

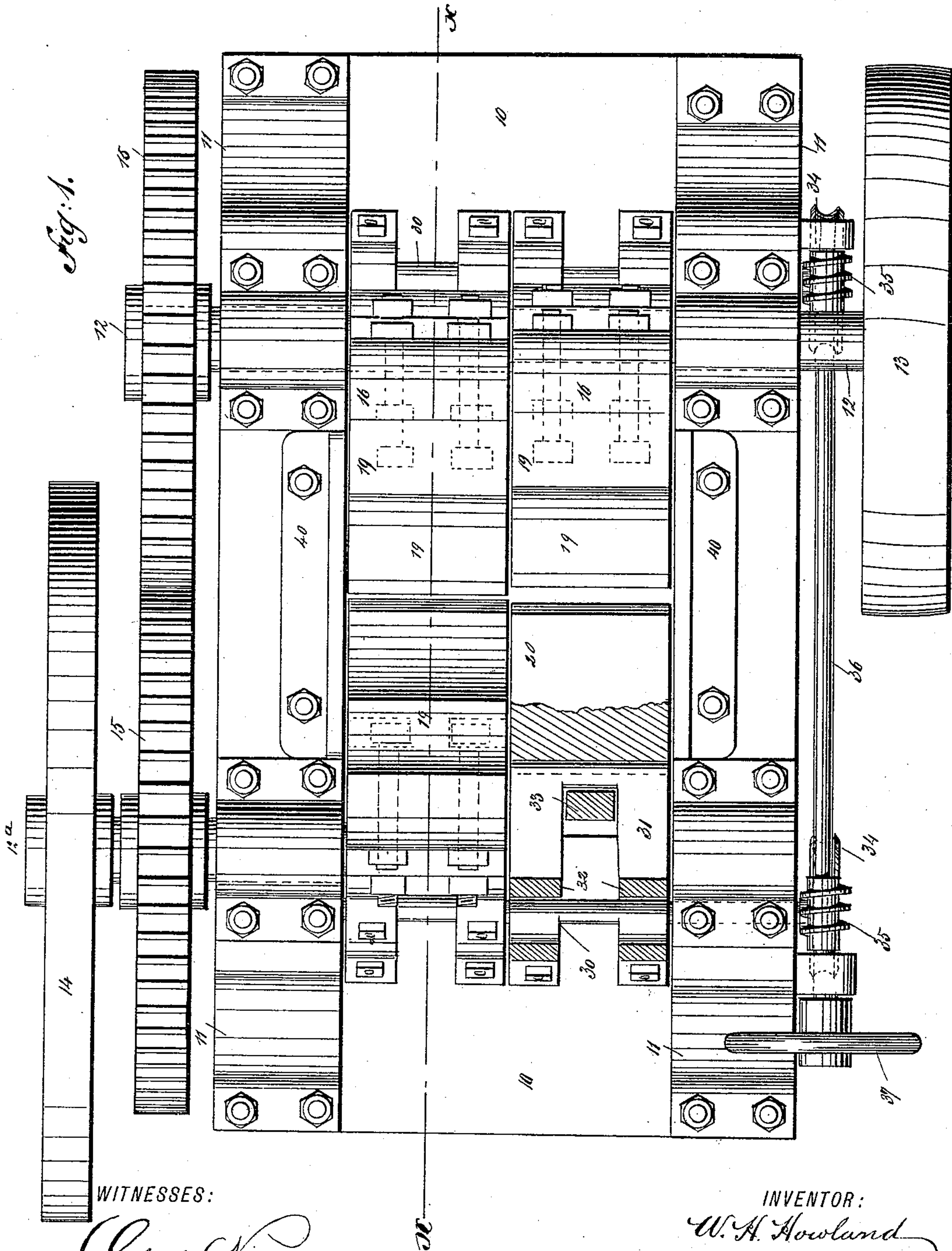
(No Model.)

4 Sheets—Sheet 1.

W. H. HOWLAND.
CRUSHING AND PULVERIZING MACHINE.

No. 450,488.

Patented Apr. 14, 1891.



