

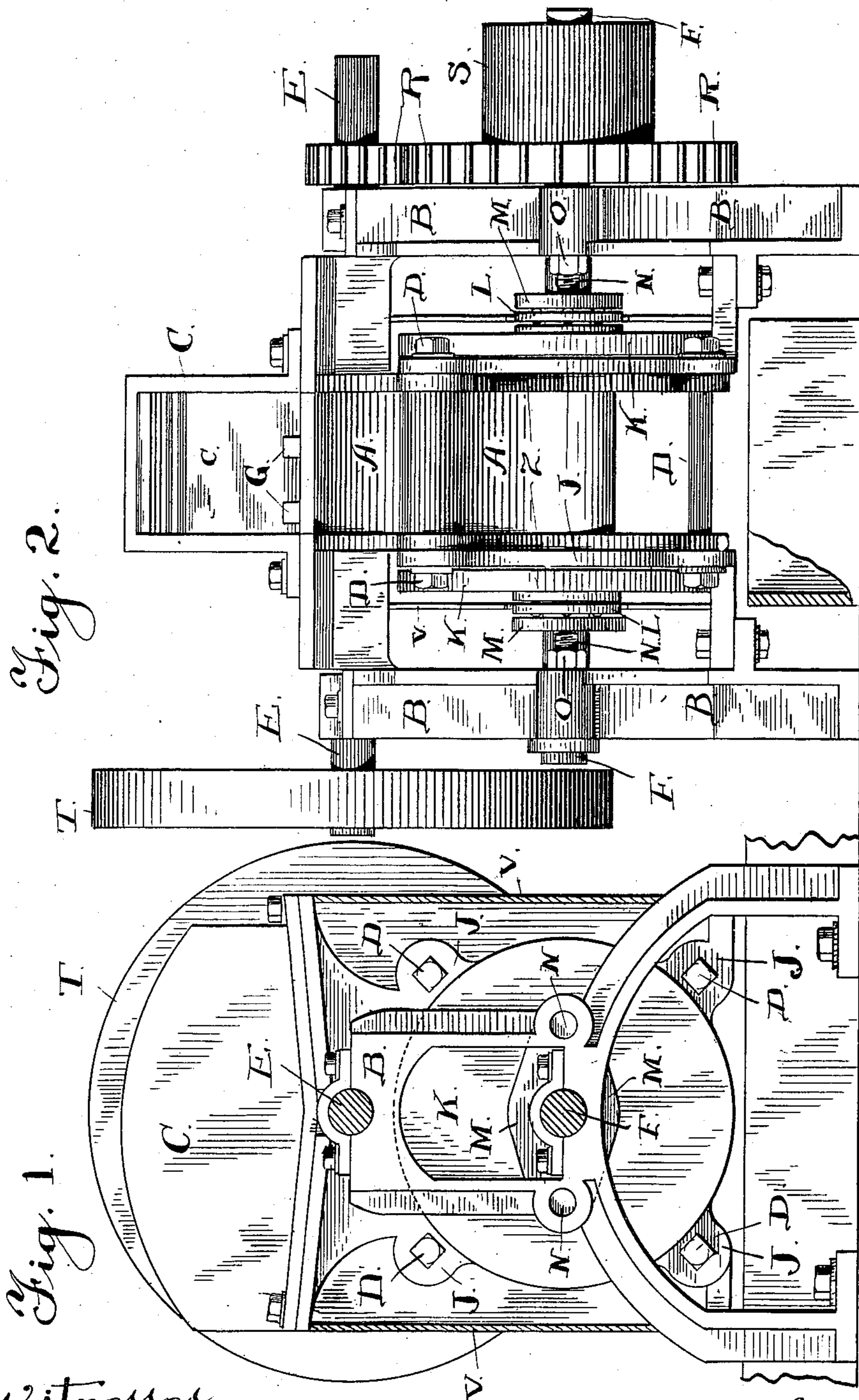
No. 861,570.

PATENTED JULY 30, 1907.

