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## Improvement in Separating and Concentrating Ores, Grains, etc.

The concentration of metallic ores, or their separation from waste and worthless rock, is a process through which all metals used in daily life must pass before they reach the smelter and through him the consumer. It is a fact which may surprise the general reader, but which is well known to those interested, that of all the ores raised from the mine not more than three-fourths, in many cases not over half, goes to the smelter. The residue is either washed away in "water dressing," or else left still mechanically combined with the rock which is thrown aside as "tailings."

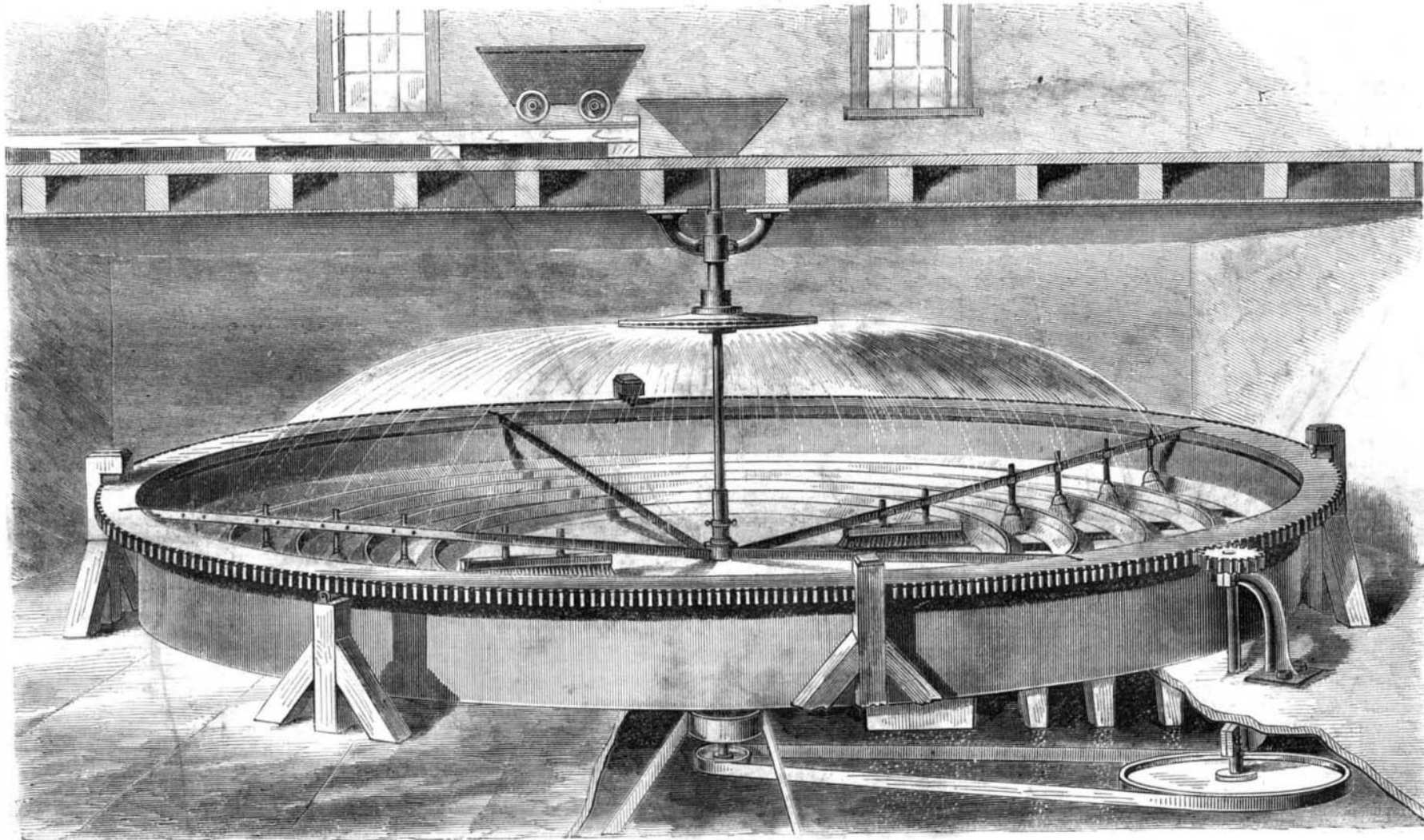
up either to the crusher or separator, to be run through at a different speed, or with fresh ore.

The machine being of a fixed size, it can be regulated to the various grades of ore with great nicety, by varying the rate of the speed or the height of the distributor, the tube being made movable for that purpose. The whole operation of dressing ore by centrifugal force is rendered entirely mechanical, and in that respect analogous to the working of an ordinary flouring mill, where there is no loss of the substance treated, nor manual labor employed in it, except for packing and attention to the machinery. While the machine will concentrate perfectly ores which are so fine as to float on wa-

pipe from each would carry off the matter which fell into them by means of its gravity alone without any machinery.

