

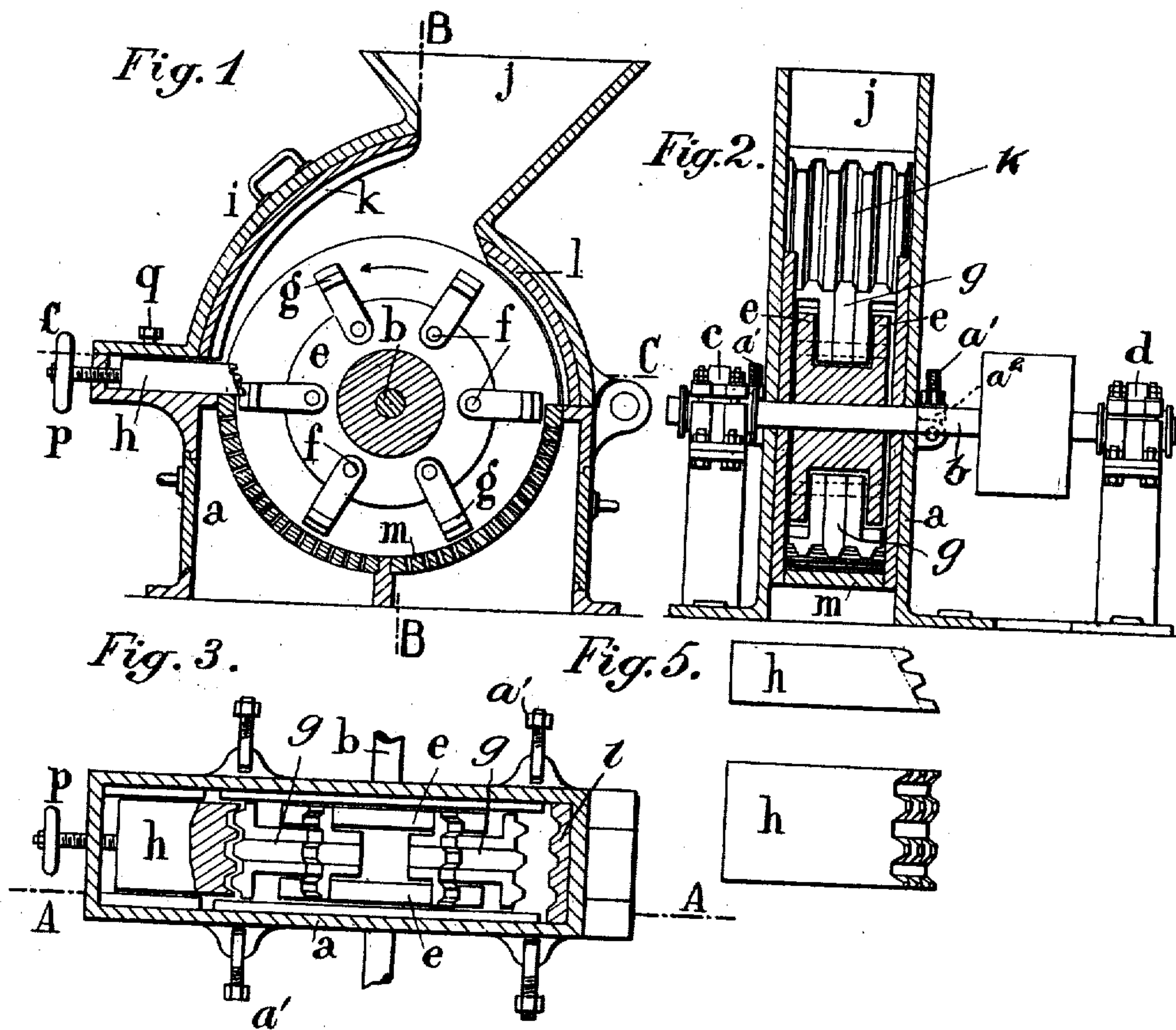
No. 843,428.

PATENTED FEB. 5, 1907.