WITNESSES:

Chas. Nida
C. Sedgwick

INVENTOR:

W. H. Howland
BY *Munn & Co.*
ATTORNEYS.

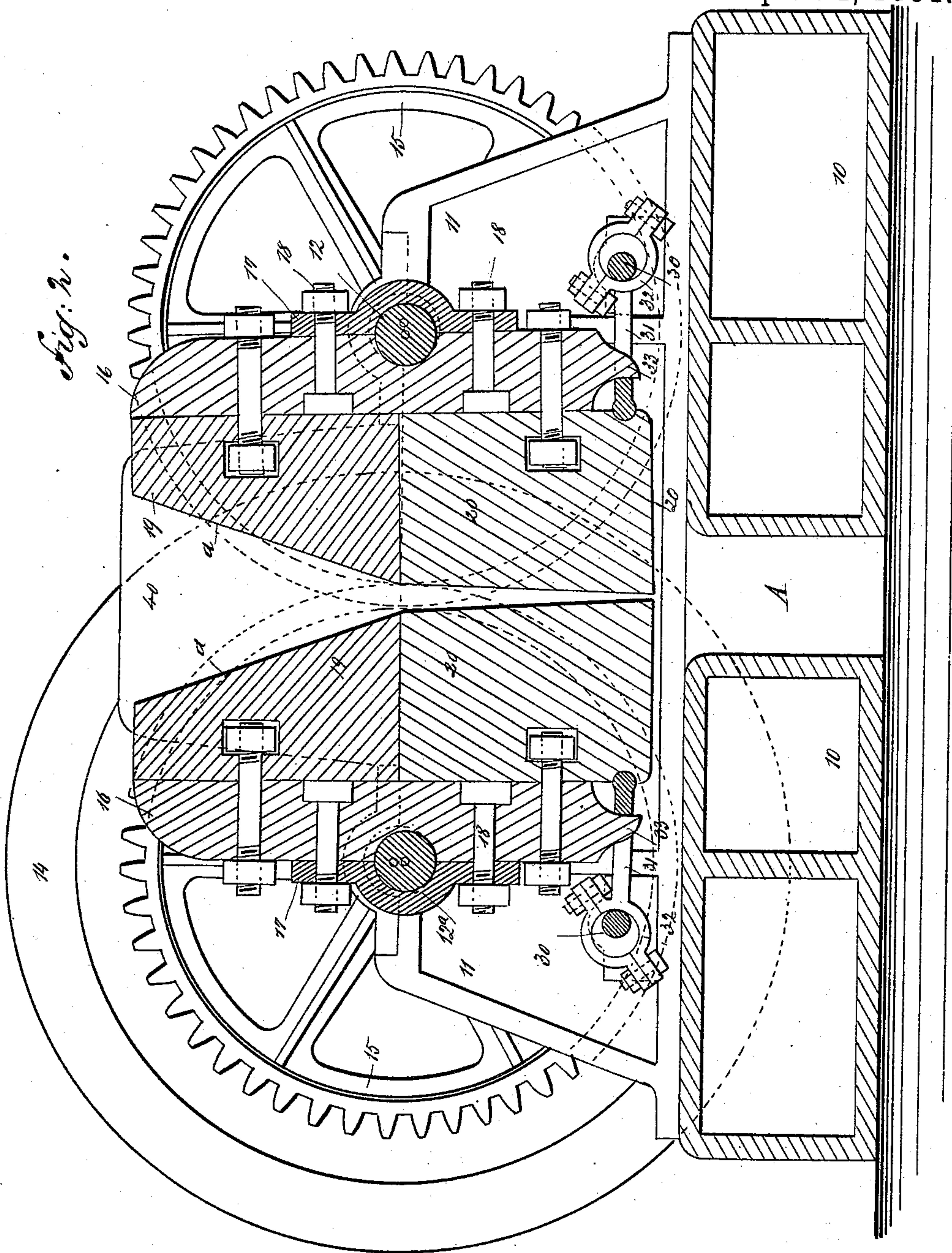
(No Model.)

4 Sheets—Sheet 2.

W. H. HOWLAND.
CRUSHING AND PULVERIZING MACHINE.

No. 450,488.

Patented Apr. 14, 1891.



WITNESSES:

Chas. Vida
C. Sedgwick

INVENTOR:

W. H. Howland
BY *Munn & Co*
ATTORNEYS.

(No Model.)

