

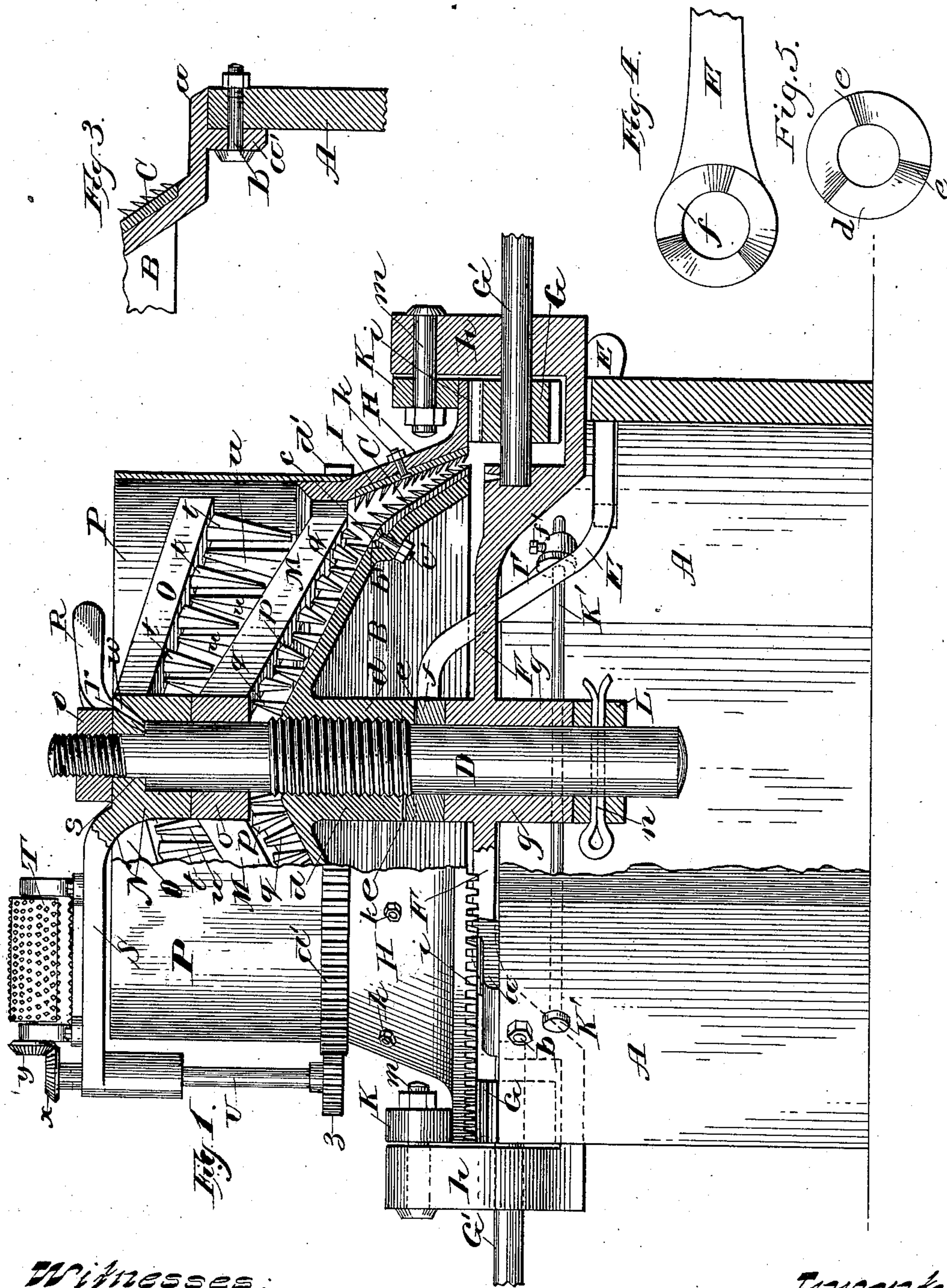
(No Model.)

2 Sheets—Sheet 1.

J. R. DAVIES.  
FEED MILL.

No. 365,583.

Patented June 28, 1887.