J. ANCEL.
CRUSHING AND PULVERIZING MACHINE.

APPLICATION FILED OCT. 4, 1904.

2 SHEETS—SHEET 1.



Witnesses:
Stephen Kinata.
Samuel Turley

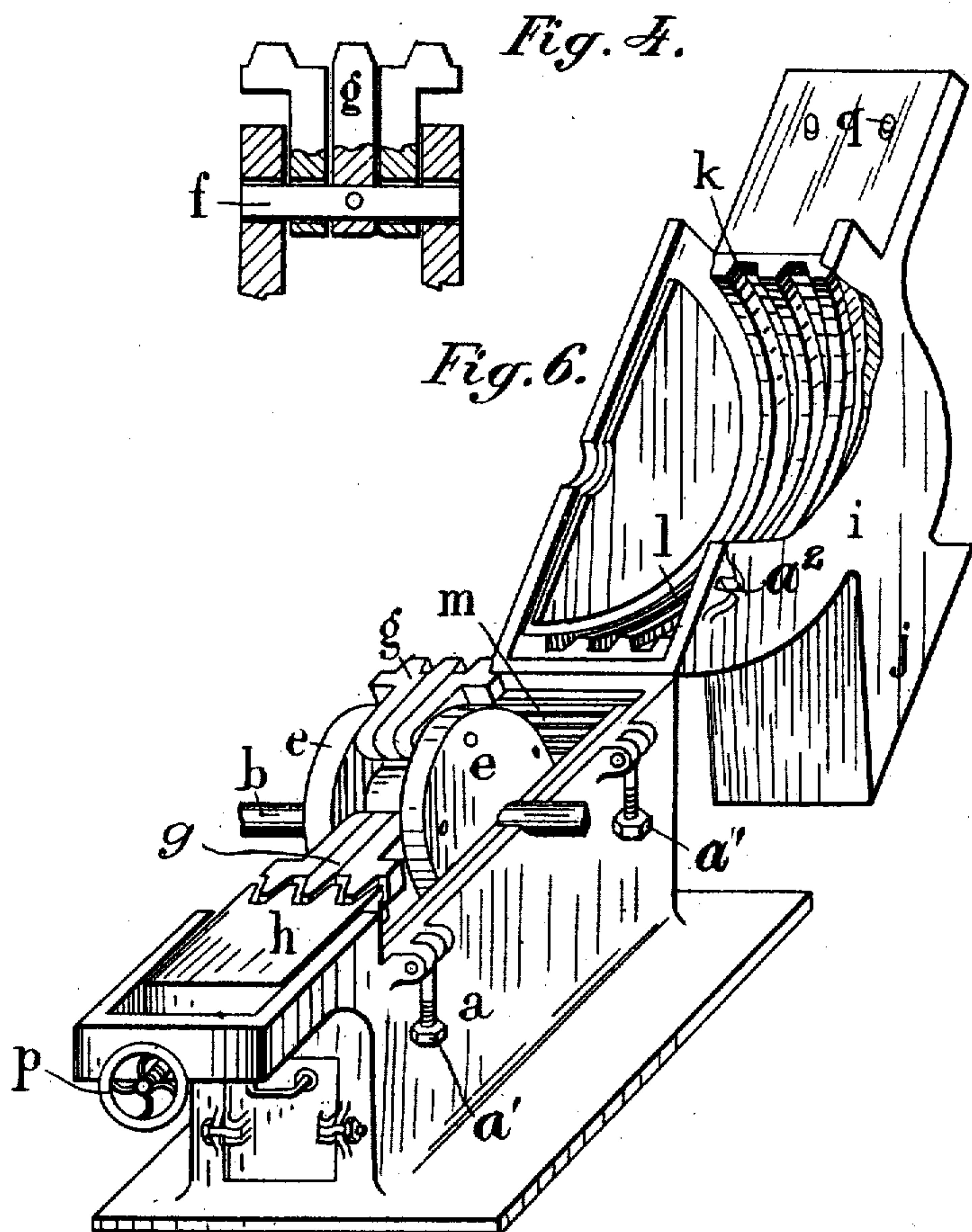
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2 SHEETS—SHEET 2.