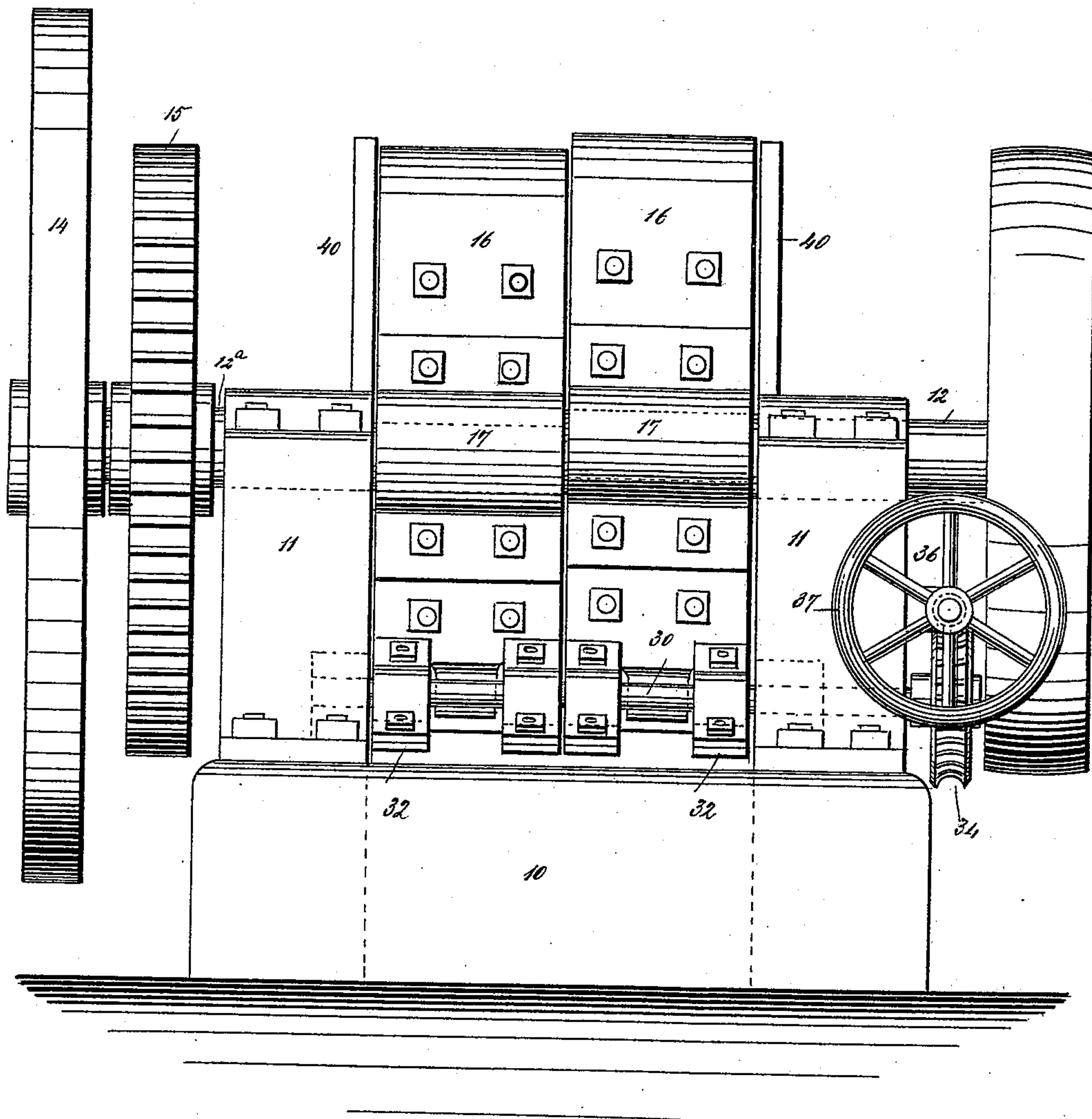
4 Sheets—Sheet 3.

W. H. HOWLAND.
CRUSHING AND PULVERIZING MACHINE.

No. 450,488.

Patented Apr. 14, 1891.

Fig. 3.



WITNESSES:

Chas. Nida.
C. Sedgwick

INVENTOR:

W. H. Howland
BY *Munn & Co.*

ATTORNEYS.

