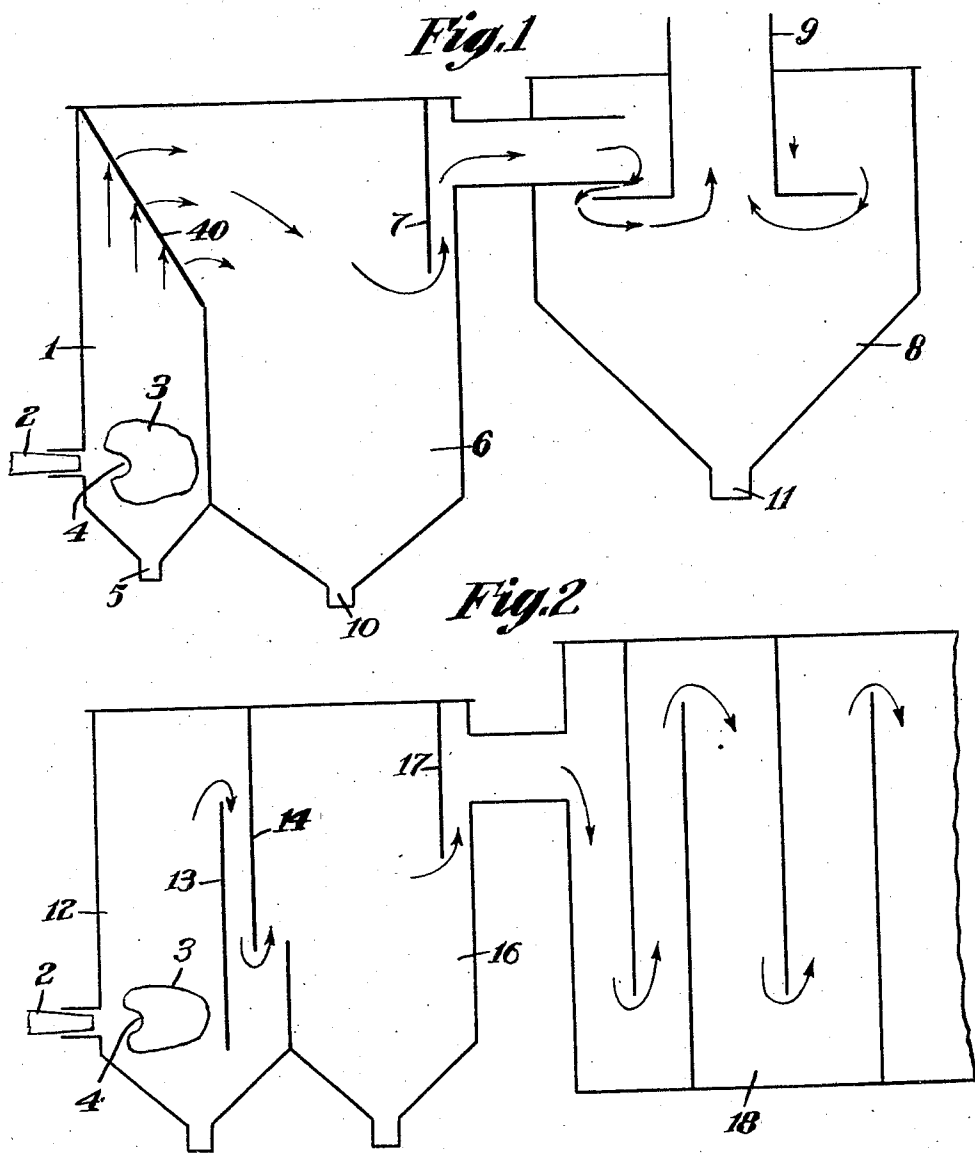


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PRODUCTION OF ABRASIVE FLOURS
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PRODUCTION OF ABRASIVE FLOURS

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The production of abrasive flours, particularly silicon carbide flours, free from contamination, has long been a problem in the industry. Many methods have been tried with varying success. The flours resulting from the ordinary breakdown of abrasive grain by any of the present methods, whether mechanical or chemical, or a combination of both, are difficult to clean, and if not cleaned of extraneous matter are unsatisfactory to the trade.

Where treated chemically, long and involved processes were necessary, with further difficulties of washing the flours free from the chemicals used. Even after such washing, however, there still remained extremely fine deleterious matter, such as graphite, in the flour, and moreover this long washing resulted in the loss of valuable fines.

Where treated mechanically, as by means of pebble mills, the grains were reduced by a long and tedious attrition process to flours of fair quality, provided that the quality of the original crude material was exceptionally free from contamination or impurities. These pebble mill flours for certain uses however required subsequent chemical treatment, and such chemical treatment represents a second long and involved process following the actual milling itself.

My present invention contemplates the production of such flours, free from contamination, by methods and apparatus which are at once simple and inexpensive so as to lend themselves to commercial practice and by means of which the time and cost factors of the methods of treatment heretofore employed may be reduced to the minimum. My invention also contemplates a resultant product which is characterized by a freedom from impurities and contaminations never heretofore attained in the art.

In practicing my invention I break down the abrasive grains by the air blast method

disclosed in the Harty-Moore application entitled "Art of processing abrasive grains or the like". Under such method, a certain amount of the abrasive material broken down by the air blast impaction is carried off by air draft, the coarser material in such air stream falling out by gravity, and according to my method, being recovered and impacted again and again until the material is all as fine as desired or only a small percentage remains to be reduced.

