A. CALDOGNETTO.

CRUSHING AND GRINDING MILL.

APPLICATION FILED JULY 22, 1913.

1,088,876.

Patented Mar. 3, 1914.

3 SHEETS—SHEET 1.

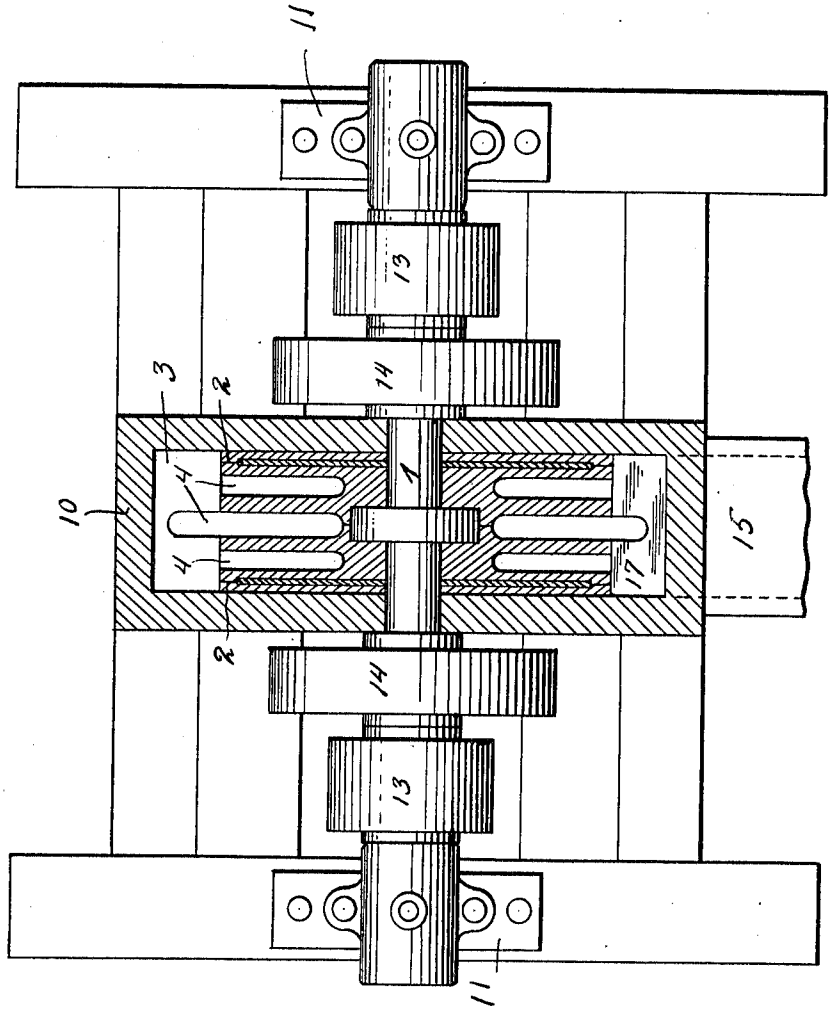


Fig. 1.

