

(No Model.)

6 Sheets—Sheet 1.

S. STRAKER.

PULVERIZING OR DISINTEGRATING APPARATUS.

No. 503,504.

Patented Aug. 15, 1893.

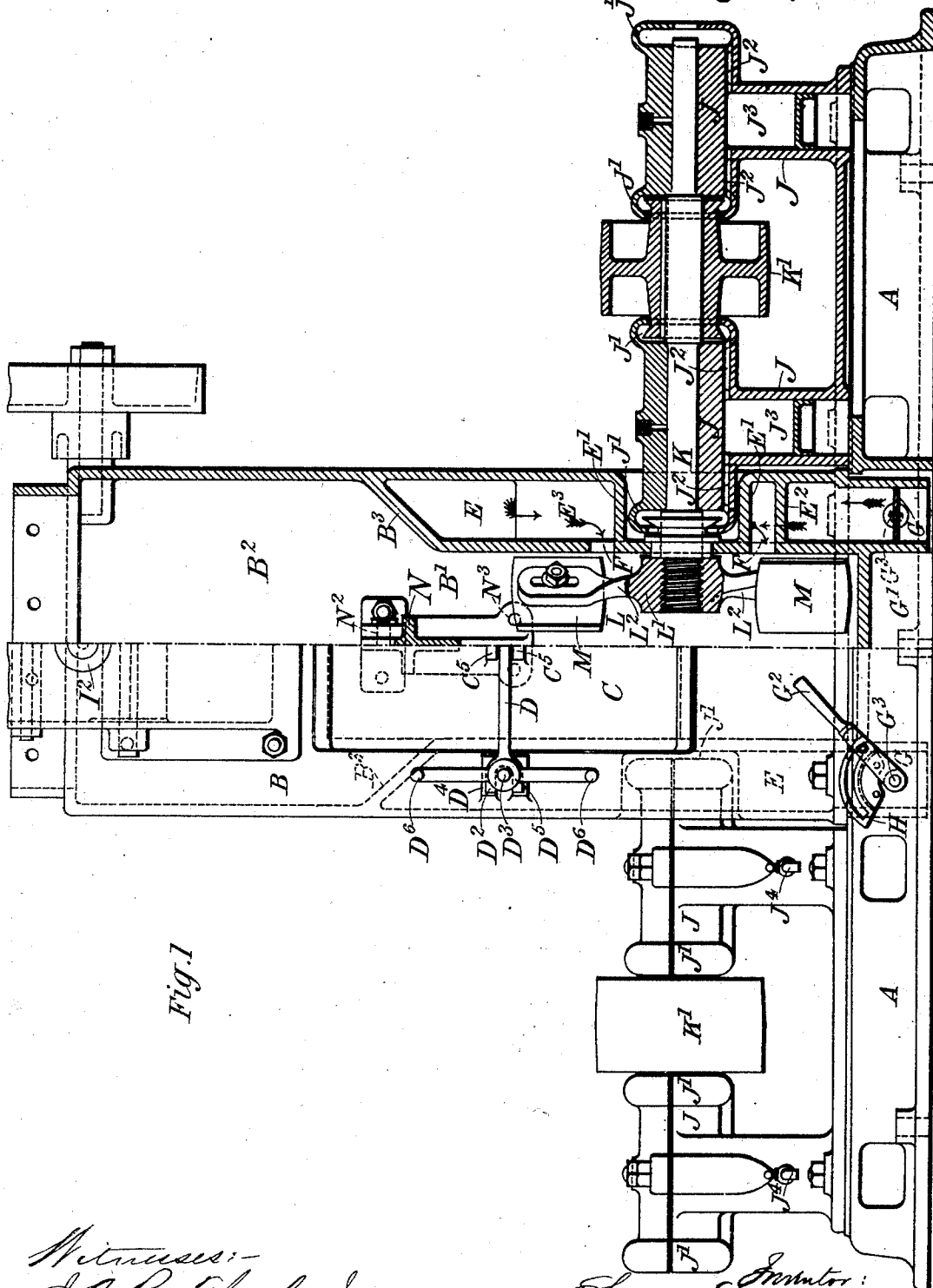


Fig. 1

Witnesses:-
J. A. Rutherford
Robert Smith

Inventor:
S. Straker
By Samuel L. Torrey,
Attorney.

