizontally through said apertures against the under side of said flange and locking the dome and cone together, substantially as set forth.

6. In a grinding-mill, a cone comprising an open-ended shell having an inward-extending flange around its upper smaller end and transversely-apertured lugs C′ under said flange and the dome D, passed upward through the cone against said flange, closing the upper end of the cone, and having peripheral recesses D′, through and below which the lugs extend, and a spindle on its upper side, and the pins passed horizontally through the apertured lugs and against the under side of its flange, substantially as set forth.

7. The combination, in a grinding-mill, with the shell and the cone having a spindle, of the sweep or master-wheel comprising the outer open gear H, toothed on its lower face and provided with inwardly-projecting lugs H′, the ring $G^3$ within the wheel H and having peripheral lugs $G^4$, provided with ribs $G^5$ along one side, vertical bolts passing through said lugs, the central hub G, through which said spindle passes, and the arms $G^2$, integral with the hub and ring, substantially as set forth.

8. The combination, with the shell and the cone provided with a spindle, of a sweep or master-wheel having integral shouldered posts projecting from its upper face and a central hub receiving the spindle, bolts projecting from the upper ends of the posts, the sweeps provided with apertures into which the posts project as far as their shoulders, and nuts on said bolts clamping the sweeps in place on the posts, substantially as set forth.

JAMES S. WOODCOCK.

Witnesses:
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FRANK A. KELLY.