Mechanics.

THE RYERSON PULVERIZER.

Pulverization of ores by attrition of the particles upon themselves has long been sought after by inventors and mining men. Believing this principle to have been successfully carried out through the invention of Mr. Van Buren Ryerson, of this city, I solicit the favor of the columns of your valuable paper, as a means of attracting the attention of miners and mining engineers to the machine in its application of the pulverization of dry ores.

Various centrifugal machines have been before the public, from time to time, in which impingement and percussion of the ore-particles upon the inner side of the apparatus has been the main principle involved. Mr. Ryerson invented and took out a patent in 1869 for a machine that substantially embodied this idea; but, after repeated experiments, it was found to be too expensive and virtually impracticable. He recently perfected the machine which I now propose to consider.

Figure 1 gives a side elevation of a machine adapted to the pulverization of ores. Figure 2 represents the action of the machine and the principle involved. The principle involved in the reduction of ores by this machine is, that the ore-particles are caused, by mechanical application of compressed air, to rotate violently, each upon its own axis, at the same time having a path of revolution about a common center; and at a certain stage of their reduction into granulations, the size of which is regulated by the opening or closing of the discharge ports, thereby varying the pressure of air within the case, the powdered material is discharged at right angles to the plane of velocity. This is accomplished with little wear to the machine, as the particles touch no part of the mechanism during their pulverization, This rotary movement of the ore-particles is induced by a succession of eddies or reactionary air-currents in opposition to the direction in which the particles at a high velocity are moving, thereby causing the particles to be rubbed upon each other, and reducing themselves to an impalpable powder.

Reference to Figure 1 will show that the machine comprises three circular metalic cases *a*, each about three feet nine inches in diameter, discharging into one another through the pipes *b* at either side of each case.

Within each case is a revolving disk of gun-metal, shown at *c*, having at its outer periphery the four beaters *d*, the upper and front faces of which are of the full width of the space between the inner sides of the cases, the disk *c* being of a thickness to secure strength and solidity. The outer face of each beater *d* is ratchet-dressed, while the radial face is smooth. These dressings extend across the full width of the beaters, and are of uniform depth. The inner periphery of the case *a* is provided with a stationary ring of steel *e*, which is dressed in the same manner as the outer faces of the beaters, only differing in that the angle of the dressing upon the outer faces of the beaters. This construction will more readily appear in Figure 2. The distance, therefore, between the outer faces of the beaters and the inner periphery of the case varies alternately from three quarters of an inch to an inch and a half, from the apex to the base of each two notches of the dressings, when directly opposite each other.

When the disk *c* is revolved at a high rate of speed causing a rotation of the central body of air in the case, it produces a reactionary effect upon the belt of air lying between the path of revolution of the upper faces of the beaters and the dressed surface of the inner periphery of the case. The use of the ratchet dressing on the inner periphery of the case and the upper faces of the beaters will now be understood. It is not intended for grinding; but its purpose is to present a succession of abrupt surfaces, radial to the circle in which the belt of air revolves, which serve, by the impingement of this belt of air upon them, to break it up into whirlpools and eddies. These eddies of air, while each revolves upon its own axis, have also a path of revolution about a fixed center. This peculiar action of the compressed air is shown clearly in Figure 2, where the scrolled line represents the eddying character and direction of the current.

The ore to be reduced to powder, after having first been crushed fine in a Blake ore crusher, is introduced through the feed-pipe *f* at the center at both sides of the first case of the series. At the instant the crushed ore enters the machine, it flies outward in radial lines toward the periphery of the case, and is there caught up by the revolving belt of air-eddies, and each particle of ore is then rapidly reduced to powder by the violent attrition of the particles upon each other. The pulverized ore is discharged at right angles to the plane of velocity through the port-holes *g*, and forward into the next machine, where the particles are still further reduced.

The size of the granulations will depend upon the length of time that the ore-particles are retained within the case. The port-holes *g* are covered with the slide *h*, in which are port-holes of a large size and number; so that when this slide is moved backward or forward, the discharge of air is lessened or increased, and it simply rests with the discretion of the man in charge of the machine to regulate the size of the granulations of the powdered material. This feature of the machine is absolutely necessary, as it may often occur that the ore to be pulverized will be of varying degrees of hardness.

The second revolving disk moves with a greater velocity than the first, and the third with a greater velocity than the second. Thus there is the combined pressure from the first case, and suction from the one into which the material is discharged. The powdered material comes from the machine perfectly cool.

Simplicity is the leading characteristic of this machine. Its parts are few, which will necessitate but little repair; and such portions of the mechanism as are likely to ware—the circular rim of steel and the faces of the beaters—can be replaced indefinitely at a small cost.

As applied to wheat-grinding in this city, the machine has proved a great success. Important improvements have been made recently in the adaptation of the machine for that purpose, which are to be introduced practically this fall. The producing capacity of the machine is enormous. Upon what it has ground this is estimated at three hundred bushels per hour, with a small proportionate expenditure of horse-power.

The cost of the machine illustrated is given at $3,500.

HOW ARTIFICIAL PEARLS ARE MADE.

Many persons have no doubt been frequently struck with the great beauty of artificial or imitation pearls. Those who make it their business to produce such articles of ornamentation have attained to a high degree of perfection in their art; so much so that in 1862, at the London Exhibition, a Frenchman who was an adept at their manufacture exhibited a row of large real and imitation pearls alternately; and without close inspection, we are assured, it would have been impossible even for a judge to have selected the real from the unreal. Some translations from French and German works on this manufacture have recently been communicated to *Land and Water*, and from these it appears that the art of making imitation pearls is ascribed to one Jacquin, a chaplet and rosary manufacturer at Passy, who lived about 1680. Noticing that the water after cleaning some whitefish (*Leuciscus alburnus*), a species of dace, was a silvery appearance, he gradually collected the sediment, and with this substance—to which he gave the name of *essence d'orient*—and with a thin glue made of parchment, he lined the glass beads of which he framed his rosaries, and afterward filled them with wax. The method of making the round bead is by heating one end—which has first been closed—of a glass tube, which then, when blown into two or three times, expands into a globular form. The workman then separates the bead, places the end which has been heated on a wire, and heats the other end. This process is called bordering or edging. The best pearls are made in the same way, the holes of the tubes being gradually reduced by heat to the size of those of the real pearls, the workman taking each bead on inserted wire, and, by continually turning them round in the flame of the lamp used, they become so true as to be strung as evenly as the Oriental pearls.

The process of coloring the pearl is commenced by lining the interior of the ball with a delicate layer of perfectly limpid and colorless parchment glue; and before it is quite dry the essence of orient is introduced by means of a slender glass blowpipe. It is then allowed to dry; the pearl is filled with wax, and if intended for a necklace is pierced through the wax with a redhot needle. The essence of orient, as it is called, is the chief ingredient in the manufacture of the pearl. It is a very valuable substance, and is obtained from the fish above named by rubbing them rather roughly in a basin of pure water, so as to remove the scales; the whole is then strained through a linen cloth, and left for several days to settle, when the water is drawn off. The sediment forms the essence referred to. It requires from seventeen to eighteen thousand fish to obtain about a pound of this substance! Besides the French there are other imitation pearls, made of wax, covered with a kind of pearly luster. But these do not look so well as the French pearls; while, in a heated room they are apt to soften and stick to the skin. A very extensive trade is now done in the manufacture and sale of French artificial pearls.—*Scientific American.*