(No Model.)

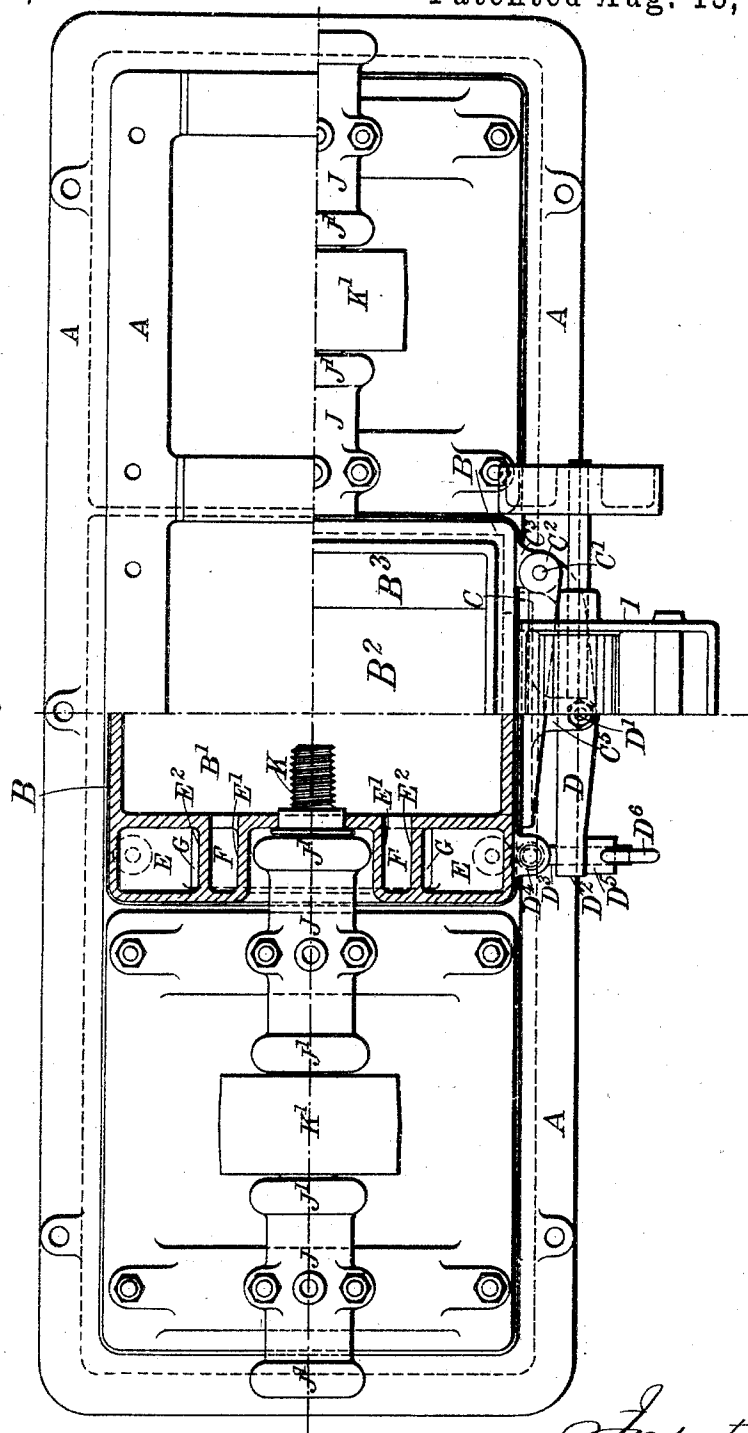
6 Sheets—Sheet 2.

S. STRAKER.
PULVERIZING OR DISINTEGRATING APPARATUS.

No. 503,504.

Patented Aug. 15, 1893.

Fig. 2.



Witnesses:
J. A. Rutherford.
Robert Burnett.

Inventor:
Sidney Straker
By James L. Morris.
Attorney

(No Model.)