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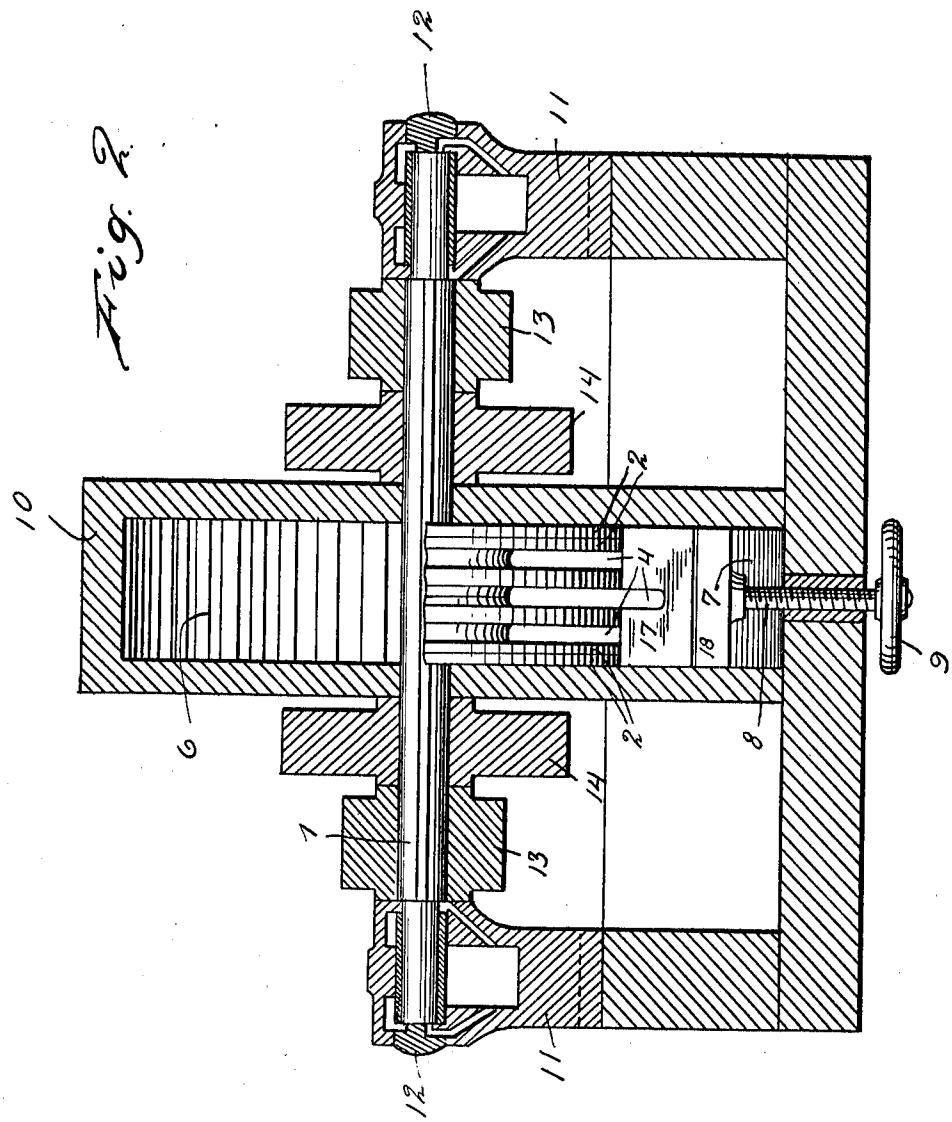
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3 SHEETS—SHEET 2.

Fig. 2.



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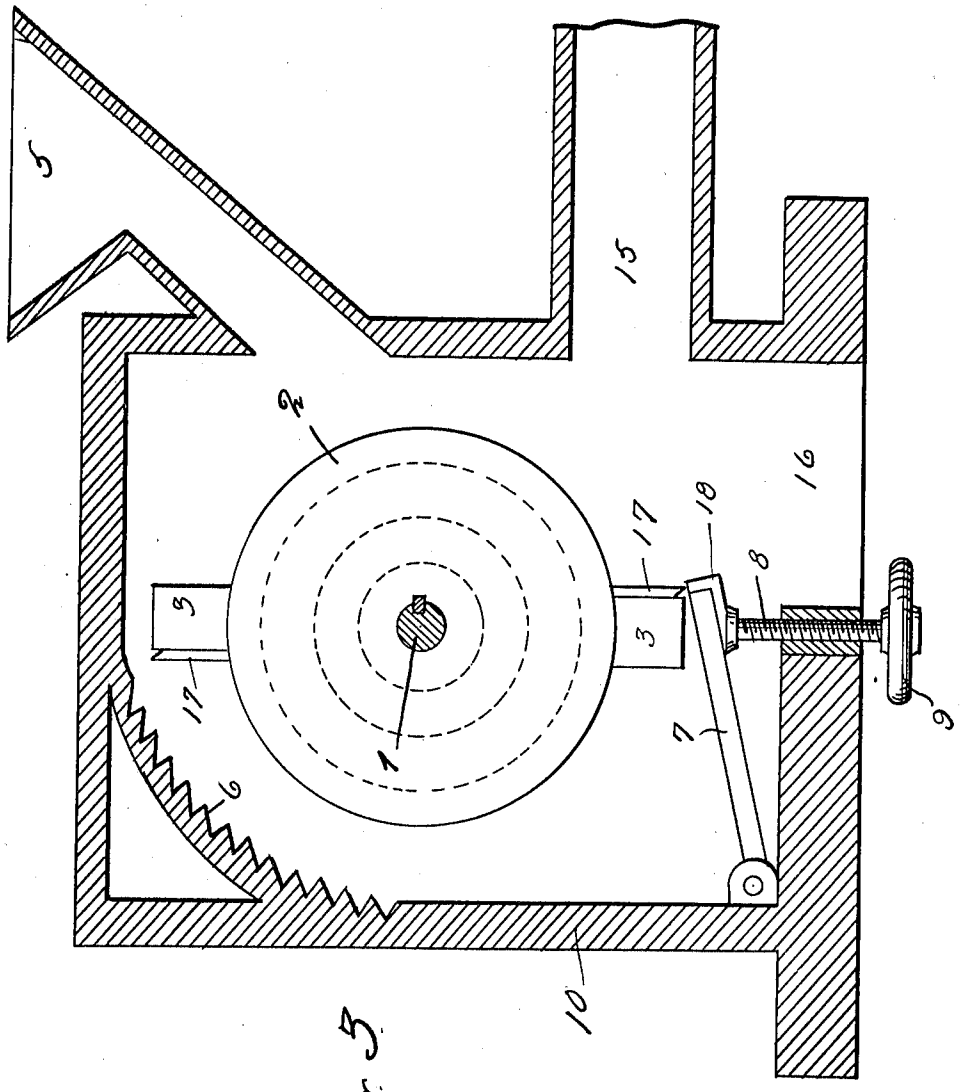


