

(No Model.)

S. W. KIMBLE.

APPARATUS FOR ATOMIZING SOLID SUBSTANCES.

No. 410,247.

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Fig. 1.

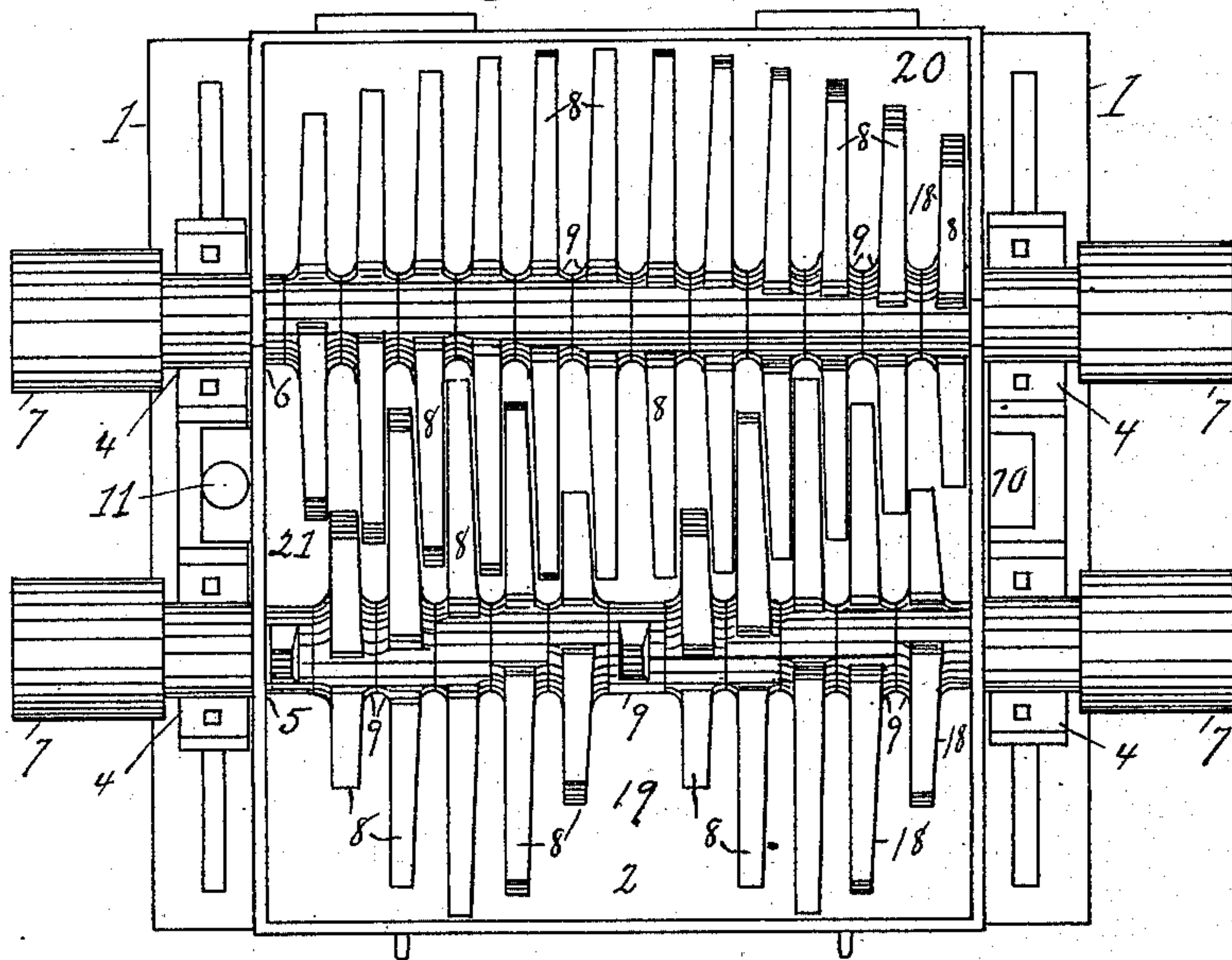