6 Sheets—Sheet 3.

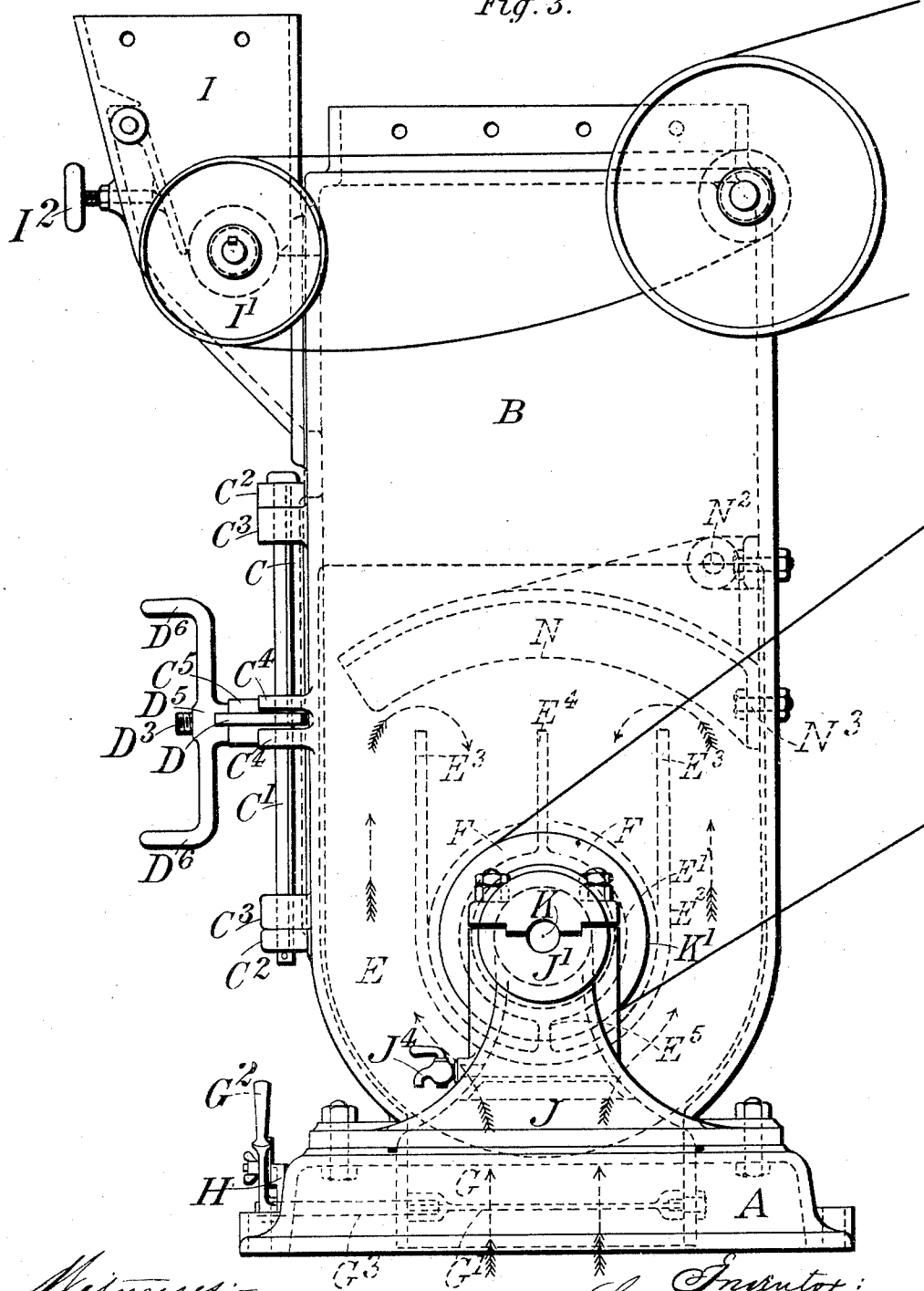
S. STRAKER.

PULVERIZING OR DISINTEGRATING APPARATUS.

No. 503,504.

Patented Aug. 15, 1893.

Fig. 3.



Witnesses:
J. A. Ryther
Robert Corbett.

In witness whereof
 I have hereunto set my hand
 and the seal of the said
 Court, at New York, this
 12th day of January, 1884.