Fig. 3.

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UNITED STATES PATENT OFFICE.

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CRUSHING AND GRINDING MILL.

1,088,876. Specification of Letters Patent. Patented Mar. 3, 1914.

Application filed July 22, 1913. Serial No. 780,447.

To all whom it may concern:

Be it known that I, ALEJANDRO CALDOGNETTO, a subject of the King of Italy, residing at No. 2181 Bustamante street, Buenos Aires, Argentina, have invented certain new and useful Improvements in Crushing and Grinding Mills, of which the following is a specification.

This invention relates to a novel grinding and crushing machine, particularly adapted for grinding salt and similar materials. With regard to the grinding of salt, the machine which forms the subject matter of this invention, offers many advantages over all the machines of this kind heretofore used because it yields a considerable amount of work with a minimum consumption of power. With the apparatus constructed in accordance with the present invention, within a period of 9 hours, 10,000 kgs. of common rock salt may be ground with a consumption of motive power of 4½ hp., while with any of the machines actually in use, in order to grind the same amount, from 70 to 80 hp. would be required, for an equal length of time.

It is also an object of the present invention to provide means whereby the salt may efficiently be ground irrespective of its condition, that is to say, no matter whether it is damp or dry. This is a fact of much importance as, owing to the hygroscopic properties of chlorid of sodium or common salt, it is always a matter of serious difficulty to proceed to grind the salt when the atmosphere is moist or if on account of any other circumstance the salt has come in contact with any liquid.

Besides the advantages already stated, the present salt grinding machine is adapted to be adjusted so that the salt may be ground to any desired degree of fineness, by means of a screw device which controls the position of the fixed knife or cutter in relation to the moving cutters, as will hereinafter be fully described. Moreover, if desired, the ground product may at the same time contain fine and coarser particles, of different grades, without the necessity of changing the relative positions of the cutters, all as will later on be explained in connection with the working of the machine.

For the sake of clearness and in order to facilitate the understanding of this invention, illustrative drawings have been annexed to this specification which show by way of example the manner of carrying the invention into practice.

In said drawings, Figure 1 is a horizontal section of the machine showing the essential parts of which the same is formed. Fig. 2 is a vertical section of the machine, on the line of its axis of rotation, and Fig. 3 is a vertical section perpendicular to that of Fig. 2, wherein may be clearly seen the toothed crown and cutter knives, as well as the adjusting device for regulating the distance between these latter.

In all of said figures, the same numbers of reference indicate the same or corresponding parts.

Referring more particularly to the said drawings, 1 is the central shaft having keyed thereon the rotary disks 2, preferably made of wood and provided with suitable metallic reinforcements, as clearly indicated in Figs. 1 and 3. These disks are formed with continuous peripheral grooves or recesses 4, which constitute air chambers, and at diametrically opposed points on said disks are placed two wooden blocks 3 whereon are mounted, at the side corresponding to the direction of rotation, the knives or cutters 17, made of steel. At the upper part of the machine, see Fig. 3, is arranged the charging hopper 5 through which the raw salt is fed into the interior of the grinding chamber, the walls of this chamber being formed by the casing 10. 6 indicates a toothed crown arranged within the said grinding chamber on the inside of the cover, the wooden teeth of the crown being inclined in the direction in which the shaft is rotated. The crown is disposed eccentrically with relation to the disks 2, with its lower end nearer thereto than its upper end, so as to produce a gradual reduction of the salt, and its teeth serve to retain the salt and to effect a preliminary crushing of the same by impact as it is being fed into the machine.