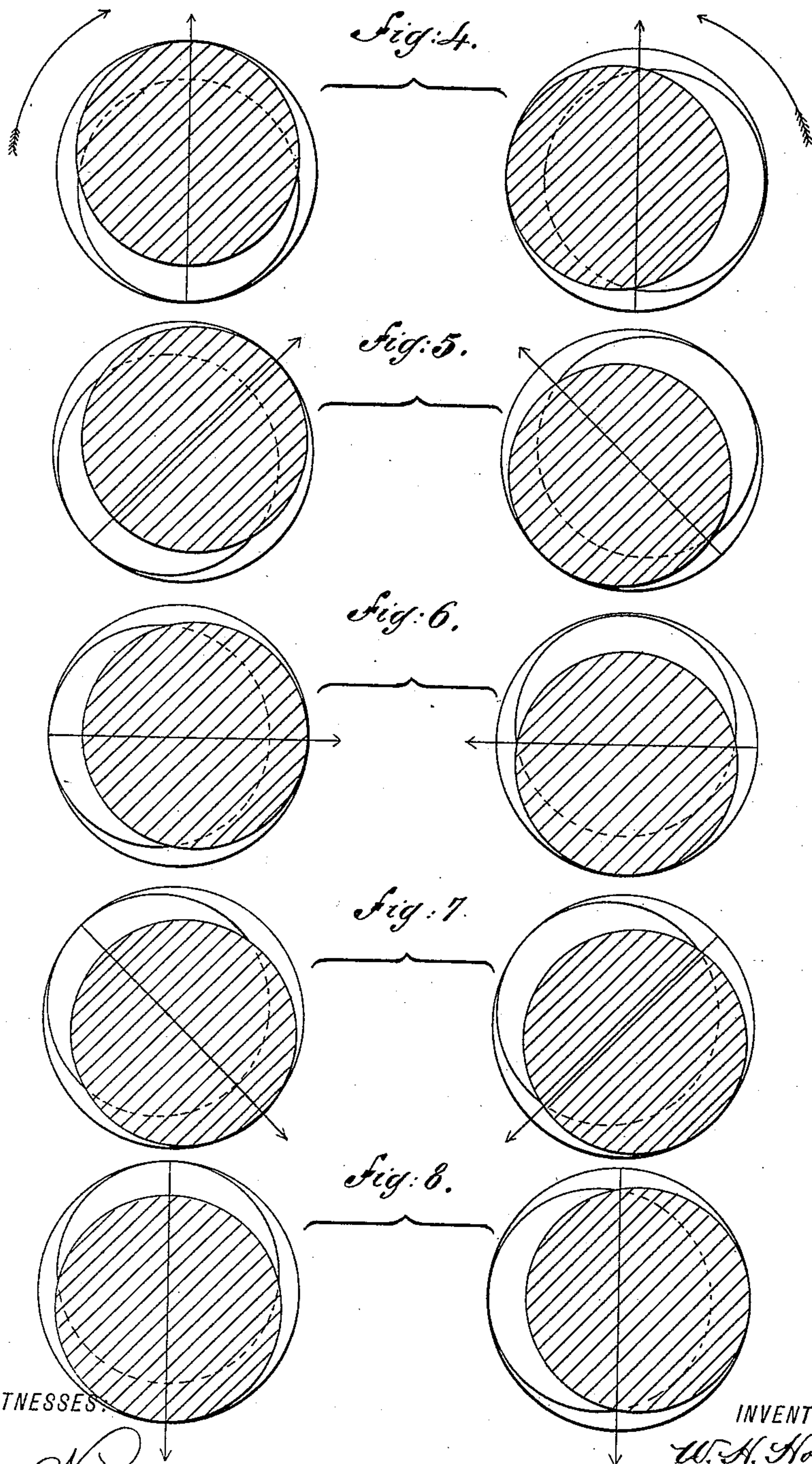
(No Model.)

4 Sheets—Sheet 4.

W. H. HOWLAND.
CRUSHING AND PULVERIZING MACHINE.

No. 450,488.

Patented Apr. 14, 1891.



WITNESSES:

Chas. Nida.
C. Sedgwick

INVENTOR:

W. H. Howland
BY *Munn & Co.*

ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM H. HOWLAND, OF BERGENFIELD, NEW JERSEY.

CRUSHING AND PULVERIZING MACHINE.

SPECIFICATION forming part of Letters Patent No. 450,488, dated April 14, 1891.

Application filed December 28, 1888. Renewed February 24, 1891. Serial No. 382,326. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. HOWLAND, of Bergenfield, in the county of Bergen and State of New Jersey, have invented a new and Improved Crushing and Pulverizing Machine, of which the following is a full, clear, and exact description.

This invention relates to crushing and pulverizing machines, the objects of the invention being to increase the grinding action of the jaws, to divide the strain incident to the operation of the machine, and at the same time to provide for the centering and adjustment of the operating-jaws.

The invention consists of certain constructions and combinations of elements to be hereinafter explained, and specifically pointed out in the claims.