Judge of the Court.

By *Lidney Fraker.*
Jacques L. Norris,
Attorney

(No Model.)

6 Sheets—Sheet 4.

S. STRAKER.
PULVERIZING OR DISINTEGRATING APPARATUS.

No. 503,504.

Patented Aug. 15, 1893.

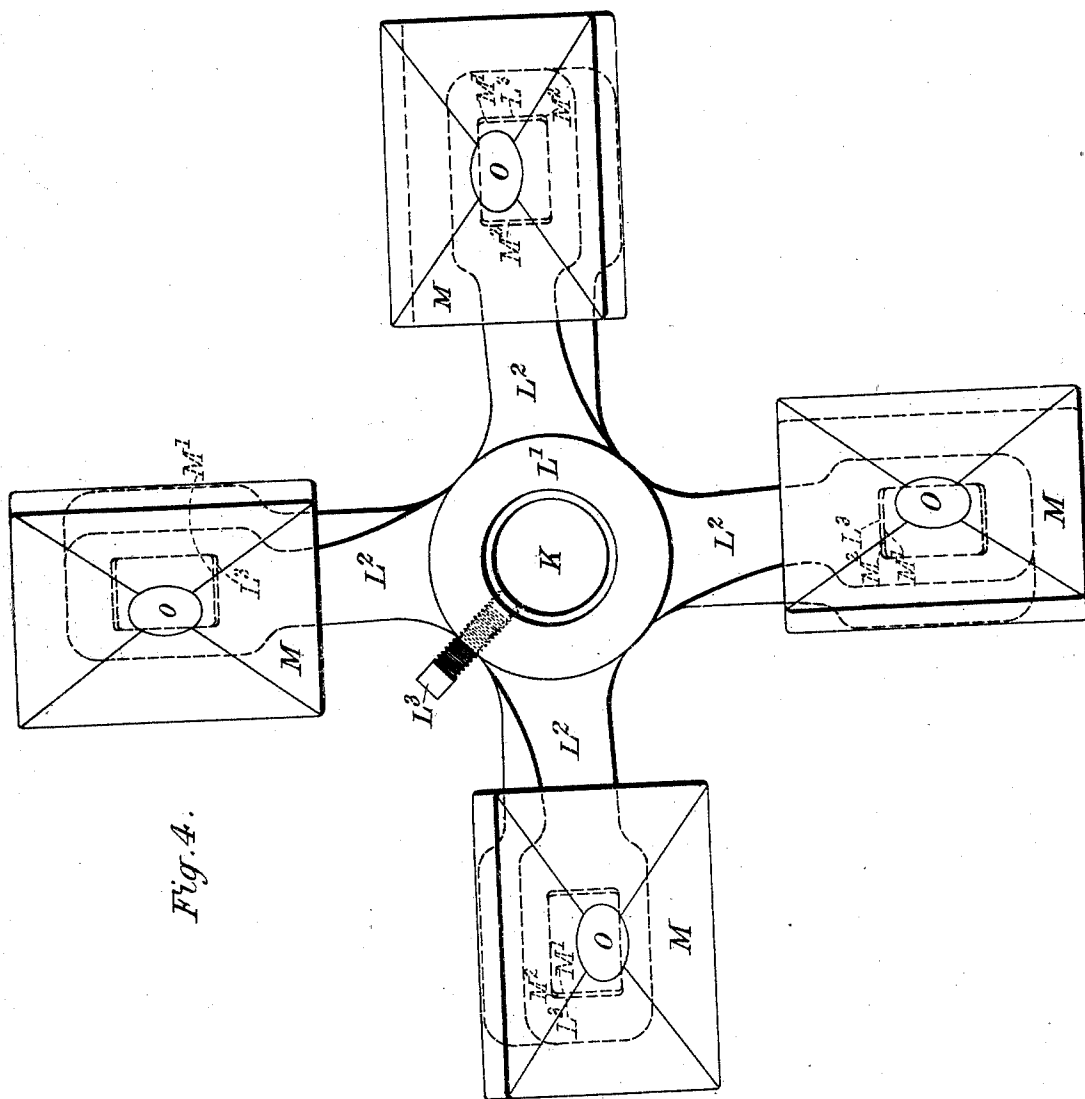


Fig. 4.

