(Model.) 3 Sheets—Sheet 1.

J. C. ANDERSON.

CLAY REDUCER AND DISINTEGRATOR.

No. 246,992. Patented Sept. 13, 1881.

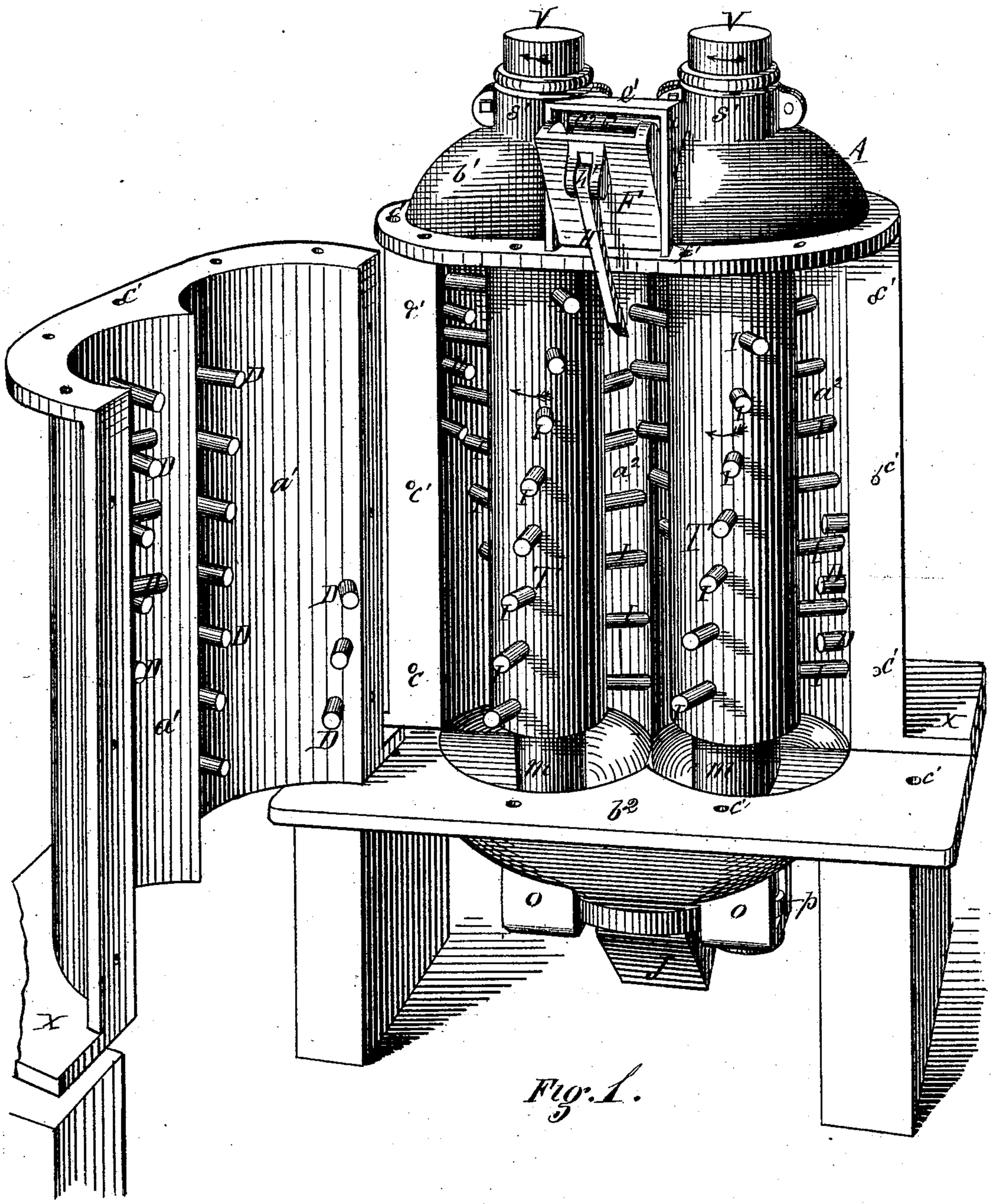

Fig. 1.