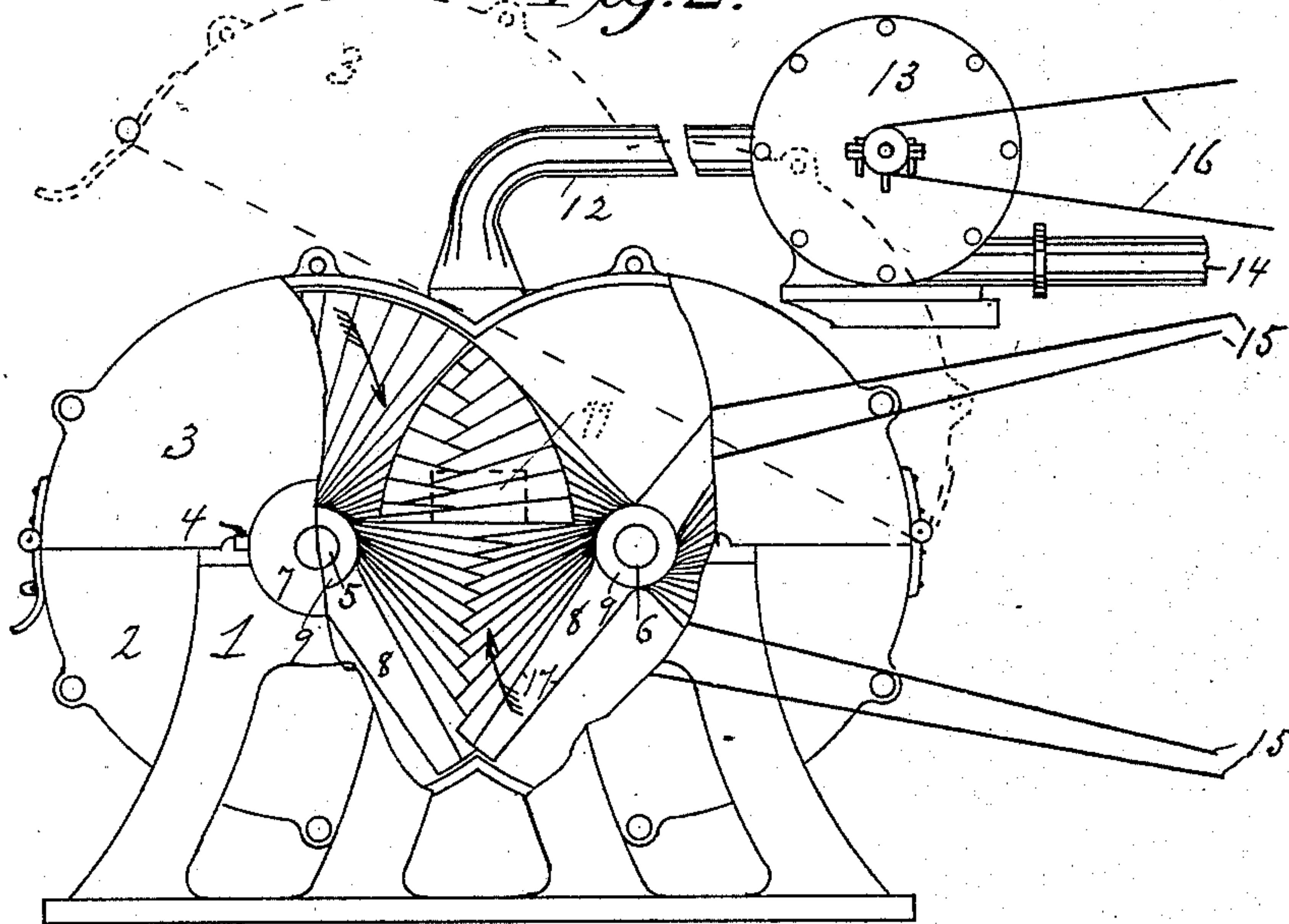


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

SMITH W. KIMBLE, OF DENVER, COLORADO, ASSIGNOR OF TWO-THIRDS TO CHARLES H. ABBOTT AND SIDNEY McCLANATHAN, OF SAME PLACE.