Witnesses:—

J. A. Ruthenford
Robert Everett.

Inventor:
Sidney Straker.
By James L. Norris.
Attorney.

(No Model.)

6 Sheets—Sheet 5.

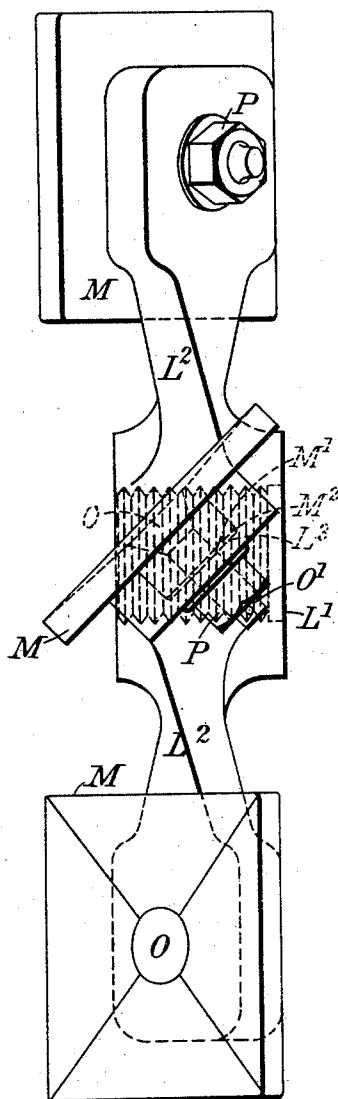
S. STRAKER.

PULVERIZING OR DISINTEGRATING APPARATUS.

No. 503,504.

Patented Aug. 15, 1893.

Fig. 5.



Witnesses:—
J. A. Ruthenford.
Robert Corbett.

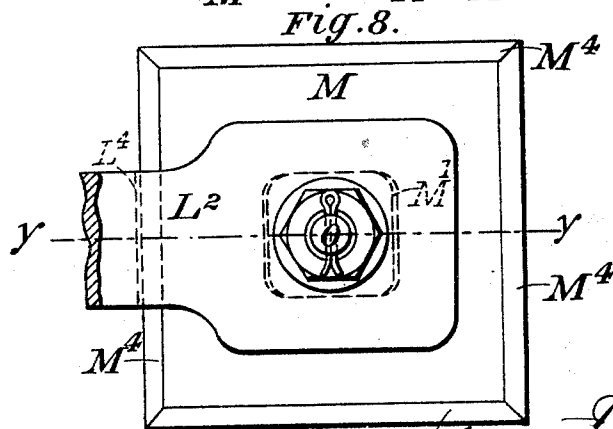
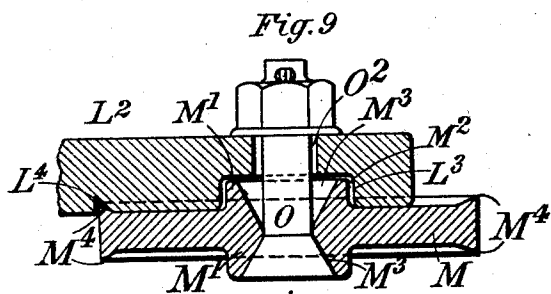
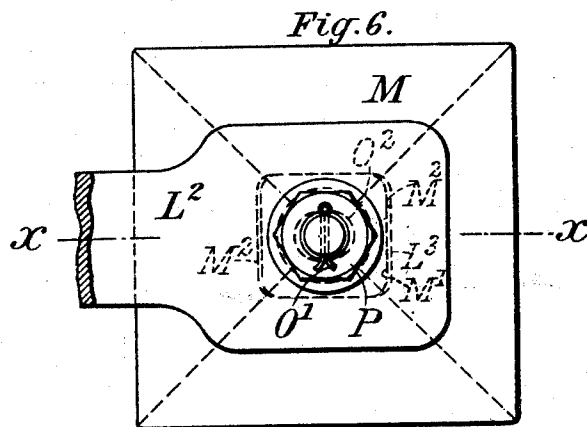
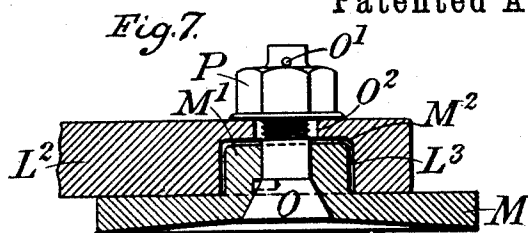
Inventor,
Sidney Straker.
By James L. Norris.
Attorney.

