

1. Speed of mill, 300 revolutions; speed of fan, 2,000 revolutions; weight of ball used, 85lb.; quantity of cement ground, 2,666lb.; indicated horse-power absorbed by mill and fan, 28.5; indicated horse-power reduced to tons per hour, 23.8; fineness of grinding, 3 per cent. residue on 100 × 100 sieve.

2. With same number of revolutions of mill and fan—weight of ball used, 54lb.; indicated horse-power of mill and fan, 29.5; indicated horse-power reduced to tons per hour, 22.4; fineness of grinding, 4 per cent. residue on 100 × 100 sieve.

Although these mills are said to give very satisfactory results in crushing cement, they cannot be commended as economical mills for reducing quartz, and they are only suitable for dry crushing.

Rock-breakers required.—In using either the Huntingdon Mill, Cyclone Rolls, Bryant, or Globe Mills, the ore must first be put through a rock-breaker, and be reduced to something like a maximum size of about 1½ in. diameter. The same principle also holds good in crushing with stamps, in order to reduce in cost of crushing. As regards those mills, the ore must be broken small before they will work properly; so that in estimating the cost of a plant a rock-breaker has to be included as well as a proper ore-feeder. Rock-breakers and ore-feeders have not as yet, with exception of the new mills in the North Island district, been used in connection with crushing-batteries; but the day is not far distant when they will be attached to all the mills in the colonies. The old conservative notions must give way in order to utilise the low-grade ores, which require an inexpensive method of treatment to make them pay for working. The rock-breaker is decidedly the class of machine that will reduce the ore to a medium size at a less cost than any other that has yet been used. It has very few wearing-parts, and those parts can be replaced at a small cost and also very quickly. It is totally against all natural laws to attempt to crush large blocks of stone quickly in a mortar. One has only to try this on a small scale by putting a large stone in a common hand-mortar. The pestle will break the stone, but if the quantity of material in the mortar is large it will take double the time to pulverise it to a sufficient fineness that it would take if the quantity were divided in two or three lots and pulverised separately. Therefore as long as large blocks of stone are put into a stamp-mortar we can never expect to crush cheaply. After the ore has been broken by a rock-breaker an ore-feeder is indispensable, as the greatest regularity has to be observed in keeping a uniform quantity of material; and this can never be done so well by hand as by an automatic feeding-machine.

Marsden's Fine Crusher or Pulveriser.

This is a machine which commends itself as an economical dry-pulveriser. It will be seen on referring to the sectional elevation of the machine appended hereto (Figs. 4 and 5) that the power required to work it and the quantity it will pulverise per hour will necessarily vary according to the nature of the material under treatment; but in any case its crushing-capacity for the power employed to drive it is as great as any machine now in use. It will be seen that it is merely a rock-breaker with the jaws set close together at the bottom, and having a revolving screen set under it. The material which does not pass through the screen falls into a chamber and is lifted with elevators to be treated again, on the same principle as that used in crushing with rolls.

The wear and tear in a machine of this description must be very small, as there are only four wearing-parts—namely, the two jaw-faces and the two side-plates—and these can easily be removed and changed in about half an hour by an ordinary labourer. These machines are made of six different sizes at the mouth—viz., 5in. by ½ in., 6in. by 1½ in., 10in. by 2½ in., 12in. by 3in., 20in. by 3in., and 20in. by 5in. As previously stated, their capabilities are according to the nature of the material and the degree of fineness to which it has to be crushed. The following table will give approximately the products and power required:—

Size of Machine at Mouth.		Approximate Product per Hour, to pass Ordinary Gaze of 2,500 Holes to the Square Inch.	Nominal Horse-power required to drive.	Price of Machine, Woodwork not included.	Price of Screening Apparatus	Weight of Machine.	Prices of Best Copper-sewn Belts. (Extra.)		Speed of Pulley.	Extra for Machine arranged on a Bed-plate, with Screening Apparatus overhead, supported on Iron Pillars, in which case the Wood Framing shown in Sketch is done away with.
							Double, Driving.	Single, Screening.		
In.	In.	Cwt.		£	£	Tons cwt.	£ s. d.	£ s. d.	300 revolutions per minute.	In. In. £
5 by ½	1 ½	1	1 man	21	5	0 1	0 19 6	0 11 0	
6 by 1 ½	2	2	2 men	85	15	0 10	2 12 0	0 16 6	
10 by 2 ½	7 ½	7 ½	3 n.h.p.	130	25	2 5	7 4 0	2 2 0		10 by 2 ½, 25
12 by 3	10	10	4 n.h.p.	150	30	3 0	7 4 0	2 2 0		12 by 3, 25
20 by 3	16	16	6 n.h.p.	250	40	4 7	8 16 0	3 0 0		20 by 3, 35
20 by 5	20	20	12 n.h.p.	300	45	6 10	10 14 0	3 0 0		20 by 5, 40

* Sampling machine.

Blake-Marsden Stone-breaker or Ore-crusher.

This is one of the best stone-breakers and ore-crushers that are made. Everywhere they are erected they give satisfaction. The Blake stone-breaker is an old machine, and well known. This machine has been so improved in its details that it is far superior to those of the old type. One of the great improvements is its toggled jaws. The position of the teeth can be altered upon the front toggle up or down upon the cushion of the lever. The motion or length of the stroke of the jaw can be increased or decreased, and the material operated on can be crushed to any size required.