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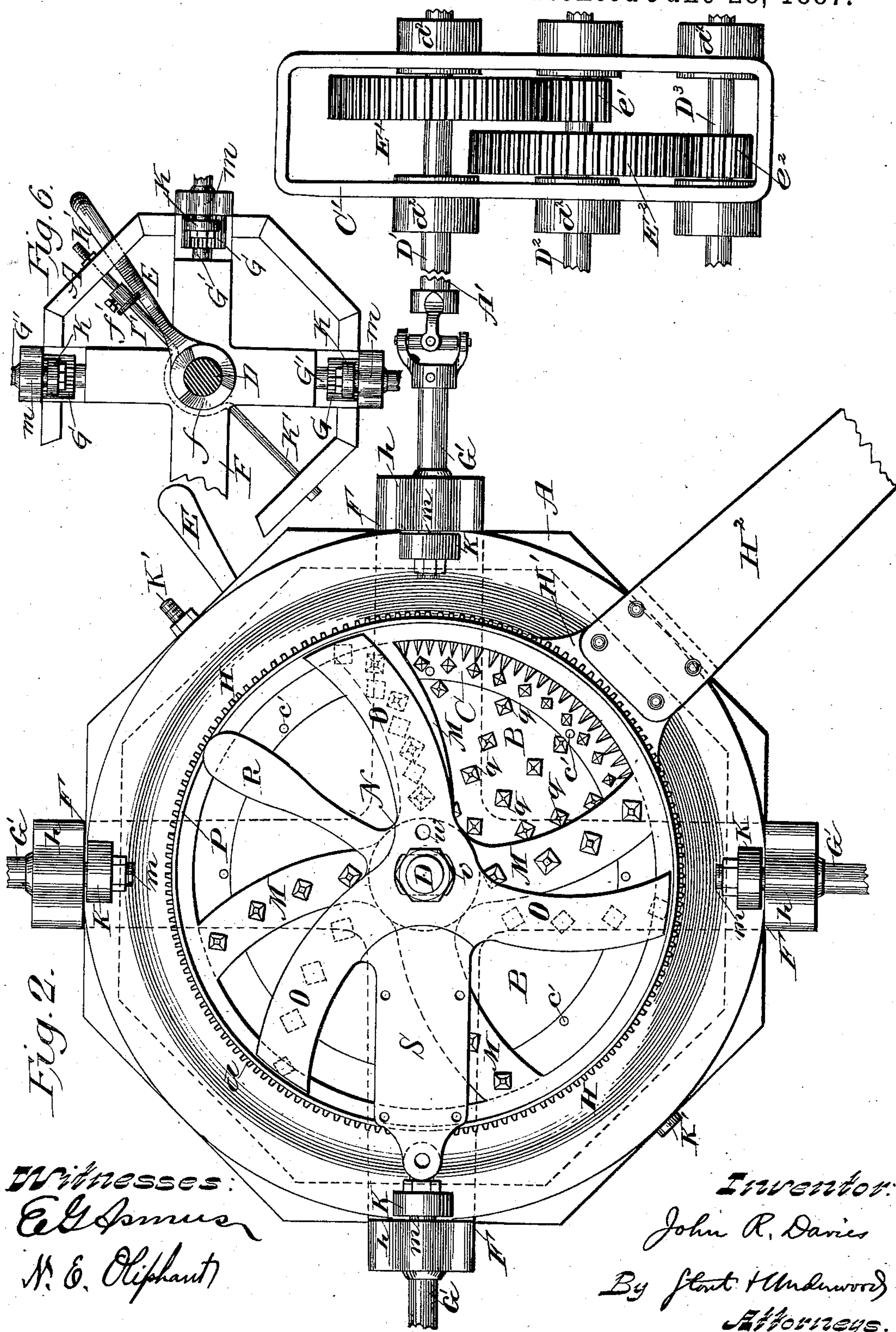
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# UNITED STATES PATENT OFFICE.

JOHN R. DAVIES, OF CHICAGO, ILLINOIS.

## FEED-MILL.

SPECIFICATION forming part of Letters Patent No. 365,583, dated June 28, 1887.