S. STRAKER.

PULVERIZING OR DISINTEGRATING APPARATUS.

No. 503,504.

Patented Aug. 15, 1893.



Witnesses:
J. A. Rutherford.
Robert Conant.

Inventor:
S. Straker
James W. Norris.
Attorney.

UNITED STATES PATENT OFFICE.

SIDNEY STRAKER, OF LONDON, ENGLAND, ASSIGNOR TO THE CENTRAL
CYCLONE COMPANY, LIMITED, OF SAME PLACE.

PULVERIZING OR DISINTEGRATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 503,504, dated August 15, 1893.

Application filed April 26, 1892. Serial No. 430,713. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY STRAKER, engineer, a subject of the Queen of Great Britain, and a resident of London, England, have
5 invented certain new and useful Improvements in Pulverizing or Disintegrating Apparatus, of which the following is a specification, reference being had to the accompanying drawings.

10 This invention relates to apparatus for pulverizing or disintegrating grain and other dry substances.

The said invention is chiefly designed to improve the construction and increase the efficiency of apparatus of the kind or class
15 wherein two beaters or fans rotating in opposite directions are employed for the purpose above set forth. The present improvements are, however, partly applicable to other pulverizing or disintegrating machines.

With reference to the central uptake of the machine, in which the beaters are situated, it is an important feature of this invention that
25 the upper portion or collecting chamber of the said uptake should be of larger diameter or cross sectional area than the lower portion or pulverizing chamber and that the said chambers should have vertical walls preferably connected by inclined surfaces so that
30 no lodgment of material can occur.

Another important feature of this invention is the combination with the said fans or beaters, of a plate or bar so placed in the uptake that disintegrated material thrown from
35 the fans or beaters will impinge upon it and suffer further disintegration.

In order that the said invention may be clearly understood, the hereinbefore mentioned features thereof, and other improvements comprised in the said invention and relating to the beater blades, the arrangements for the supply of air to the apparatus, and to a lubricator suited for lubricating certain of the parts, will now be described with
40 reference to the accompanying drawings, in which—

Figure 1 is a front view, partly in elevation and partly in vertical section, of a pulverizer or disintegrator constructed according
50 to this invention. Fig. 2 is a plan, partly

in horizontal section, of Fig. 1, the upper part of the machine being removed from the top right-hand portion of the drawing in order to show the form of the bed-plate more clearly. Fig. 3 is an end elevation of Fig. 1. Fig. 55 4 is an elevation of a fan or beater. Fig. 5 is a view of the said fan or beater at right angles to the view given in Fig. 4. Fig. 6 is a view of the rear face of one of the beater arms, with the blade attached thereto. Fig. 60 7 is a section on the line *x, x* of Fig. 6. Fig. 8 is a rear view of a beater arm with an alternative form of blade, which is reversible. Fig. 9 is a section on the line *y, y* of Fig. 8.

Like reference letters indicate corresponding parts throughout the drawings.

With reference first to Figs. 1, 2 and 3, A is the bed plate of the pulverizer. B is the uptake firmly bolted thereto. The part B' of the uptake constitutes the pulverizing chamber, and the part B² forms a collecting chamber of greater cross-sectional area than the chamber B'. The end walls of the pulverizing chamber are connected to the end walls of the wider collecting-chamber by inclined
75 portions B³.