Witnesses:
Charles H. Hirst.
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UNITED STATES PATENT OFFICE.

JACQUES ANCEL, OF ASNIÈRES, FRANCE, ASSIGNOR TO CHARLES BRODBECK,
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CRUSHING AND PULVERIZING MACHINE.

No. 843,428.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed October 4, 1904. Serial No. 227,161.

To all whom it may concern:

Be it known that I, JACQUES ANCEL, a citizen of the Republic of France, residing at 81^{bis} Avenue d'Courbevoie, Asnières, Seine, France, have invented an Improved Crushing and Pulverizing Machine, of which the following is a specification.

This invention relates to a machine capable of reducing materials of all kinds and whatever may be their hardness to pieces and particles of any desired size and also of pulverizing the same to a degree of extreme fineness.

The apparatus is essentially characterized by the combination, first, of hammers having a ribbed or toothed profile and capable of oscillating freely upon a pair of disks keyed upon a revolving shaft, and, second, of a block of hard metal also having a grooved or toothed profile corresponding to that of the hammers, the teeth on the latter being so disposed that as the hammers rotate they successively engage with the teeth of the block, whose position is adjustable relatively to the hammers in such manner as to permit the size or degree of coarseness of the crushed material to be regulated as desired.

The apparatus is further characterized in that the outer wall of the cover for the chest or casing between the hopper and abutment-block is eccentrically disposed with reference to the main axis and is provided on its inside face with a breaking member, forming, with the arc of travel of the hammers, a wedge-shaped space converging from the hopper toward the block. This eccentrically-disposed wall is so arranged that it extends upwardly and inwardly toward the hopper, the upper end lying in a position within the limits of the casing as contradistinguished from a wall which might be eccentric, but which would flare outwardly from the casing and terminate beyond its limits. The eccentric wall is shown in the drawings as being spirally disposed with reference to the arc of travel of the hammers.

The invention is illustrated, by way of example, in the accompanying drawings, wherein—

Figure 1 represents a longitudinal vertical section of the machine on line A A, Fig. 3. Fig. 2 is a transverse vertical section on line B B, Fig. 1, and Fig. 3 a horizontal section on line C C, Fig. 1. Fig. 4 is a detail view show-

ing the manner in which the hammers are mounted. - Fig. 5 is a detail view of the block in elevation and plan. Fig. 6 is a perspective view of the machine with the cover raised.

The same letters of reference denote like parts in all the figures.

a is a chest or casing which is traversed by a rotary shaft *b*, journaled in bearings *c d* on the outside of the chest and driven by any suitable transmission-gear.

Upon the shaft *b* within the chest *a* are keyed two disks *e e*, which serve to carry one or more hammers *g*, and instead of being integral with the disks *e* these hammers (three being shown grouped in Fig. 4) may be pivotally supported, as illustrated, on axles *f*, (six, for example,) circumferentially disposed between said disks. The outer surfaces of these hammers are toothed or indented, so as to present larger surfaces of contact to the material to be crushed or broken.

At the front of the chest or casing *a* within a recessed prolongation thereof there is mounted a horizontally-disposed abutment-block or anvil member *h*, of hard metal, the working edge of which is provided with a plurality of transverse series of teeth projecting into the path of travel of the hammers, so arranged as to present an upwardly and forwardly receding or stepped toothed profile, the interstices between the teeth of each lateral or transverse series substantially corresponding in size and position to the teeth on the opposed hammers. The block *h* is capable of sliding longitudinally in its support, so as to permit of the distance between the edges of the teeth of the hammers and the bottom of the teeth of the block being regulated. For this purpose a screw *p*, operated by means of a hand-wheel, is provided whereby to enable the block to be adjusted nearer to or farther from the hammers *g*.

q are screw-bolts by means of which the block when adjusted is fixed in position during the operation of the machine.