Witnesses,
Francis D. Clark
Albert Martin

Inventor
J. C. Anderson

(Model.) 3 Sheets—Sheet 2.

J. C. ANDERSON.

CLAY REDUCER AND DISINTEGRATOR.

No. 246,992. Patented Sept. 13, 1881.

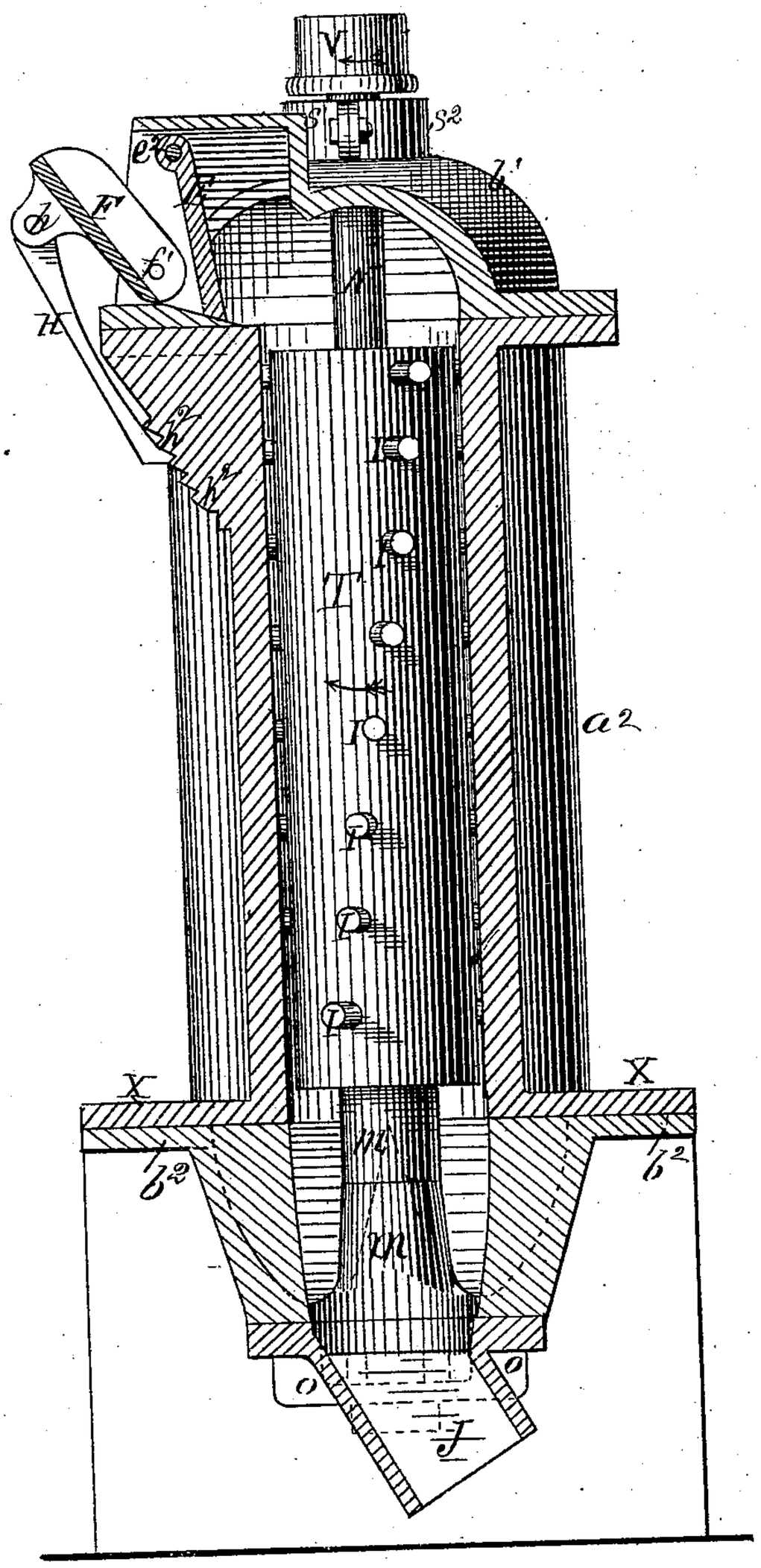

Fig. 2.