A. C. BATES.
REDUCTION AND PULVERIZING MILL.

APPLICATION FILED MAY 29, 1905.

3 SHEETS—SHEET 1.



Witnesses.
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Fig. 4.

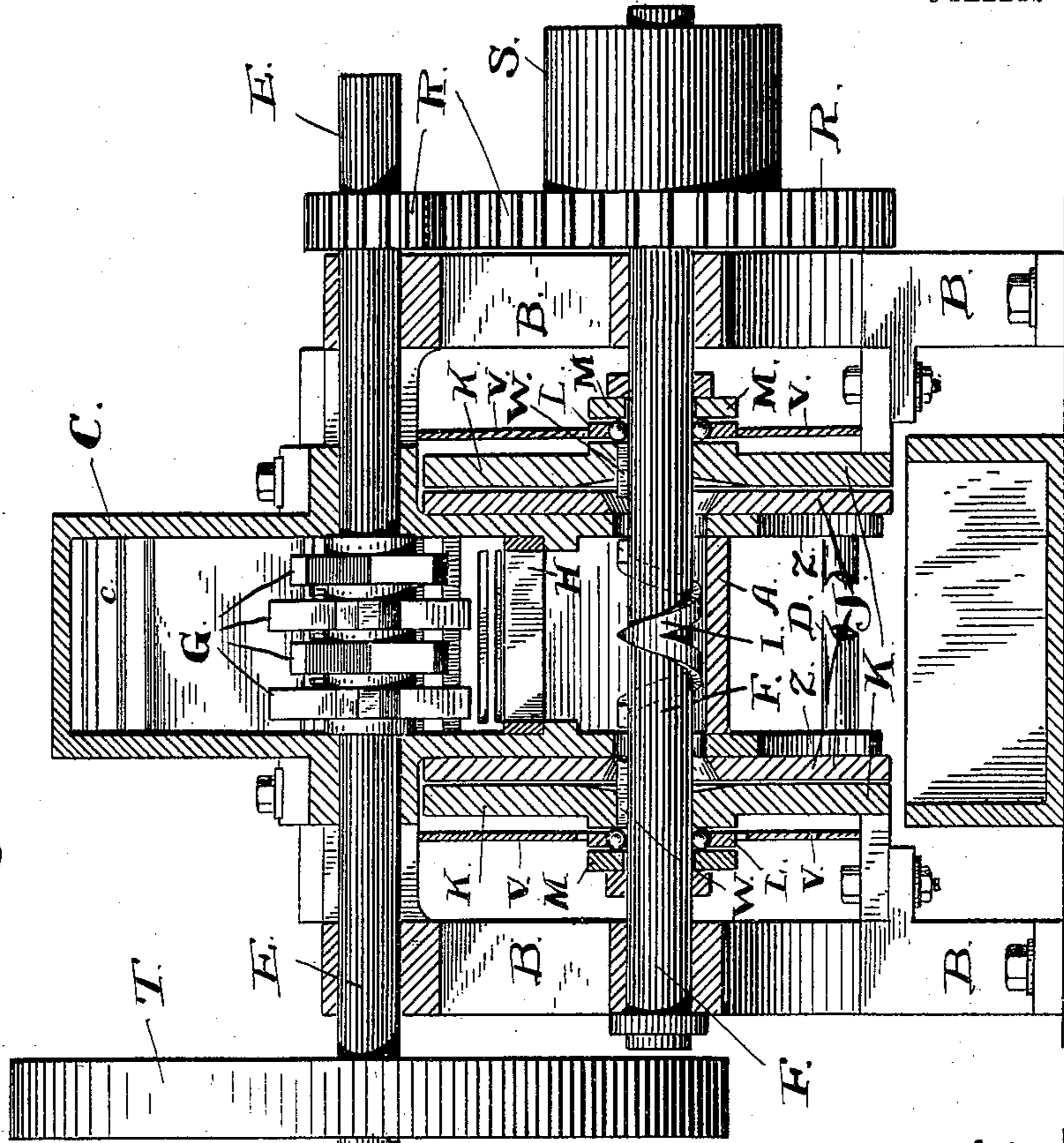
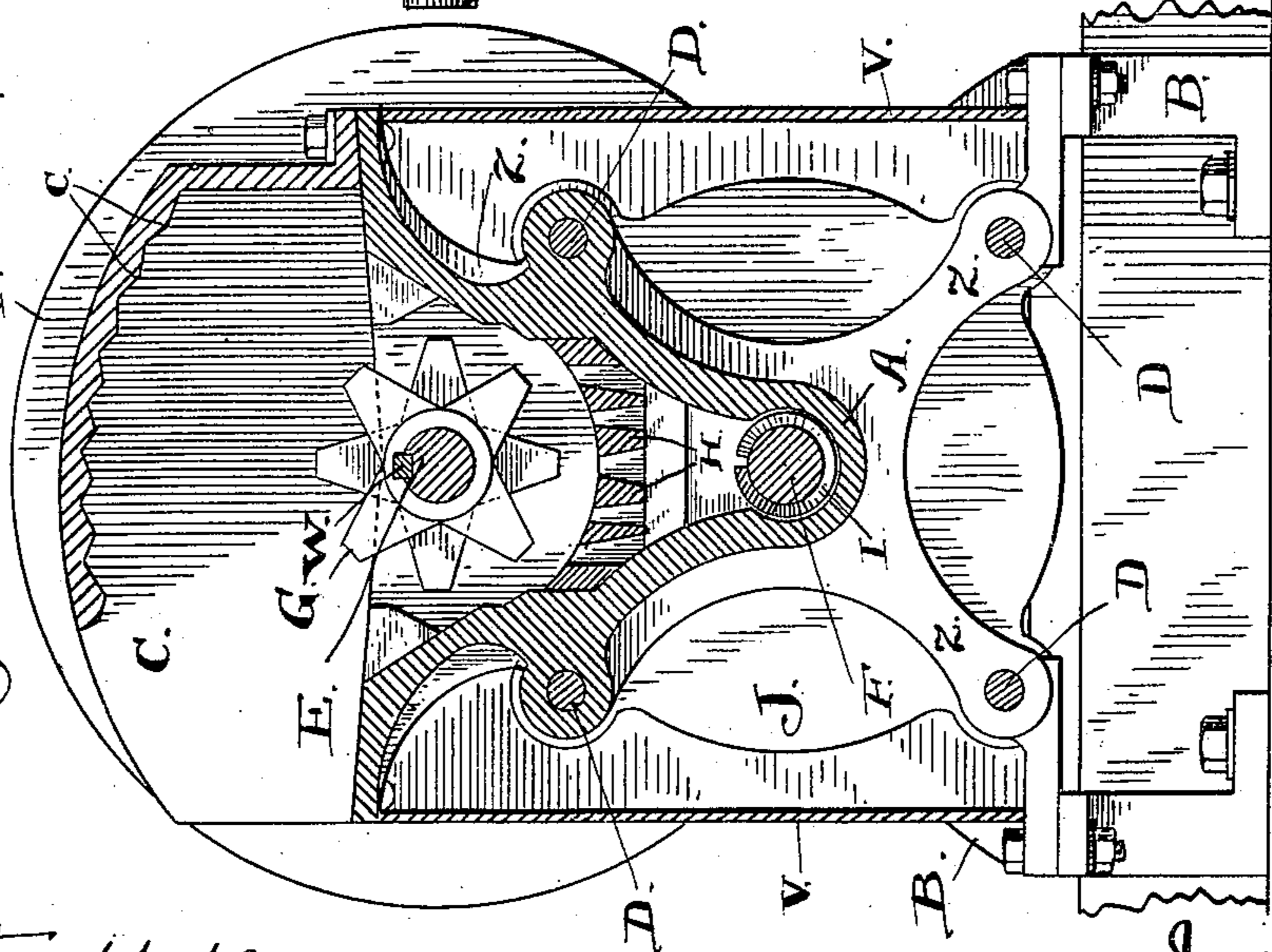


Fig. 3.