Access to the interior of the uptake is obtained by the door C. The said door turns upon the pin C', which is passed through lugs C², upon the door and lugs C³ C⁴ upon the uptake. Upon the pin C', and between the lugs C⁴ the bar D is hinged to swing with the door. The said bar is connected to the lugs C⁵ upon the center portion of the door by a bolt D', and at its free end D² is forked to receive a
85 screw bolt D³, which is hinged at D⁴ to the uptake. Upon the said bolt is a nut D⁵ with crank handle D⁶, and, if the door be closed and the hinged bolt D³ be brought into the opening of the forked end of the bar, the nut
90 D⁵ may be screwed down to bear on the bar and cause it to force the door close up against the face of the uptake.

On the side walls of the uptake and below the inclined portions B³ are the two air spaces
95 E in each of which is an annular web E', a semi-annular web E² with extensions E³, and the straight webs E⁴ and E⁵, all of which extend across the air-space from the outer to the inner wall thereof. Each air-space E com-
100

municates with the pulverizing chamber by the two semi-circular air passages F F, instead of by comparatively small holes such as have been heretofore employed.

5 At the bottom of each air space is an air inlet G, in which is placed a valve G', controlled by a handle G² upon the valve spindle G³.

Upon the bed plate A are bolted segments 10 H to which the handles G² may be temporarily secured in different positions by the well-known arrangement of locking nut and bolt, to enable the valves to be retained in the positions to which they may be adjusted. The 15 air inlets G are extended down through the bed-plate as shown, and draw the supply of air for the machine from an underground pit, or other inclosure. By this construction the noise arising from the working of the 20 machine is minimized and the possibility of any foreign body being passed into the apparatus so as to cause damage to the fans or blades in the uptake is prevented.

Air-filters, consisting, for example, of wad- 25 ding or similar material interposed between layers of wire gauze or the like are preferably provided in combination with the air inlets G, in order to arrest any impurities that may be suspended in the air, and thus prevent the 30 entrance of such impurities into the pulverizing chamber and the consequent admixture thereof with the pulverized material.

At the top of the uptake is a feed hopper 35 I in which the material to be pulverized or disintegrated is placed. From the said hopper, which is provided with suitable feed gear operated by the pulley I', and with regulating gear controlled by the hand-wheel I², the material is delivered to the interior of the up- 40 take so that it may fall into the pulverizing chamber B'.

Upon each side of the uptake B, very long pedestal bearings J are placed, in which the 45 shafts K rotate, a driving pulley K' being secured upon each shaft between the bearings. The noses of the said shafts project into the pulverizing chamber, and to the end of each a fan or beater L is secured. In the example shown, the end of each shaft is screw-threaded, and the bosses L' of the fans or beaters 50 are correspondingly threaded so that they may be screwed on to the shafts.

L² L² are the arms of the fans, and M, M, are 55 the blades secured thereto, preferably at an angle of forty five degrees to the axis of the beater, which blades may be arranged either radially or inclined to the radius. The blades are formed of or are faced with steel, chilled iron, or other suitable material, either plain, 60 corrugated, file-cut, dished or edge-ribbed, as may be found most desirable; they may also be reversible, and have their front and back surfaces similar. The said blades, and the means adopted for securing them to the beater 65 arms will be hereinafter more particularly described. The ends J' of the bearings J are

formed to act as oil-catchers, into which the projecting disks on the ends of the bosses of the pulleys K' extend; the oil caught therein is delivered by the passages J² to the cham- 70 bers J³ into the oil reservoir in the pedestals J whence it may be withdrawn by the cocks J⁴. A curved plate or bar N T or V shaped in cross-section is placed in the uptake near the point where the pulverizing chamber wid- 75 ens out into the collecting chamber. The said bar is hinged to the back wall of the said uptake at N² and additionally secured thereto by bolts N³. The combination of the said bar or its equivalent, with the beaters L, is particularly advantageous for reasons which will be hereinafter explained. By withdrawing the 80 bolts N³ from engagement with the plate or bar N its free end can be raised vertically to permit of easy access to the beaters. 85