Witnesses
Francis L. Clark
Albert Martin

Inventor
J. C. Anderson

(Model.) 3 Sheets—Sheet 3.

J. C. ANDERSON.

CLAY REDUCER AND DISINTEGRATOR.

No. 246,992. Patented Sept. 13, 1881.

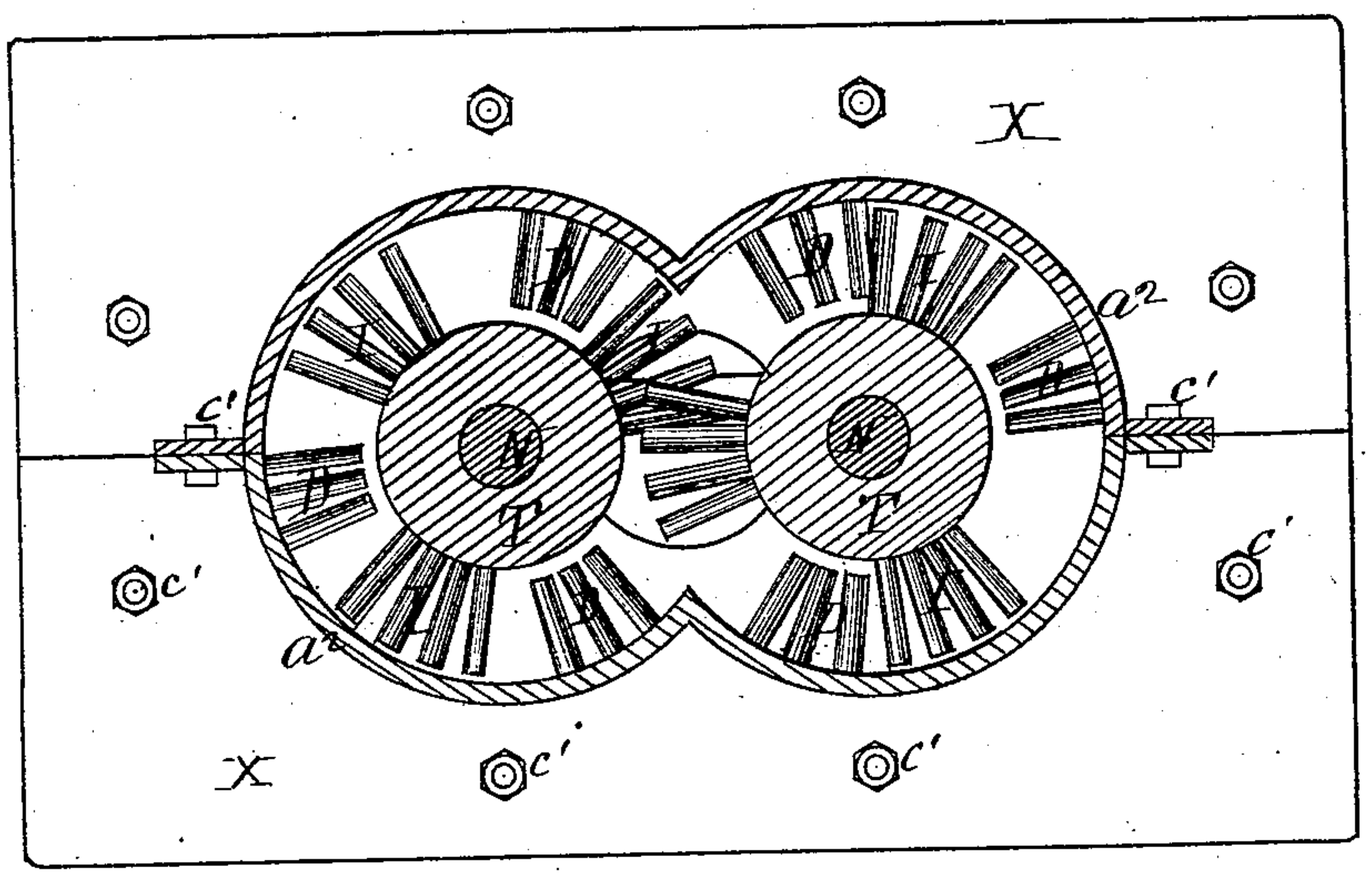

Fig. 3.

