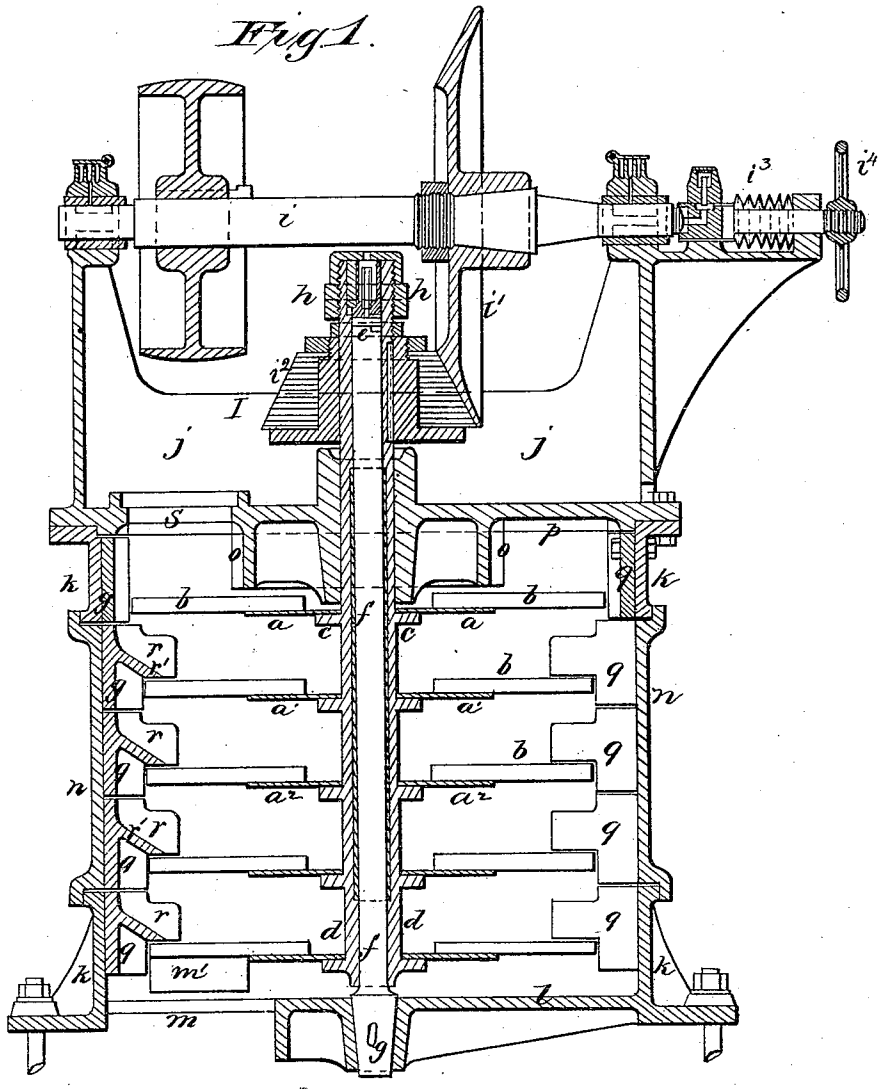
2 Sheets—Sheet 1.

C. DECHAMP.

DISINTEGRATING APPARATUS.

No. 248,923. Patented Nov. 1, 1881.

Fig 1.



Witnesses.
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Inventor.
Casimir Dechamp
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D. D. Stetson

N. PETERS. Photo-Lithographer. Washington, D. C.

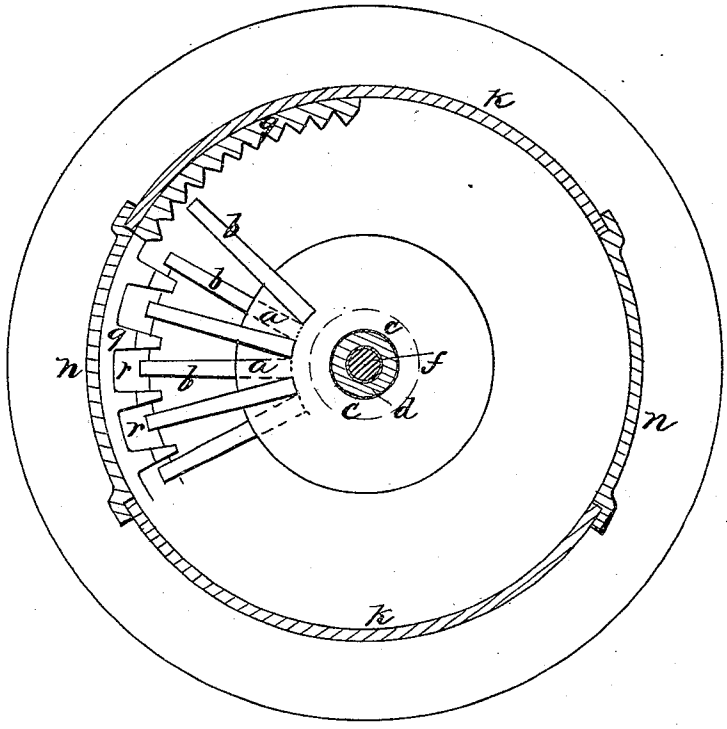
2 Sheets—Sheet 2.