Application filed March 16, 1886. Serial No. 195,402. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN R. DAVIES, of Chicago, in the county of Cook, and in the State of Illinois, have invented certain new and useful Improvements in Feed-Mills; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to a feed-mill; and it consists in certain peculiarities of construction and combinations of parts, as will be fully described hereinafter and subsequently claimed.

Figure 1 of the drawings represents an elevation of my invention, partly in vertical section; Fig. 2, a top plan view of the same, a portion only of the cone and grinding-teeth being illustrated therein; Fig. 3, a detail view showing the manner of connecting the stationary cone and receiving-box; Fig. 4, a similar view of a portion of the locking-lever; Fig. 5, a like view of the clutch-face on the hub of the stationary cone; and Fig. 6 is a horizontal section on a reduced scale, illustrating the means for retaining the lever in engagement with the clutch-hub of the stationary cone.

A represents the receiving-box of the mill, and on the upper edge of this box rest lugs *a*, extending out from the stationary cone B, these lugs being provided with depending perforated studs *a'*, through which and the walls of said box are passed bolts *b*, to retain the respective parts in their relative positions. The stationary cone B is offsetted at *b'*, to receive an inwardly-projecting flange, *c*, on a grinding-ring, C, that is secured to said cone by bolts *c'*, passed through the latter and the flange of the former, so that when these bolts are tightened the ring is drawn down upon the cone without kinking, as is generally the case in the ordinary manner of uniting said parts by bolting through the center of the ring. The center of the stationary cone B is formed with a depending hub, *d*, provided upon its interior with screw-threads designed to engage corresponding threads upon a central shaft, D. The lower face, *e*, of the cone-hub *d* is provided with clutch-teeth to engage a clutch-faced ring, *f*, that forms the inner terminus of a curved lever, E, said ring fitting around the central shaft, D, this engagement acting as a means to prevent said shaft from revolving when the mill is in operation.

Adapted to fit upon the central shaft, D,

below the ring *f* of the lever E, is the hub *g* of a suitable spider, the arms F of said spider being provided at their outer ends with bearings *h* for the journals *G'* of pinions G, said bearings being vertically extended in an upward direction. The pinions G mesh with an annular rack, *i*, formed upon the lower under face of an outer shell, H, said shell being offsetted upon its interior to receive a grinding-ring, I, retained in position by bolts *k*. The respective grinding-rings C I have the corrugations or dress of their exposed faces graduated from top to bottom, so as to gradually reduce the substance coming in contact therewith.

To prevent the shell H from rocking on the pinions G, I secure in the vertically-extended outer ends of the spider-arms F suitable journals, *m*, designed to carry anti-friction rollers K, and these rollers come immediately above the pinions and bear upon the upper surface of the outer rim of said shell, to retain the latter at all times in operative position with relation to the pinions.

Immediately below the hub *g* of the spider I secure a collar, L, by means of a cotter, *n*, passed through this collar and the central shaft, D, thus forming a firm central bearing for said spider. Though this construction of the central support may be variously modified to accomplish the same result, that already described is deemed sufficient for all practical purposes.

Extending inwardly from the upper rim of the outer shell, H, are a series of arms, M, terminating in a hub, *o*, adapted to fit loosely upon the central shaft, D, and said arms are provided with depending teeth *p*, arranged with relation to teeth *q*, projecting up from the stationary cone B. The central shaft, D, is cut away at its upper extremity to form a seat, *r*, for the flange *s* of a hub, N, designed to fit around said shaft and bear upon the hub *o*, forming the inner terminus of the arms M. The outer shell, H, of which said arms are integral parts, is entirely supported by the spider-arms F through the medium of the pinions G. That portion of the shaft D immediately above the seat *r* is squared off upon its sides, and the bore of the hub N correspondingly formed, in order that the parts when united will be rigidly connected. Radiating from the hub N are



a series of toothed arms, O, forming what I term the "crusher." The depending teeth *t* of the crusher-arms are arranged with relation to teeth *u*, projecting up from the arms M of the outer shell, H, said crusher-arms being preferably one more or less than those belonging to the shell. The hub N of the crusher-arms O is held down in operative position by means of a nut, *v*, or other suitable means, and said hub is provided with a port, *w*, through which oil is introduced to lubricate the central shaft, D, and its several connections.