As illustrative of the principles involved, I shall discuss my invention in its adaptation to the production of silicon carbide flours. It will be understood, however, that this treatment is purely illustrative and in no way limiting and that the principles apply to the production of any kind of flour wherein the flour is an item of recovery, so to speak, based upon the initial reduction of a heavier particle and during such reduction, the release of lighter particles which ultimately are converted into flour. According to my invention, considering the abrasive grain as illustrative, I first crush in any suitable manner, as by rolls, crude abrasive silicon carbide to a size wherein it will all pass, say, an eight mesh screen. This material is then given a preliminary air-blasted impaction wherein any flours produced are usually too impure to be retained. Following this, the remaining material is repeatedly broken down by air blast impactions and the resultant flours carried off by draft. These flours are separated out of the air stream by any means such as an air gallery or cyclone separators, the extremely fine material unsatisfactory for use because of extreme fineness and contamination, etc., being collected in any suitable dust arrestor.

To accomplish this finer breakdown and separation, and particularly to prevent during such breakdown and separation the incorporation of unwanted coarse material, I use the equipment disclosed diagrammatical-

ly in the accompanying drawing, in which:—

Fig. 1 is a diagrammatic view of one form of equipment for the practice of my invention, and

Fig. 2 is a similar view showing a modification.

In accordance with my general concept and following the method disclosed in said Harty-Moore application, the abrasive grains after preliminary crushing as by rolls, to six and eight mesh or finer, are projected as a grain stream of predetermined velocity into a reducing chamber having a grain impingement surface therein.

For the purposes of this application, the reducing chamber is indicated at 1, the air blast nozzle at 2, and the impingement surface at 3. Preferably, though not necessarily, the impingement surface 3 is a block of material like the grains being projected thereagainst from the nozzle 2 and has a recess 4 aligned with said nozzle and either pre-formed therein or worn therein by the attritive action of the grains discharged thereagainst.

In the form shown in Fig. 1 an angularly disposed screen 40 above the block 3 retains the unwanted coarse sizes for re-impaction, such coarser sizes discharging by gravity as at 5 into any suitable collection receptacle. The fine abrasive grains which, however, still are coarser than the wanted flours pass through screen 4 into a collecting chamber 6, which is baffled as at 7 to shunt the path of the fines into a cyclone separator 8, the exit 9 of which leads to a second cyclone or to a dust arrestor. The heavier particles in chamber 6 discharge by gravity as at 10 into any suitable collection receptacle, and the same is true as regards the separator 8, the gravity discharge for which is indicated at 11.

The successively finer particles, which, however, are not yet of the desired degree of fineness, discharging from the respective gravity outlets 5, 10 and 11, are again introduced through air-blast nozzle 2 into the reducing chamber and subjected to further reduction, and this procedure is repeated again and again until the grains are all as fine as desired. With each successive repetition of the procedure, a certain percentage of extremely fine material is separated out of the air stream by the cyclone or other separator 8, these representing material which is of such extreme fineness and so contaminated as to be wholly undesirable, and which is simply collected in the dust arrestor.

In the modification of Fig. 2, 12 is the chamber in which the breakdown occurs, 13 and 14 are staggered baffles which prevent unwanted coarse sizes being carried over into the chamber 16, and 17 is a baffle inserted in chamber 16 to obstruct the air stream and shunt the fines into the air gal-

lery or the cyclone separator 18, from which the unwanted fines discharge into any suitable dust arrestor, as in Fig. 1.

It is obvious that other adaptations would accomplish a similar separation of wanted flours from unwanted coarse grain.

The flours produced by my process are exceptionally clean, free from extraneous matter, particularly graphitic particles as found in the ordinary pulverizing of silicon carbide. Such iron or iron bearing material as may be present can be readily removed by means of special magnetic separator.

Although the flours produced are satisfactory without further treatment for most purposes, if flours of exceptional purity are desired, a light chemical treatment is found to give satisfactory results. The washing and drying and elutriating of these flours involves no particular problem.

As suggested, the drawing and description are to be understood as suggestive rather than inclusive, as it is obviously impractical within the limits of this specification to catalog or enumerate all the various materials and procedures which might be involved in the practice of the concepts involved.

All variations in method and apparatus, however, are to be regarded as within the spirit and scope of our invention, if within the limits of the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. In apparatus for producing abrasive flours, in combination, an air blast for projecting a grain stream, a reduction chamber into which said stream is delivered, an impingement surface within said chamber and so located with reference to said air blast that a recess is worn in said surface by attritive action of the grains projected thereagainst whereby the grains have a colliding action with each other and a caroming action off the walls of the recess effective both to reduce them to the desired size and simultaneously impart to them a permanent capillarity, and a collection chamber communicating with said reduction chamber, said chambers having a common outlet for the lighter products of reduction and said reduction chamber having a baffled outlet into said collection chamber, and draft means connecting with said common outlet for carrying the lighter products of reduction from said reduction chamber through said collection chamber and out of the apparatus, said reduction chamber having also a gravity discharge for the heavier products of reduction dropping out of the air stream in said reduction chamber whereby such products may be collected for reintroduction into said reduction chamber and reimpaction against said impingement surface thereof, and said collection chamber having an independent gravity discharge for the lighter products of reduction passing

thereinto through said baffled outlet of the reduction chamber and dropping out of the air stream into said collection chamber whereby said lighter products may be collected.

2. Apparatus as claimed in claim 1 wherein the impingement surface is of a material which is substantially as hard as the grains being reduced.

10 In testimony whereof I affix my signature.
SAMUEL F. WALTON.

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