The chest *a* is surmounted by a cover *i*, which is hinged thereto and provided with a hopper *j*, at which the matters to be crushed or pulverized are introduced. The cover, which during the operation of the machine is firmly secured to the chest by means of the swivel-bolts *a'* and recessed lugs *a''*, carried by the chest *a* and the cover *i*, respectively, may be turned back upon its hinges into the

position shown in Fig. 6 to enable the hammers to be changed and the interior of the machine to be inspected.

The cover *i* of chest *a* is provided on its interior with concave breaking-plates *k* *l*, provided with ribs or teeth of corresponding profile to those of the hammers *g*.

It will be observed that the ribbed plate *l* is curved in an arc substantially concentric with the arc of rotation of the hammers, while the breaking-plate *k* is disposed eccentrically to the main axis *b* and is preferably of curved conformation, as illustrated, the arc of curvature being eccentric to the arc of rotation of the hammers, whereby there is formed the converging space between the hopper and the abutment or anvil-block, hereinbefore mentioned.

Beneath the revolving hammers is also mounted a concave grid *m* of a mesh adapted to allow of the passage therethrough of only such matters as have been crushed or reduced to the desired degree, the larger lumps being retained on the grid and afterward subjected afresh to the action of the hammers.

Upon the machine being set in motion the hammers under the effect of centrifugal force assume a radial position relatively to the shaft *b* and violently strike the matters introduced into the machine by the hopper *j* throwing them against the breaking-plate *k* of the cover with great force, the introduced contents being thus initially broken into fragments, which thence pass forwardly and downwardly through the converging space before described and during their passage therethrough being ground or reduced to smaller particles between the hammers and the ribbed plate *k* and are thus conveyed gradually to the teeth of the block *h*, where they are finally engaged between the teeth of the latter and the teeth of hammers *g*. Thus it will be seen by the foregoing construction that the lumps of matter upon their introduction into the machine are initially struck by the hammers and are violently thrown in a tangential direction against the ribs of the breaking-plate and afterward gradually fed down while being further ground against the corrugations on the plate, being finally deposited in position on the teeth of the abutment or anvil-block without any great shock to the latter and crushed to such a degree that there is little liability of breaking off the teeth of this block by the blows of the hammers on the material when located between the hammer and block. Furthermore, owing to the teeth being arranged in a stepped manner the ultimate degree of fineness of the particles is brought

about in gradual stages tending further toward the avoidance of shocking blows on the block.

Having thus described the invention, what I claim is—

1. In a machine of the character described, the combination with a casing provided with a hopper and a rotatably-mounted hammer in said casing, of an anvil-block, and a corrugated breaking-plate extending inwardly and upwardly from said anvil-block and terminating in a position, within the limits of said casing, at a distance from the axis of said hammer-support greater than the distance between the axis of said hammer-support and anvil-block and cooperating with said hammer to initially break up the material to be crushed and further crush same during its delivery to the anvil-block, substantially as described.

2. In a machine of the character described, the combination with a rotatable shaft and a toothed hammer supported thereby, of a casing and a cover therefor, one wall of said cover being curved in an arc concentric with said shaft, and the opposite wall of said cover being curved in an arc eccentric with said shaft and spirally disposed with relation to the arc of travel of said hammer, and the upper end of said cover terminating in a hopper, concave plates on the inside faces of said cover-walls provided with longitudinally-corrugated surfaces for cooperating with said toothed hammer, and an anvil-block provided with teeth disposed in the arc of rotation of said hammer and cooperating therewith, substantially as described.

3. In a machine of the character described, the combination with a casing provided with a semicircular grid and a cover therefor having one wall concentric with said grid, and an opposite wall eccentric therewith, said walls terminating in a hopper, of longitudinally-corrugated curved plates located on the inside face of said walls, an anvil-block provided with teeth adapted to project beyond said grid, means for adjusting said anvil-block, a plurality of rotatably-supported pivoting-hammers provided on their free ends with teeth for cooperating with the teeth of said anvil-block and the corrugated surface of said plates, and means for rotating said hammers, substantially as described.

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JACQUES ANCEL.

Witnesses:

R. H. BRANDON,
LOUIS RINUY.