P is a hopper suitably secured to the outer or revolving shell, H, so as to incase the crushing devices above described. The hub N of the arms O is also formed with a radial handle, R, that is operated when it is desired to revolve the central shaft, D, to vary the space between the grinding-rings C I, as will be hereinafter more fully described, the normal condition of said shaft being stationary. If desired, I may also provide the hub N with a radial bracket, S, upon which to secure a corn-sheller, T, or grain-cracker, such a device being partially shown in Fig. 1, and the bracket forms a bearing for a vertical shaft, U, carrying at its upper extremity a bevel-pinion, *x*, adapted to mesh with a gear, *y*, on the main shaft of said sheller. The main shaft of the sheller has fast thereon a rough-faced horizontal roller, between which and a similar-faced bed-plate the ears of corn are fed to have the kernels removed, said sheller being ordinarily provided with a suitable casing that has a delivery-chute for the cobs; but for convenience of illustration this casing has been omitted.

To the lower extremity of the vertical shaft U, I secure a horizontal pinion, *z*, designed to mesh with cog-teeth *d'* on the upper outer portion of the shell H, this construction and arrangement of parts serving to drive the corn-sheller as said part H is revolved, so as to shell and reduce the corn to meal at one operation. Ordinarily the outer shell, H, is provided with a lateral tongue, H', to which I attach a sweep, H<sup>2</sup>, and to the latter I hitch a horse or team to furnish the motive power for my mill. Any one or all the journals G' of the pinions G may be laterally extended, so as to be operatively connected by suitable couplings and shafting or other gear to a saw-mill, root-cutter, or other machine generally employed about a farm, and in such an instance the mill becomes a horse-power.

As various machines about a farm cannot be effectively run at the same rate of speed, I provide what I term a "jack," adapted to be connected by a tumbling-rod and shafting, A', with one of the laterally-extended pinion-journals G', and constructed to give a variety of speed adapted to different machines. This jack consists of a rectangular frame, C', cast in one piece and constructed with a series of chilled bearings, *d*<sup>2</sup>, adapted to receive horizontal shafts D' D<sup>2</sup> D<sup>3</sup>. The shaft D' receives motion from the mill or horse-power through the

tumbling-rod and shaft connection A', and a spur-wheel, E', keyed to said shaft, meshes with a pinion, *e'*, on the shaft D<sup>2</sup>, this latter shaft also carrying a spur-wheel, E<sup>2</sup>, designed to mesh with a pinion, *e*<sup>2</sup>, on the shaft D<sup>3</sup>, and this relative connection of spur-wheels and pinions may be multiplied. A band-pulley may be attached to any of the shafts in the series and changed from one to another as occasion may require, though, if desired, each shaft may be provided with such a pulley, so as to have a series of pulleys varying in size.

Instead of driving the mill by attaching a horse or team thereto, as above described, I may connect one of the pinion-journals G' with any suitable separate power to accomplish the same result.

To vary the space between the grinding-rings C I, the lever E is shifted to regulate the engagement of the clutch-faces on the ring *f* and those on the hub *d*, and then by operating the handle R, radiating from the hub N, that is seated on the cut-away portion of the central shaft, D, the latter is rotated in the hub *d* of the stationary cone B, and is thus caused to travel up or down, as the case may require, the spider-bearing on the collar L being carried therewith in the same direction. The spider, being carried as above described, will in turn carry the outer or revolving shell, and this part having a bearing with relation to the hub N of the crusher, the latter is raised or lowered accordingly as the adjustment of the grinding-rings may be effected for coarse or fine grinding. After the mill has been adjusted as above described I operate the lever E to lock the clutch-faces on the parts *d f*, and to prevent the lever from being disengaged from its locked position by strain or other causes I stop the same with a stop, I', adjustable on a rod, K', that is secured at its ends to the sides of the receiving-box A, and in order to retain the stop in the position to which it may be adjusted I provide the same with a binding-screw, *f*, this construction being illustrated in Figs. 2 and 6.