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

Figure 1 is a plan view of my improved crusher and pulverizer, parts being broken away and parts being shown in section. Fig. 2 is a sectional elevation of the machine, the view being taken on line *x x* of Fig. 1. Fig. 3 is an end view of the machine, and Figs. 4, 5, 6, 7, and 8 are diagrams illustrating certain positions of the driving-shafts.

In constructing the machine illustrated in the drawings above referred to I provide a bed-plate 10, that is formed with a central recess A, and to this bed-plate I bolt side standards or brackets 11, which serve as supports for the driving-shafts 12 and 12^a, one of said shafts carrying a driving-pulley 13 and the other a balance-wheel 14, each shaft carrying a large gear 15, which said gears intermesh, whereby a uniform motion is imparted to the two shafts. The shafts 12 and 12^a are each formed with opposing eccentric sections, and to these opposing eccentric sections there are held back plates 16, the connection being established by means of straps 17 and bolts 18, and to the face-plates 16 there are bolted facing-plates 19 and 20, the plates 19 being much broader at their lower sides than at their upper sides, whereby a decidedly inclined face *a* is produced, while the plates 20 are only slightly narrower at the top than at

the bottom, so that when the two plates 20 are opposed, as shown in Fig. 2, the space between them will be only slightly greater at the top than at the bottom, as is clearly shown in said figure. As before stated, the eccentric sections of the shafts 12 and 12^a are in opposition; but the sections of the shaft 12 quarter with their opposing sections on the shaft 12^a, as is clearly shown upon the fourth sheet of the drawings.

The back plates 16 and the facing-plates 19 and 20 constitute the jaws of the crusher, and in order to adjust these jaws and at the same time center them I provide each set or series of jaws with an eccentric-shaft 30, said shafts being mounted in bearings formed in the standards or brackets 11.

To the eccentric sections of the shafts 30 there are connected toggles 31, said toggles being made integral with the lower sections 32 of the eccentric-straps, and each toggle is centrally apertured to receive a horn 33, said horns being formed upon the plates 16.

To one end of each of the shafts 30 I connect a worm-gear 34, which said gears are engaged by right and left pitched worms 35, that are carried by a horizontal shaft 36, said shaft being provided with a hand-wheel 37, whereby by turning the shaft 36 the worm-gears 34 will be rotated and the jaws will be equally moved toward or from each other, the centering of the jaws thus being maintained.

To prevent the material being operated upon from falling out from between the jaws, I bolt side plates 40 to place upon the bed-plate 10, as is clearly shown in the drawings.

In practice I prefer to form the plates 20 from burr-stone; but the plates could be made from wooden blocks placed side by side to bring the end of the grain forward; or, if desired, the plates could be iron or other metal.

The machine above described is designed more especially for the grinding and crushing of cereals, coffee, or spices; but it could be employed in crushing and grinding stone or ore, the construction being such that the material operated upon could be reduced to almost any desired degree of fineness.

From the construction above described it will be seen that the strain incident to the operation of the machine is divided between

the two main driving-shafts, and, moreover, that the strain upon each shaft is equalized and divided, owing to the oppositely-arranged eccentric sections, and it will also be seen that
5 the means employed for adjusting the jaws acts as a jaw-centering attachment.

I do not claim, broadly, in this application a drive-shaft having an eccentric section, a movable jaw hung thereon, and an adjusting-
10 shaft provided with an eccentric to adjust the lower end of said jaw, as such construction is claimed in my application, Serial No. 291,974, filed November 27, 1888; but in this application I confine myself to opposed mov-
15 able jaws operated and adjusted as described and claimed herein.

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

20 1. The combination, with the parallel driving-shafts provided with opposed eccentrics,

and the movable jaws mounted between their ends on said eccentrics, of adjusting-shafts
30 below and parallel with the drive-shafts and provided with eccentrics, and toggles 25 connecting the eccentrics of said adjusting-shafts with the lower ends of the said two jaws, substantially as set forth.

2. In a crushing and pulverizing machine, the combination, with two driving-shafts, 30 each provided with eccentric sections, of jaws mounted upon said eccentric sections, toggles arranged in connection with the jaws, eccentric-shafts to which the toggles are connected, worm-gears carried by the shafts, and worms 35 carried by a common shaft, said worms engaging the worm-gears, substantially as described.

WILLIAM H. HOWLAND.

Witnesses:

EDWARD KENT, Jr.,
C. SEDGWICK.