APPARATUS FOR ATOMIZING SOLID SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 410,247, dated September 3, 1889.

Application filed April 16, 1889. Serial No. 307,294. (No model.)

To all whom it may concern:

Be it known that I, SMITH W. KIMBLE, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Apparatus for Atomizing Solid Substances, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to a new and improved form and combination of a pulverizer or disintegrator; and its objects are to produce a pulverizing and reducing apparatus of simple compact construction with comparatively few but durable parts easily operated and controlled and adapted to reduce speedily and thoroughly the material fed thereinto, a reducer especially well adapted for the reduction and comminution of such materials as the various spars, mica, and other aluminous compounds, whose reduction has always been attended with great difficulty; to which ends the invention consists in the features, constructions, and combinations more particularly hereinafter set forth and claimed.

In the drawings is illustrated an embodiment of my invention, wherein—

Figure 1 is a top or plan view of my improved pulverizer with the cover removed therefrom; Fig. 2, an end view or elevation thereof with a part of an end broken away to show the interior.

In the figures, the reference-numerals 1 1 indicate the main framing for supporting the operative parts and constructed or built up in any suitable or desired form. By such main framing is supported the casing for inclosing the reducing apparatus proper, such casing consisting of the lower portion 2 and a similar upper portion 3, hinged thereto or detachably connected thereto, the parts being provided with any suitable devices by which they may be securely fastened together. This casing is in substance somewhat of the form exteriorly and in transverse or cross section of a figure 8 laid horizontally upon its side—that is, it is composed, in effect, of two hollow cylinders, from each of which a portion of its periphery—say a quarter—has been cut away longitudinally, the two being then united along the line of this opening. Upon the main

framing are secured the boxes 4, furnishing the bearings for the shafts 5 6, which carry at both ends the pulleys 7, by which motion may be communicated to the shafts. On these shafts are arranged to project therefrom the beaters or fingers 8, there being an equal number of such beaters or fingers on each shaft. Preferably these fingers are constructed in pairs, two projecting at diametrically-opposite points from a hub 9, such hub being apertured that it may be slid into position upon a shaft. Preferably they should be made of some material of great tensile strength, not easily worn away or abraded, and be tapered somewhat on their exterior faces or edges, as shown at 17 in Fig. 2, while one of the sides is a plane surface, the other being somewhat inclined or tapering, as seen at 18. They are arranged spirally on the shafts, but with a different pitch, those on one shaft (herein the shaft 6) being placed thereon at such a pitch that they make, say, in a length of about three feet a half-turn of a screw-thread thereon, while on the other shaft 5 the pitch is such that they make a complete turn thereon. The location of the shafts 5 6 relatively to each other is such that the fingers or beaters projecting from one shaft reach comparatively near the other shaft in rotating, the fingers on the one passing through the interfinger spaces on the other.

At 10 is situated the inlet or hopper for the material to be acted on, while at 11 is the outlet therefor, a pipe 12 being connected to the latter at one end, while at its other end it is connected to any suitable exhaust apparatus 13, from which a pipe 14 extends to the point where it is desired to deliver the pulverized material.