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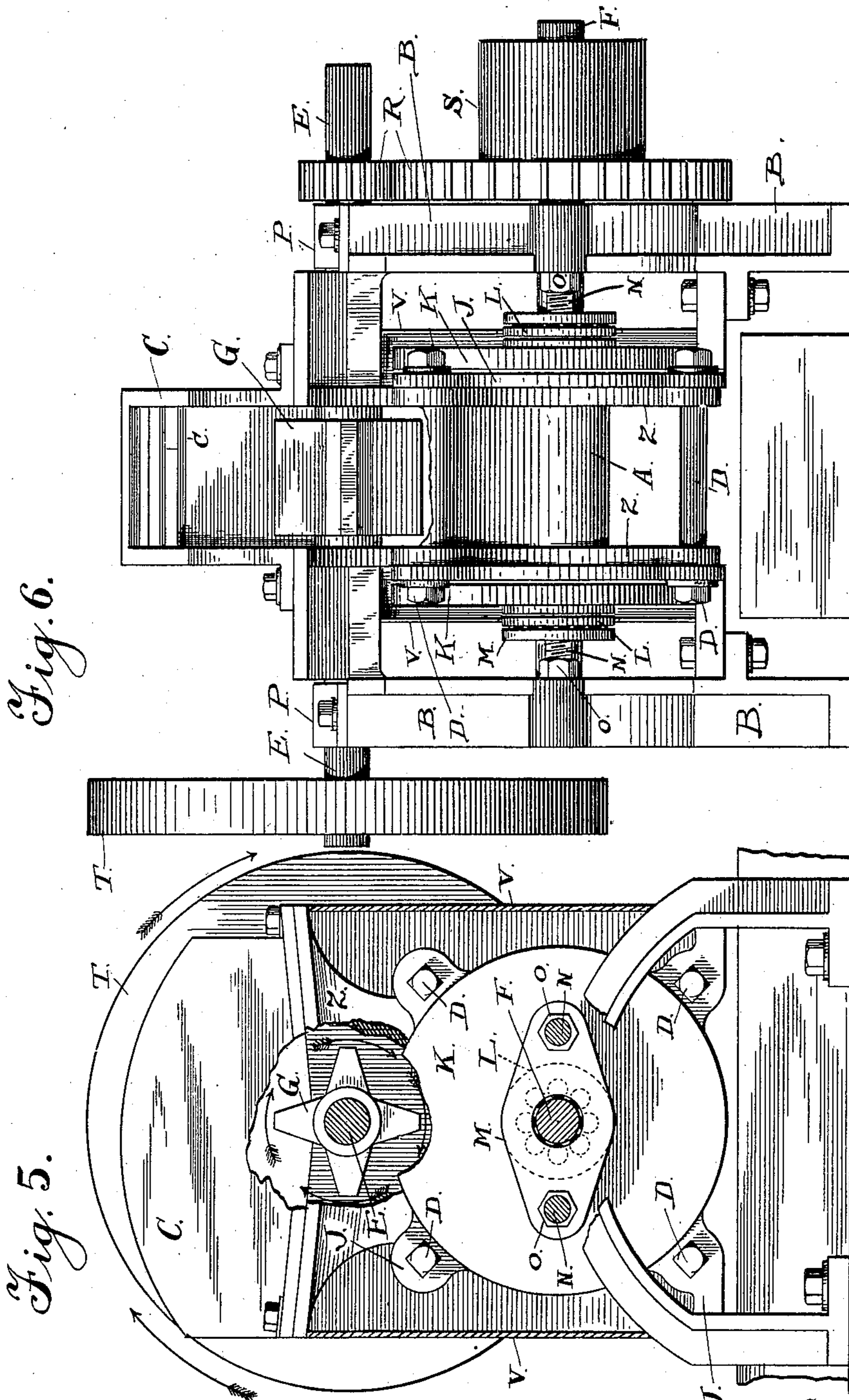
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ARTHUR C. BATES, OF OAKLAND, CALIFORNIA.