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Fig. 2.



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UNITED STATES PATENT OFFICE.

CASIMIR DÉCHAMP, OF PARIS, FRANCE.

DISINTEGRATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 248,923, dated November 1, 1881.

Application filed September 27, 1879.

To all whom it may concern:

Be it known that I, CASIMIR DÉCHAMP, of Paris, in France, have invented certain new and useful Improvements in Machines for Disintegrating, of which the following is a specification.

My machine may be used to disintegrate or pulverize a wide range of materials used for food and in the arts. It is based on the principle that when a body is struck by another body moving at so high a velocity that the shock has not time to be communicated from one particle to another throughout the mass the body will be broken, the particles which are more immediately affected becoming separated from the others. This operation being repeated many times results in a very fine disintegration of the mass.

My disintegrator is composed of two principal parts, the one revolving around on a vertical axis and the other serving as a fixed casing for the first and as a support for its bearings. The revolving part gives a succession of sharp blows as the material is allowed to fall into the machine from above. The material thus struck is somewhat broken and thrown with great violence against the interior of the casing. The revolving part is formed with arms or beaters of hardened steel, and the interior of the fixed part being correspondingly equipped or grooved, the material treated is alternately struck by the revolving beaters, and thus set in violent motion, and this motion is violently arrested by the striking of the particles against the vertical grooved shell.

The interior of the machine is not only grooved vertically, but is formed with guides which direct the material inward. The beaters before mentioned are attached and project beyond the circumference of the circular plates, which are mounted successively one above another on the vertical shaft in a series, and the series of vertical stops or teeth and inwardly-projecting deflectors or guides on the fixed part correspond therewith. The material is acted on by these parts in succession and escapes at the bottom, through a suitable aperture, finely disintegrated.

I attach much importance to the fact that I employ, in connection with the revolving part equipped with beaters, not only stationary ridges or teeth and inclined surfaces adapted to arrest the motion of the particles as they are projected directly, and to conduct them inward as they descend by gravity, but also that the stationary parts are equipped with wings extending radially inward farther than the inclines, which prevent the particles being carried along by the wind.

The accompanying drawings form a part of this invention, and represent what I consider the best means of carrying out this invention.

Figure 1 is a central vertical section, and Fig. 2 a top view, partly in section, on two different planes.

Similar letters of reference indicate like parts in both the figures.

a a' a² represent a series of horizontal circular plates of sheet-iron, as many in number as desired, to which plates are attached radial arms or beaters *b*, of steel, so that they project beyond the circumference of the plates. These plates, which are made in two pieces for convenience in securing them, are riveted to the circular projections or enlargements *c* of the hollow shaft *d*, of cast-iron, placed in the center of the apparatus. The shaft *d* is supported at the upper end by means of a steel pivot keyed on the interior thereof, which bears upon a steel disk, *e*, resting upon the upper end of the vertical shaft *f*, of iron. The shaft *f* is fixed by means of its tapered extremities and the key *g* at the bottom of the casing, to be hereinafter described.

The lubrication is effected automatically and as required, and the reservoirs of oil are perfectly protected from the powder or dust common to milling-machines of all kinds.

An iron cap, *h*, screwed over the hole upon the end of the shaft, supports all the movable parts of the disintegrator. In the center of the cap is a hole for the introduction of lubricating-oil.

The gearing represented in the drawings for imparting motion to the shaft *d* and beaters *b* operates by friction.

Upon the shaft *i* is mounted, in two standards braced by the circular rib *j*, a cone-wheel,

I, which may be of metal. Upon the shaft *d* the cone-wheel I is secured by a spline, or in any suitable way. This last-named wheel may be of any suitable material—say leather—to obtain proper friction with the the wheel *i'*. The wheel *i'* is pressed against the wheel I by means of a spring or springs, i^3, and is released by the internally screw-threaded wheel i^4. A belt-pulley on the shaft *i* imparts motion thereto from a convenient motor.

The beating apparatus before described is inclosed in a cylindrical casing, *k*, cast in one piece with the bottom *l*, in which is left an opening, *m*, for the escape of the ground material. Upon opposite sides of the casing *k* are two doors, *n*, for the purpose of cleaning and keeping the machine in good order. The bolts shown at the lower part of the apparatus serve to attach it to masonry, wood-work, or other suitable foundation.