With reference now to Figs. 4, 5, 6 and 7 which illustrate one of the forms of beater constructed according to this invention, L³ is 90 a set screw which assists in retaining the boss L' of the beater in place upon the shaft K, and each of the blades M is shown as being concave upon its face and formed with a square lug M' on the back thereof. Each arm L² is provided with a corresponding recess L³, to receive the said lug. When the blade is placed 95 upon the arm the lug engages with the recess and the said blade is secured in place by a conical-headed bolt O and the nut P. The coned head of the bolt fits into a coned recess in the plate and the split pin O' is 100 passed through the end of the bolt to retain the nut in place. The said square recess is of somewhat greater width, in one direction than the lug M' in order that each blade may be adjusted radially upon the arm so that the 105 arms of the beater may balance each other. For the same reason the hole O² in each arm through which the bolts O are passed, is elongated. Any spaces between the lug on the blade and the recess in the arm, such as the 110 spaces at M², are filled by sheet-metal or other packing. When any blade becomes worn upon its outermost edge, for example, as is commonly the case in practice, the said blade may be lifted to bring the lug out of the recess, turned round to bring one of its other 115 edges into the position formerly occupied by the worn edge, and again secured in place, and so on, until each of the four edges has done its share of duty. 120

The alternative form of blade illustrated in Figs. 8 and 9 is reversible. It is secured 125 upon the arm L² by means similar to those employed in the example illustrated in Figs. 4, 5, 6 and 7 but is provided with a lug M' on both faces, a countersunk recess M³ being provided in each lug; thus when the four edges of one face are worn, the blade can be turned over and the four edges of its opposite face exposed to wear in turn, so that eight edges 130 of the blade are made available, and the blade is available for a long term of service.

L⁴ is a recess in the arm L² in which is received one of the raised edges M⁴ of the blade M to assist in holding the blade in place.

The operation of the apparatus hereinbefore described is as follows: The material to be pulverized or disintegrated is fed into the hopper I, whence, if the serrated roller upon the shaft or the pulley I' be rotated by suitable belt gear, it is delivered into the upper part of the uptake B so as to fall into the chamber B' in which the beaters are kept in rapid rotation in opposite directions by means of belt gearing arranged to drive the pulleys K'. The material in the pulverizing chamber is acted upon by the beaters, and disintegrated or pulverized, and the whole or a considerable proportion thereof is projected against the bar N, and, by impact thereon is further disintegrated or pulverized, so that the output of the machine is greater than if beaters were employed alone. The rapid rotation of the beaters draws air through the inlets G, thus rendering the employment of an independent fan or blower unnecessary, and causes it to take the course indicated by the arrows in Figs. 1 and 3, so as to pass into the pulverizing chamber B' by the passages F, whence it ascends the uptake B. Owing to the widening of the uptake in the portion B² thereof which forms the collecting chamber the air-current in that chamber is of less intensity than in the pulverizing chamber; the difference of intensity is determined by suitably proportioning the two chambers in accordance with the nature of the materials upon which the apparatus is intended to operate. The result of such difference is that the movement of the coarser or heavier particles of the material carried up by the air-current is arrested when they arrive at or near the lower portion of the collecting-chamber and they drop back or roll down the slopes B³ into the pulverizing chamber where they are further reduced. The finer particles, how-

ever, are carried by the air-current into the collecting chamber and thence to any suitable receptacle.

What I claim is—

1. In a pulverizing and disintegrating machine, the combination of an uptake having in its lower portion a disintegrating chamber and in its upper portion a collecting chamber of greater cross sectional area than the disintegrating chamber, the walls of said chambers being wholly vertical but joined on two sides by sloped surfaces, oppositely rotary beaters located in the disintegrating chamber, and valved air chambers each having two semi-circular air passages surrounding the beater shafts and through which they communicate with opposite sides of the disintegrating chamber, substantially as described.

2. In a pulverizing and disintegrating machine, the combination of an uptake having in its lower portion a disintegrating chamber and in its upper portion a collecting chamber, the walls of said chambers being wholly vertical but joined on two sides by sloped surfaces, a hopper located at the upper end of the uptake, oppositely rotary beaters located in the disintegrating chamber, a longitudinally curved angular bar supported transversely in the upper portion of the disintegrating chamber in proximity to the beaters to receive the impact of ascending material, and valved air chambers having semi-circular air openings surrounding the beater shafts and communicating with opposite sides of the disintegrating chamber, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

SIDNEY STRAKER.

Witnesses:

H. G. BISHOP,
ARTHUR CARRICK.