REDUCTION AND PULVERIZING MILL.

No. 861,570.

Specification of Letters Patent.

Patented July 30, 1907.

Application filed May 29, 1905. Serial No. 262,943.

To all whom it may concern:

Be it known that I, ARTHUR C. BATES, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Reduction and Pulverizing Mills, of which the following is a specification.

My invention relates to improvements in reduction and pulverizing mills.

10 The objects of my invention are to provide a machine for reducing quartz, rocks, minerals and other objects either wet or dry requiring reduction and for pulverizing ore and other bodies requiring pulverization and to accomplish such work by means of lighter machinery and the expenditure of less power than has been heretofore used for the same.

My invention consists in the novel construction, arrangement and combination of parts shown in the accompanying drawings, described in the following specification and claimed in the appended claims.

Referring to the figures in said drawings Figure 1 is a side elevation of the machine showing one side of the box or casing removed as well as the spur gearing. Fig. 2 is a front elevation of the machine and Fig. 3 a transverse section thereof. Fig. 4 is a longitudinal section of the machine. Fig. 5 is a side view of the machine with part of the case and supports broken away to expose interior mechanism. Fig. 6 is front view of the machine with part of the case broken away to show knocker G.

In the figures A represents the body of the frame and B supports for the shafting and adjustments for disk mullers. C shows the hood covering the primary rock or other object breaking device. The parts marked D represent rods for the securing of parts. E shows the shaft for the revolving crushing spurs G and F the shaft for the mullers hereinafter mentioned. H represents a grate and I a rib to force the material to said mullers. The parts J show side flanges for the further securing of the frame also to prevent wearing thereof by friction from moving materials. Disk mullers are shown at K and ball bearing washers at L. A bar is shown at M for the adjustment of the mullers K to secure the graduated output of material. The rods N secure the bar M and the nuts O are intended as additional means for the adjustment of the mullers K to secure such graduated output of material. P represents caps for the shaft boxes and R spur gearing for the driving of shafts. A balance wheel is shown at T and the parts V represent the inclosing sides of the machine, Z being the movable sides to the body. W represents a key securing the muller or wheel supporting knockers or spurs to a shaft. The spurs or knockers G are attached on shaft E within the body A. The collars over the shaft F may be used to hold the disk mullers K in position and the balance wheel T may be used to govern or steady

the mill in operation. The machine has an upper and lower compartment as indicated by circles in Fig. 1. The bars at the bottom of the grate are substantially V-shaped as shown so that material will more readily pass 60 between the same than if they were of equal width throughout.

The operation of the machine is as follows: Ore or any other body to be crushed being thrown or placed on the machine at the upper left hand side as shown in 65 Fig. 3, the object comes in contact with the spurs or knockers G revolving at necessary speed causing chips or fragments to be broken from the same, and the material being also by such revolution thrown upward against top of the hood further rupture or breaking of 70 the material taking place so that the fragments are reduced to a size that will admit of their passage between the spurs or knockers and the interior surface of the body A. By such passage of the material the consequent throwing and rubbing of the same between such 75 spurs or knockers and the interior case still further reduces the size of the fragments until they are sufficiently small to admit of their passage through the grate H to the opening leading to the revolving shaft or roll F. The descent of the material on the rib I 80 on said roll causes the material to be further broken or reduced against the interior of the case and said roll, and to be forced against the revolving disk mullers K, when such material is reduced to much smaller pieces or to a pulverized state and thrown to the interior of 85 the inclosure formed by the sides V. and from thence to a suitable receptacle placed as shown at the base of Fig. 4. It should be observed that the grate H may be made of such size and the machine arranged so that only material finally reduced to the desired size will 90 pass through it and from thence to the exterior of such machine. The machine may be readily increased in size or the number of its working parts may be increased or diminished to adapt the same to the capacity desired by any one skilled in the art. Should the hood 95 C be removed, the machine will still operate effectively as broken material thrown upward by the spurs or knockers will come in contact with fresh material descending from above, the consequent contact causing a further breaking of such material. 100

It should be observed that the reducing or pulverizing parts are so arranged that they do not come in contact with each other when the machine is in operation, thus avoiding unnecessary friction and wearing of parts when the machine is running but not being 105 fed with material also when not being so fed to its full capacity. As a reduction mill the parts for contact with the material after its passage through the grate may be omitted, but to reduce the material to very small pieces or a pulverized state the machine substantially as shown and described is essential. Each 110 disk muller is chambered on the side nearest to the

body of the mill and from the center thereof exteriorly, to hold the material for distribution to the flat portion of the disk which is on the side nearest the frame and to the rim of such muller.