Witnesses

Francis L Clark
Albert Martin

Inventor

J C Anderson

UNITED STATES PATENT OFFICE.

JAMES C. ANDERSON, OF HIGHLAND PARK, ILLINOIS.

CLAY REDUCER AND DISINTEGRATOR.

SPECIFICATION forming part of Letters Patent No. 246,992, dated September 13, 1881.

Application filed June 16, 1881. (Model.)

To all whom it may concern:

Be it known that I, JAMES C. ANDERSON, of Highland Park, in the county of Lake and State of Illinois, have invented a new and useful Improvement in Clay Reducers and Disintegrators, which improvement is fully set forth in the following specification.

The object of my invention is the speedy reduction of clay shale, feldspathic and granitic rocks, and other like substances into a fine powder.

The invention consists in the construction, arrangement, and operation of a mechanism, hereinafter fully described and claimed, by which violent centrifugal attrition-currents are generated and utilized, whereby clay shale, plastic clay, (when dry,) and the hardest feldspathic, granitic, and quartz rock are rapidly and at one operation reduced into an exceedingly fine powder.

In the accompanying drawings, Figure 1 is a perspective view of the mechanism, showing part b' of the outer shell thrown open. Fig. 2 is a vertical central section, and Fig. 3 shows a horizontal section of the same.

The shell A is cast of cast-iron when clay alluvium or clay shales are to be disintegrated, and from steel castings when the harder substances are to be treated. This shell is formed of integral parts $a'\,a^2$ and $b'\,b^2$. These parts are fitted snugly together at their flange-edges and secured firmly in place by the screw-bolts *c*. The parts $a'\,a^2$, when in place and set in position for use, form essentially two vertical cylinders thirty inches long by fourteen inches inside diameter, having walls one inch in thickness and joined side to side with their two contiguous sides cut away, forming, in horizontal cross-section, a figure **8**, and terminating at the lower end in a suitable flange for a base-plate, upon which the mechanism rests. This double cylindrical shell determines the size of the mechanism, which may, however, be made of any suitable size. The above example of size I have found, in practical use, to be well adapted to the purposes named.

A series of armed projections, D, are formed as a part of the shell, extending inwardly within the cylinders to the length of about three and one-half inches, the use of which armed projections will be hereinafter more fully described.

The part b', which forms the part of the shell A, is in the form of two hemispherical domes joined side to side, and made to member with the parts $a'\,a^2$ of the shell. A pediment, e', is formed on the side of the part b', so as to provide a door opening in the shell at this point in such a manner that the metallic door E, being hinged at e^2, will remain closed by its own gravity, except when such gravity is overcome by the pressure of the materials to be reduced within the chute F, which chute is hinged to the shell at f' and supported at the other end by the brace H, the brace being hinged to the outer end of the chute at h' and supported upon graduated keepers h^2.

The part b^2 or bottom of the shell A is in the form of an oblong inverted hollow cone, forming a funnel-like shed for the reduced materials to pass by their own gravity through the opening J from the mechanism. The sleeved openings *m m* are formed in this part of the shell to allow the shafts N N to have their bearings *o o* beneath the shell, and at the same time to prevent the escape of the powdered materials through such openings upon the bearings. The collars *p p* are placed upon the shafts as a further protection to the journal-bearings from any dust that may escape between the sleeves and the shafts. These bearings *o o* are secured rigidly to this part b^2 of the shell, and are provided with suitable shoes and oil-reservoirs to protect the journals at the high speed required to be maintained in the operation.

The journal-boxes s' are formed on the part b' of the shell to provide the upper journal-bearings for the shafts N N. These boxes are babbitted and provided with movable caps s^2. The shafts N N are thus journaled to the shell A in a vertical position, passing longitudinally through the center of each of the joined cylinders described as the parts $b'\,b^2$ of the shell.