7 is a block of wood which is hinged or pivoted in the bottom of the grinding chamber, and is raised or lowered through the agency of a screw 8 operated by means of a hand wheel 9.

The shaft 1 is supported by means of the bearings 11 and brasses 12, and to the shaft are keyed the two pulleys 13 and the two fly-wheels 14.

15 is the discharge outlet for the ground salt.

16 is an orifice for the entrance of air for the purpose of creating a ventilating air current and of efficiently assisting the discharge of the ground salt through the outlet 15.

18 is a fixed knife or cutter of steel, secured to the block 7 and acting tangentially with relation to the rotary cutters 17.

After having thus described the essential parts of the apparatus, I shall now proceed to explain the operation of the same.

The central shaft 1 being started by means of the pulleys 13 which receive the motive power from any convenient source, common rock salt is fed into the machine through the hopper 5. The rapid rotatory movement of the cutters 17, together with the air current created thereby and by the small air chambers 4, will cause the salt to be drawn along toward the toothed crown 6, and by impacting against the same, it will be partially crushed up and will fall upon the block 7 at the bottom of the grinding chamber. The position of this block, that is to say, the position of the fixed cutter 18 with relation to the rotary cutters 17 is previously arranged and conveniently adjusted by means of the screw 8 and the hand wheel 9, so as to cause the final product to be of the desired degree of fineness. When a layer of partially ground salt has been deposited on the block 7, the passage of the rotary cutter 17 past the fixed cutter 18 will remove therefrom the particles of salt which are of the desired degree of fineness, and such particles will be drawn through and carried outside of the chamber, owing to the strong suction produced in said chamber by the rotatory motion of the cutters 17 and of the wooden disks 2, the air being drawn into said chamber at a high speed through the inlet 16. This entrance of air absolutely prevents any ground salt from falling through the said inlet 16, the salt being caused to issue with great force through the outlet 15, and falling at a distance therefrom which varies from 4 to 10 meters, according to the degree of fineness of the ground product. It is evident that the finer the salt, the farther it will deposit on being drawn along by the air current. In view of this fact, a box consisting of several compartments may conveniently be placed before the said outlet, so that the said compartments will receive the different grades of the salt.

The apparatus is entirely constructed of wood, excepting of course, the steel cutters and the bearings, shaft, pulleys, fly-wheels and the device for regulating the fineness of the product. By constructing the apparatus of wood, the salt cannot come into contact with any metallic surfaces to which it might stick and become dirtied. Notwithstanding, if desired, the machine might also be constructed of any other suitable material without changing the purposes of the invention. The number of rotary cutters might also be varied and three or four of them may be used, even though in practice it has been found most suitable to use the number shown in the drawings.

The size of the feeding inlet, of the discharge outlet and of the air inlet may be varied at will, without departing from this invention. The outer part of the apparatus, may if desired, also be made of one piece, but it is preferred to construct the same of two or more pieces, arranged to be readily dismounted, for the purpose of cleaning the same.

I declare that what I claim and desire to secure by Letters Patent, is:

1. In a grinding mill, the combination, with a casing having inlets for air and the material to be ground, and a discharge outlet located between said inlets; of coöperating, stationary and movable grinding elements arranged within said casing; and means for rotating the movable grinding element, to draw air continuously through the air inlet into said casing, and force it therefrom with the ground material through said outlet.

2. In a grinding mill, the combination of a rotatable disk provided at diametrically opposed points with a pair of knives; means for rotating said disk; a block pivoted at one end beneath said disk and provided with a knife coöperative with the first-named knives; and a vertically-arranged screw upon which the other end of the block is supported for raising and lowering said block, to adjust the position of the second-named knife with relation to the first-named knives.

3. In a grinding mill, the combination, with a casing having inlets for air and the material to be ground, and a discharge outlet located between said inlets; of a rotary element provided with peripheral air chambers and with grinding means; a stationary element provided with grinding means for coöperation with the first-named grinding means; and means for rotating the first-named element, to draw air continuously through the air inlet into said casing and said air chambers, and force it therefrom with the ground material through said outlet.

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

ALEJANDRO CALDOGNETTO.

Witnesses:

J. H. AINSWORTH,

N. BARTLEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."