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

1. A reduction and pulverizing mill comprising a case having a passage leading from the upper compartment to the lower compartment therein contained, an upper shaft 10 passing through said upper compartment, a wheel having projecting arms or knockers attached to said shaft, a grate having a plurality of V-shaped bars beneath said arms or knockers, a hood above said arms or knockers, a shaft passing through said lower compartment, disk mullers 15 arranged to slide on the shaft last mentioned and on each side of the exterior of the case substantially as shown and described.

2. A reduction and pulverizing mill comprising a case having a partly circular interior and a passage leading 20 from the upper circular compartment to the lower circular compartment therein contained, an upper shaft running longitudinally through said case supporting wheels having projecting arms or knockers attached thereto a grate having a plurality of V-shaped bars positioned below said 25 wheels, a shaft running through the said lower circular compartment, disk mullers arranged to slide upon the shaft last mentioned and exteriorly of each side of said case, a rib on said last-named shaft for forcing material against said disk mullers, substantially as shown and described. 30

3. A reduction and pulverizing mill comprising a case having a partly circular interior, a shaft running longitudinally through the upper circular compartment of said case, a wheel having projecting arms or knockers attached 35 to said shaft a grate positioned below said wheels, a hood above said wheel, a shaft running through the lower circular compartment of said case, disk mullers slidable on the shaft last mentioned and exteriorly of said case, a rib on said last named shaft to force material against said 40 mullers, rods passing through central supports for shafting, nuts turnable on said rods and against said supports for the movement of bars and the adjustment of said disk mullers, substantially as described.

4. A reduction and pulverizing mill comprising a case 45 having a partly circular interior, a shaft running longitudinally through the upper circular compartment of said case, a wheel having projecting arms or knockers attached to said shaft, a grate positioned below said wheel, a hood above said wheel, a shaft running through the lower circular compartment of said case, disk mullers slidable on 50 the shaft last mentioned and exteriorly of said case, a rib on said last named shaft to force material against said mullers, rods passing through central supports for shafting, nuts turnable on said rods and against said supports 55 for the movement of bars and the adjustment of said disk mullers and washers and ball bearings placed between said bars and disk mullers for the reduction of friction, substantially as described.

5. A reduction and pulverizing mill comprising a case 60 having a partly circular interior, a shaft running longitudinally through the upper circular compartment of said case, a wheel having projecting arms or knockers attached to said shaft, a grate positioned below said wheel, a hood above said wheel, a shaft running through the lower circular compartment of said case, disk mullers slidable on 65 the shaft last mentioned and exteriorly of said case, a rib on said last named shaft to force material against said mullers, rods passing through central supports for shafting, nuts turnable on said rods and against said supports 70 for the movement of bars and the adjustment of said disk mullers and washers and ball bearings placed between said bars and disk mullers for the reduction of friction and removable side plates attached to the sides of said case to prevent wearing thereof, substantially as described.

75 6. A reduction and pulverizing mill comprising a case having a partly circular interior, a shaft running longitudinally through the upper circular compartment of said case, a wheel having projecting arms or knockers attached to said shaft, a grate positioned below said wheel, a hood

above said wheel, a shaft running through the lower circular compartment of said case, disk mullers slidable on 80 the shaft last mentioned and exteriorly of said case, a rib on said last named shaft to force material against said mullers, rods passing through central supports for shafting, nuts turnable on said rods and against said supports 85 for the movement of bars and the adjustment of said disk mullers and washers and ball bearings placed between said bars and disk mullers for the reduction of friction, removable side plates attached to the sides of said case to prevent wearing thereof and removable sides for catching output and directing it to place intended and to secure same 90 from admixture with foreign substances, substantially as described.