The cover of the casing, made of a single piece of metal, is pierced centrally by the hollow shaft *d*, and is bolted to the sides of the casing. Upon the under side of this cover is an annular toothed or corrugated flange, *o*, about which is a corrugated or toothed portion, *p*, which, together with the upper part of the cylindrical casing and the first series of beaters, forms a hollow ring of rectangular cross-section. The interior of the cylindrical casing is filled all around and from top to bottom with series of corrugations or teeth, *q*, as many in number as the plates *a a' a²*. With the exception of those for the first plate or series of beaters, the teeth *q* are formed into guides *r*, which project between the different series of beaters *b*. These guides *r* extend radially inward beyond the inclines *r'*, with which they are cast, and perform a function additional thereto. The inclines *r'* cause the material to move inward as it descends; but these inclines alone would not sufficiently resist the tendency of the particles to be carried around by the motion of the air. The wings *r*, extending inward, further resist such tendency, and compel the particles to descend by gravity without being affected by the rapid motion of the air. I count the wings *r* and inclines *r'* together as guides. These teeth and guides are or should be made of very hard chilled cast-iron.

s represents the inlet-opening, through which the material to be disintegrated is introduced into the machine. At the bottom of the casing one or more plates or scrapers, *m'*, are attached to the revolving beaters, so that they sweep the material from the bottom of the casing into the opening *m*. Preferably two such scrapers on opposite sides of the shaft are employed.

The operation of the machine is as follows: Power being applied to the driving-pulley and the shaft *d*, with the beaters *b* set in motion, the material to be ground is introduced through one or more orifices, *s*, and falling between the beaters attached to the first plate, *a*, is struck forcibly by them, owing to their high velocity of rotation. The material, more or less pulverized, is thrown by the centrifugal force against the walls of the casing, when its motion is arrested and it falls directed by the guides *r* upon the beaters of the second series, which in their turn still further break the material. In like manner it is subjected to the action of the third series, an so on until it is delivered as an impalpable powder through the opening *m* into any suitable receptacle. The aforesaid teeth and guides not only serve to direct the more or less broken material from the preceding beaters to the subsequent ones, but they also prevent the material, however finely powdered, from being carried around by a current of air generated by the rotary movement of the beaters, and present the material successively and without movement to the rotary beaters in the most favorable condition for its certain reduction to an impalpable powder.

It will be readily understood that the disintegration may be modified, according to the nature of the material treated and the condition to which it is wished to reduce it. To fulfill the required conditions with regard to the nature of the material, the fineness of pulverization and the quantity to be disintegrated in a definite time, changes will be necessary in the following element—viz., the diameter of the apparatus, the height through which the material falls in the apparatus, the velocity of rotation of the beaters, the number of the plates or series of beaters, the number of beaters for each plate, the form and length of the beaters, the number of teeth on the casing, the depth of these teeth, and the amount of projection of the guides. When the influence of each of these elements is known upon the result, it will be easy to find the best condition for adoption for any particular case.

It will be understood that by this apparatus the heaviest and hardest substances and the lightest and most pliable as well can be disintegrated or pulverized. Moreover, the apparatus may be advantageously used for decortication, for grinding or milling, for granulation, or even simple crushing, and, finally, the most difficult thing, for reducing to an impalpable powder in place of a millstone. This disintegrator is at the same time a perfect mixer.

It is evident that many modifications may be introduced without departing from my invention, some of which I have already indicated. The belts and guides before mentioned may be made in separate pieces and detachable. The beaters may be curved instead of straight. A closed tube may be used for conveying the material to be ground, and any ordinary or suitable means may be used to control the rate of feed.

Having thus fully described my said invention and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. In a disintegrating apparatus, the combi-

nation of the radial beaters b, case $k n$, provided with toothed segment-lining q, and guides $r r'$, substantially as set forth.

2. In a disintegrating-mill, the hollow-shaft d, provided at suitable distances with flanges c, plates $a\ a'\ a^2$, formed in two pieces, radial arms b, adapted to be interchanged, in combination with the circular casing k, provided interiorly with the cutting and guiding means $q\ r$, and doors n, substantially as set forth.

3. The grinding or disintegrating mill described, having the fixed shaft f, the hollow revolving shaft d, provided with flanges c, two-part plates $a\ a'\ a^2$, radial levers b, and scrapers m', the case k having the toothed flange o, toothed sections q, and guides r, all arranged to operate substantially as herein described.

C. DÉCHAMP.

Witnesses:
RIVET,
EUG. DUBIUL.