Two cylinders, T, corresponding to the shafts N N, are cast from the same materials as the shell A, and made to conform in length to said shell and about seven inches in diameter. These cylinders T are cast hollow, and bored out to permit the shafts N N to pass through

them longitudinally and to be firmly secured thereto by suitable keys. The armed projections I are cast as a part of said cylinders T, and are formed of a suitable length to extend outwardly in close proximity to the diameter of the two circular openings of the shell A, in which said cylinders are located, which gives a length of arms of about three and one-half inches, conforming to the length of the armed projections D of the shell A, which latter arms extend to a like distance from the shell of the cylinder, in which position the arms of the two cylinders overlap each other in like manner, so as to bring the ends of the respective arms so close to the shells as to clear them only in the revolutions of the cylinders, and the arms of the cylinders are spaced to alternate with each other, allowing sufficient clearance-space between each of the arms and its opposite to prevent their clashing together when rotating, and like alternations are provided between the arms of the cylinders and of the shell. These armed projections of both the shell and the cylinders are set in horizontal rows, but are battered out of a vertical plane from the working side of the arms, so that the longitudinal rows of the arms converge toward each other downward in such manner as to intersect and cross each other in the reducing operation, by which means the materials will be operated upon by the arms in detail.

Suitable flanged pulleys, V, are provided for driving the mechanism, which pulleys are secured rigidly to the top of the shafts N N, and are rotated by belts from suitable power at a high speed, which may be varied to suit the materials to be reduced. The softer materials named are made dead fine at from ten to twelve hundred revolutions per minute; but in the reduction of the harder substances as many as twenty-three hundred revolutions per minute may be required.

In the operation the materials to be disintegrated are shoveled into the chute F, which chute is made adjustable, so as to be set at a suitable pitch to allow the materials to pass into the mechanism at a slow gravity, thus securing a regularity of feed, the door E being hinged to yield to such gravity and to present only such opening as may be necessary to admit the charge, as above described, and to prevent the undue escape of the materials or dust.

It will be seen that were the mechanism to stand at rest the materials would freely pass by their own gravity through the mechanism and be discharged through the openings at the bottom intact; but in the operation of the cylinders T, being rotated in the direction of the arrow-points, the gravity of the materials is impeded by the horizontal rotation of the armed cylinders, and made to take the direction of such rotation; but the horizontal inertia is overcome sufficiently by the gravity of the material to cause the current to bend downward, thus forming numerous spiral currents. These currents, being generated and actuated by the high peripherical speed of the armed cylinders moving in opposite directions, are brought into violent collision with each other at the intersecting point of the two cylinders, and are thus made to war upon and disintegrate each other. Meantime a like but less violent war takes place upon the materials by the outward thrust of the centrifugal force from the rotating cylinders and the inward curbing centripetal impact of the surrounding circular-formed shell and the further disintegrating attrition force incident to the interlacing of the stationary arms of the shell with the rotating arms of the cylinders, and the arms of the respective cylinders with each other. The cohesion of the materials is also destroyed by the explosive force generated by rapid rotation and the alternate vacuum and air-currents actuated by the mechanism.

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

1. A reducer and disintegrator having two upright cylinders, T, such cylinders provided with arms D, acting in conjunction with each other within a shell made to conform to the outer periphery of the said armed cylinders, and the said cylinders to be rotated at a high rate of speed, substantially as described and shown.

2. In a reducer and disintegrator, the shell A, composed of the parts a' a^2 and b' b^2, substantially as described and shown, and for the purposes set forth.

3. The two-cylindered shell A, having the arms D and provided with the flanged bed-rest X, substantially as described and shown.

4. The funneled shed b^2, provided with the sleeves b^3, to shed the reduced material, substantially as set forth.

5. The domed casting b', provided with the door-pediment e^2 and the journal-boxes s', substantially as described and shown.

6. The combination of the adjustable door E and the adjustable chute F, substantially as described and shown, and for the purposes set forth.

7. The combination, in a reducer and disintegrator, of two vertical conjoining cylinders, T, provided with horizontal interlacing arms D, said armed cylinders to be rotated at a high speed within a stationary shell, A, said shell made to conform to the periphery of the armed cylinders in rotation, whereby the cohesion of the materials is overcome by a violent centrifugal force, substantially as described and set forth.

J. C. ANDERSON.

Attest:
THEO. H. CARNAHAN,
W. S. MILLER.