7. A reduction and pulverizing mill comprising a case having a partly circular interior, a shaft running longitudinally through the upper circular compartment of said case, a wheel having projecting arms or knockers attached 95 to said shaft, a grate positioned below said wheel, a shaft running through the lower circular compartment of said case, disk mullers, slidable on the shaft last mentioned and exteriorly of said case, a rib on said last named shaft to force material against said mullers, rods passing 100 through central supports for shafting, nuts turnable on said rods and against said supports for the movement of bars and the adjustment of said disk mullers and washers 105 and ball bearings placed between said bars and disk mullers for the reduction of friction, removable side plates attached to the sides of said case to prevent wearing thereof and removable sides for catching output and directing it to place intended and to secure same from 110 admixture with foreign substances, substantially as described.

8. A reduction and pulverizing mill comprising a case having a passage leading from the upper compartment to the lower compartment therein contained, a shaft passing 115 through said upper compartment, a wheel having projecting arms or knockers attached to said shaft, a grate beneath said arms or knockers, a hood above said arms or knockers, a shaft passing through said lower compartment, disk mullers arranged to slide on the shaft last mentioned 120 and chambered on side next to the body of mill substantially as described.

9. A reduction and pulverizing mill comprising a case having a passage leading from the upper compartment to the lower compartment therein contained, a shaft passing 125 through said upper compartment, a wheel having projecting arms or knockers, attached to said shaft, a grate beneath said arms or knockers, a shaft passing through said lower compartment, disk mullers arranged to slide on the shaft last mentioned and chambered on side next to the 130 body of mill substantially as described.

10. A reduction and pulverizing mill comprising a case having a passage leading from the upper compartment to the lower compartment therein contained, an upper shaft 135 passing through said upper compartment, a wheel having upwardly striking projecting arms or knockers attached to said shaft, a grate having a plurality of V-shaped bars beneath said arms or knockers, a hood above said arms or knockers, a shaft passing through said lower compartment, disk mullers arranged to slide on the shaft last 140 mentioned and on each side of the exterior of the case substantially as described.

11. A reduction and pulverizing mill comprising a case, having a passage leading from the upper compartment to the lower compartment therein contained, a shaft passing 145 through said upper compartment, a plurality of wheels having upwardly striking projecting arms or knockers attached to said shaft, a grate having a plurality of V-shaped bars beneath said arms or knockers, a hood above said arms or knockers a shaft passing through said lower 150 compartment, disk mullers arranged to slide on the shaft last mentioned and on each side of the exterior of the case and means for forcing material to said mullers, substantially as shown and described.

12. A reduction and pulverizing mill comprising a case, 155 having a passage leading from the upper compartment to the lower compartment therein contained, a shaft passing through said upper compartment, a plurality of wheels having upwardly striking projecting arms or knockers attached to said shaft, a grate having a plurality of V- 160

5 shaped bars beneath said arms or knockers, a hood above
said arms or knockers a shaft passing through said lower
compartment, disk mullers arranged to slide on the shaft
last mentioned and on each side of the exterior of the case
and means for forcing material to said mullers, and ad-
justing the same substantially as described.

10 13. A reduction and pulverizing mill comprising a case,
having a passage leading from the upper compartment to
the lower compartment therein contained, a shaft passing
through said upper compartment, a wheel having up-
wardly striking projecting arms or knockers attached to
said shaft, a grate having a plurality of V-shaped bars

beneath said arms or knockers, a hood above said arms or
knockers a shaft passing through said lower compartment,
disk mullers arranged to slide on the shaft last mentioned 15
and on each side of the exterior of the case and means for
forcing material to said mullers, and adjusting the same
substantially as described.

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

ARTHUR C. BATES.

Witnesses:

JAS. F. HOUGH,

L. E. M. DIEHL.