Another application of this principle of centrifugal force contemplated by the patentee is the cleansing and sorting of all kinds of seeds, and grains, especially such as may be intended for seeding. It is taken for granted that the heaviest grains or seeds possess the greatest germinating power, and produce the finest plants. By passing any sample of grain or seed through the separator, the heavier or plumper seeds would fall in the outer receiver, and the whole be cleared and classified, almost without cost.

An important feature in the working of this machine is the



PEARCE'S CENTRIFUGAL ORE CONCENTRATOR.

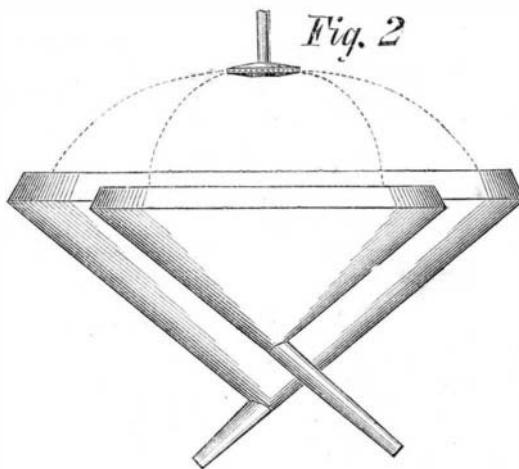
The difficulties which stand in the way of a complete separation of the metals from the rock are mainly these two: Unless the ore is crushed fine (in some cases exceedingly fine), the metallic portions are not entirely detached, and therefore cannot be mechanically separated from the rock. On the other hand, the finer the ore is crushed the greater is the difficulty of washing out the earthy matter without washing away the metal with it. Hence, fine crushing for ordinary ores is, for the most part, eschewed; yet from the friable nature of most of them it is impossible, in any mode of crushing, but that a large proportion of fine dust must be made. Moreover, if fine ores could be separated with as little loss of metal as coarse, fine crushing or more perfect disintegration would be the rule. Therefore a means of concentrating finely crushed ore must obviously be of the first importance.

This object is attained, it is believed, in the highest degree practicable, by the invention represented in the accompanying engraving.

Instead of the employment of currents either of air or water—which in whatever way they are applied must necessarily carry off some valuable matter—the crushed ore is thrown out of a revolving distributor, by the very simple mechanism shown, and by the operation of centrifugal force, alone, is carried into concentric annular receivers, the heaviest particles falling further from and the lighter nearer to the center.

Revolving brushes or scrapers, as shown, keep the machine clear, and cause each quality to be discharged, as it falls, through separate pipes. These scrapers are slowly revolved by means of the outer geared rim, driven by an upright shaft having a pulley on the lower end and a pinion meshing with the teeth of the revolving rim at its upper end. The brushes are attached to radial arms extending from a collar on the central shaft to the rim. The heavier metallic portions in the outer circles, and the waste in the inner one, will run where desired, and the middle portions which may require further crushing or further separation, may fall into an elevator and be carried

ter, it is equally applicable to the coarser grades, and beside the metallic ores all other mineral or granular substances can be treated by this process. It also affords a means of grading the particles of homogeneous substances which may require sorting to a size, much more rapidly and effectually than by sifting or bolting. With such articles as cement or plaster,



it is necessary that they should be thoroughly pulverized, and the loss of power in grinding down these substances by one operation is enormous, arising from the necessity of running the stones close, and delivering proportionately slow; but if the stones could be run free and the coarse matter thrown out from the fine and returned, it is manifest that an immense gain in the power and capacity of existing mills would be effected. A form of receiver adapted to such fine substances, where only two grades are required, is shown in Fig. 2. It consists of two funnels suspended one within the other. A

rapidity of its action. Through a working model now on exhibition at 32 Dey street, in this city, iron ore has been passed with effect at the rate of ten tons per hour, and it would be perfectly practicable to increase its capacity tenfold, with even greater perfection in the result. The "tailings" from water-dressing now accumulated at working and worked-out mines, contain metal worth many millions of dollars. The value of the invention for working over and recovering this mineral will be at once apparent.

An objection with some who have tried dry ore-dressing, arises from the flying dust which usually accompanies the operation and which is prejudicial both to the health of the workmen and the durability of the machinery. With the centrifugal machine this objection does not arise. The apparatus, as shown in the engraving, is placed in a closed chamber, which need never be entered by workmen while the machine is in operation. The pipe through which the ore is admitted, is fitted with an air-tight stuffing box, which prevents all currents of air from entering, and the air within the chamber will gradually acquire a rotary motion, with the running of the machine, which will not disturb the separation even of the finest dust; each particle of which will obey the laws of centrifugal motion and fall into its proper place. Having witnessed its operation, we think that, from the variety of interests involved in the possible application of the machine, it is well worthy the attention of seedsmen, plaster manufacturers, grain dealers, and others, beside those interested in the extraction of metals from ores.

Patented August 4, 1868, by S. T. Pearce, who may be addressed at 32 Dey st., New York city, where one of the machines having a diameter of twenty feet can be seen in operation.

THERE are twenty-five tobacco factories in Chicago, with an aggregate capital of three millions dollars, the annual product of which is about ten millions dollars.