In practice belts should be applied to the pulleys at both ends of the shafts, that they may be driven with great speed and with uniformity of power, and both shafts should be geared to revolve in the same direction, and so that the spirally-arranged beaters or fingers on shaft 5 tend to carry the material from the inlet to the outlet. As the shafts are rotated in the same direction, it follows that the fingers or beaters which at any one time are in the spaces 19 and 20 between the shafts and the outer shell or case travel in the same direc-

tion, while those in the space 21 between the shafts travel in opposite directions, those on one shaft passing between and in a direction the reverse of the direction of those on the other shaft. This, with the unequal spiral arrangements, cause the material to be subjected to a variety of conflicting and opposing influences. From the inlet 10 it passes into the space 21, wherein the spirally-arranged beaters or fingers on shaft 5 tend to force it rapidly toward the outlet 11, while at the same time those on shaft 6, having only half the pitch of those on shaft 5, tend to force it at half such speed in the contrary direction, at the same time those on shaft 5 are forcing the material downwardly and those on shaft 6 are forcing it upwardly, one set operating to carry the material in two directions, or in a direction which is the resultant of such two, while the other set is acting thereon in exactly the reverse way, while at the same time the material is subject to the action of the blast pulling it from inlet to outlet. The shell or casing, it will be noted, is of a contour like two intersecting circles, the intersecting circles described by the beaters or fingers on the two shafts 5 6, and is of a size just sufficient to permit the free rotation of such beaters or fingers within it, the direction of rotation of the two sets thereof in the intermediate space being designated by the arrows in Fig. 2. Then the set to the left or on shaft 5 tends to carry the material downward to the left and then upward to the right; but when it comes again within the overlapping of the circles described by the beaters or fingers it tends to fall, only, however, to meet the other set of blades, beaters, or fingers, tending to throw it in the opposite direction. Thus the material in the inter-shaft space 21 is, in effect, in a whirlwind, acted on by all these opposing influences, and this variety of such influences has undoubtedly as much, if not more, to do with the complete reduction to atoms of the material treated as has the mere physical beating, rubbing, and impingement of such material by the beaters or fingers. When run at a high speed—say five thousand revolutions per minute—the work of reduction is very complete, thorough, and speedy. Even sheets of mica fed in at the inlet 10 appear as an impalpable powder at the outlet after an interval of time so brief as to be scarcely perceptible, the operation on any one piece being almost, if not quite, instantaneous.

The casing may be made of any suitable metal, and preferably the two halves should be formed or fitted to make a tight joint when brought together.

Having thus described my invention, what I claim is—

1. A pulverizer consisting of an inclosing shell or casing, two shafts mounted to rotate therein, and a series of fingers or beaters on and projecting from such shafts and arranged thereon spirally, the pitch of the spiral on one shaft being different from that on the other shaft, and the fingers or beaters on one shaft passing on rotation through the inter-finger spaces of those on the other shaft, substantially as set forth.

2. The combination of the inclosing case or shell, two shafts mounted to rotate therein parallel to each other, and the fingers or beaters 8, constructed in pairs projecting from a hub 9 and inclined or tapered on their opposite edges 17 and on their faces 18, said fingers or beaters being arranged spirally on the shafts, the pitch of the spiral on one shaft being twice that of the spiral on the other shaft, substantially as set forth.

3. The combination of the shell or casing made in two parts pivotally or detachably secured together and having inlet and outlet openings at opposite ends, two shafts mounted to revolve within the shell or casing and parallel to each other, the series of beaters or fingers arranged spirally thereon, the pitch of the spiral on one shaft being different from that on the other, and an exhaust apparatus connected to the outlet, substantially as set forth.

4. The combination of the shell or casing formed of the parts 2 3, the shafts arranged to rotate therein and parallel to each other, the fingers or beaters 8, formed in pairs and projecting each pair from a hub 9 and arranged spirally on the shafts, the pitch of the spiral on one shaft being different from that on the other, the exhaust 13, and pipe 12, connecting such fan to the outlet 11, substantially as set forth.

5. The combination, with the shafts 5 6, each having the spirally-arranged series of beaters or fingers 8, the pitch of the spiral on one shaft being different from that on the other, of a casing having the contour in cross-section of the intersecting circles described by such beaters or fingers when rotated, substantially as set forth.

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

SMITH W. KIMBLE.

Witnesses:

L. F. WILBER,
BRINTON GREGORY.