In the operation of my mill corn on the cob is thrown into the hopper, and is first crushed between the toothed arms O M into small pieces, and coming in contact with the teeth upon the under sides of said arms M and those on the stationary cone B, it is further crushed and feeds down between the grinding-rings C I, and by their action is reduced to the desired fineness and falls into the receiving-box A.

By the construction above described I provide a feed-mill in which the main strain comes upon a central shaft, thereby reducing the friction upon the operative parts to a minimum, and at the same time permitting a ready adjustment of the grinding-rings to vary the grade of the ground substance. It will also be noticed that the strain caused by the expansive force of the substance to be ground will come equally on the collar L and hub N,



in a line with the vertical center of the machine, thereby preventing any clogging of the parts by unequal pressure.

Not only is my device simple and complete as a feed-mill, but at the same time it can be utilized as a horse-power.

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

10 1. The combination, with a stationary cone provided with a grinding-ring and having an internally-screw-threaded hub, and a revolving shell provided with a grinding-ring in opposition to the one on the cone, of a central shaft provided with screw-threads arranged to engage those of the cone-hub, a spider-frame fitted upon the shaft to support the revolving shell, and a hub seated upon the upper end of said shaft and provided with a radial handle, substantially as and for the purpose set forth.

2. The combination, with a stationary cone provided with a grinding-ring and having an internally-screw-threaded hub, a revolving shell provided with a grinding-ring in opposition to the one on the cone, and a central hub having a series of toothed arms radiated therefrom, of a central shaft provided with screw-threads arranged to engage those of the cone-hub, a spider-frame fitted upon the shaft to support the revolving shell, and a hub seated on the upper end of said shaft and provided with a radial handle and radiating arms, the latter having depending teeth, substantially as and for the purpose set forth.

3. The combination of a stationary cone provided with a grinding-ring and having an internally-screw-threaded hub, a revolving shell provided with a grinding-ring in opposition to the one on the cone, a central shaft provided with screw-threads arranged to engage those of the cone-hub, and a spider-frame fitted upon the shaft to support the shell, with a hub seated upon the upper end of said shaft and provided with a radial handle and an oil-port, substantially as and for the purpose set forth.

4. The combination, with a stationary cone provided with a grinding-ring and having a hub that is clutch-faced on its lower end, and a revolving shell provided with a grinding-ring in opposition to the one on the cone, of

a central shaft, a clutch-faced ring having a lever-extension and arranged to engage said hub, a spider-frame fitted upon the shaft to support the revolving shell, and means for vertically adjusting said shaft, substantially as and for the purpose set forth.

5. The combination, with a stationary cone provided with a grinding-ring and having an internally-screw-threaded hub that is clutch-faced on its lower end, and a revolving shell provided with a grinding-ring in opposition to the one on the cone, of a central shaft having screw-threads arranged to engage those of the cone-hub, a clutch-faced ring arranged to engage said hub and provided with a lever-extension, a spider-frame fitted upon the shaft to support the revolving shell, means for rotating the latter, and an adjustable stop for the lever, substantially as and for the purpose set forth.

6. The combination of a stationary grinding-cone having an internally-screw-threaded hub that is clutch-faced on its lower end, and a revolving grinding-shell in opposition to said cone, with a central shaft having screw-threads arranged to engage those of the cone-hub, a clutch-faced ring having a lever-extension and arranged to engage said hub, a spider-frame fitted upon the shaft to support the revolving shell, a rod secured to a receiving-box on which the stationary cone is mounted, and a stop adjustable on said rod to lock the lever, substantially as and for the purpose set forth.

7. The combination, with a stationary cone provided with a detachable grinding-ring and a hub, of an outer shell, also provided with a detachable grinding-ring in opposition to the one on the cone and having a series of arms inwardly terminated in a hub, a central shaft, a spider-frame fitted to the shaft to support the revolving shell, and means, substantially as described, for vertically adjusting said shaft, as set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Chicago, in the county of Cook and State of Illinois, in the presence of two witnesses.

JOHN R. DAVIES.

Witnesses:

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S. S. STOUT.