water is a constant stream having a sectional area of 40 square inches, and having a mean velocity of 3·6 ft. per second, which will deliver 1,728 cubic inches, or one cubic foot, of water per second. The regulations under "The Mines Act, 1891," have a table showing how to construct gauge-boxes for the measurement of any number of sluice-heads of water from one to a hundred, which table is practically correct. The experiments for the calculation of the table for all gauge-boxes over two sluice-heads were made at Kumara from actual measurements of the quantities discharged through large and small openings, under various pressures. A gauge-box for delivering one sluice-head of water has an opening of 20 in. in width by 2 in. in depth (40 square inches), with a pressure-board 5 in. in depth; and, as the total pressure is reckoned from the surface of the water to the centre of the opening, there is an actual head of water of 6 in. In such a box, constructed as described in the regulations, having an opening of 40 square inches, and a pressure of water of 6 in., the mean velocity of the water where the opening is full will be 3·6 ft. per second, and the quantity discharged will be 1 cubic foot per second, or one sluice-head. With the same opening, and a pressure of water of 24 in., the velocity would be 7·2 ft. per second, and the quantity discharged would be 2 cubic feet per second, or two sluice-heads. It takes four times the head of water to double the velocity. A sluice-head of water is a uniform and constant stream delivering 1 cubic foot of water per second. One cubic foot of water contains 6¼ gallons, and weighs 62½ lb. A sluice-head will therefore discharge—

1	cubic foot	6¼ gallons, or	62½ lb.	of water	per second.
60	"	375 "	3,750 lb.	"	per minute.
3,600	"	22,500 "	225,000 lb.	"	per hour.
86,400	"	540,000 "	5,400,000 lb.	"	per day (24 hours).

With figures such as the above before him, any person may have some idea of the effect of ten or twenty heads of water thrown against a face of alluvial wash with a velocity of from 60 ft. to 100 ft. per second, knowing at the same time that the force of the impact is proportional to the square of the velocity. 88 ft. per second equals 60 miles per hour.

NOTES ON BLASTING WITH NO. 1 DYNAMITE, BLASTING-GELATINE, AND AMMONITE, IN CHOTA NAGPUR, BENGAL, INDIA.*

[Communicated by A. Mervyn Smith.]

The following notes are summarised from a carefully-kept daily register, for a period extending over two years, and give the results of actual practice with the above-mentioned high-class explosives:—

The size of the shaft was 12½ ft. by 6 ft.; drives, 7 ft. by 5 ft.; cross-cuts, 7 ft. by 4 ft. Country-rock medium hard blue slate (hydromica schist), easy drilled, but tough, and splitting readily along bedding-planes. Underlie 70° with the horizon. Occasional stringers of hard quartz, from 2 in. to 6 in. wide, and parallel to the bedding-planes, were met with in sinking. The reef was from 7 ft. to 10 ft. wide, consisting of a hard crystalline quartz, showing a banded structure with alternate ribbons of blue, grey, and white quartz. Highly pyritous, the iron-sulphides making up nearly 10 per cent. of the weight of ore extracted.

The drilling was done by hand, the best 7 in. steel being used. It was found in practice that 2 ft. to 3 ft. holes did the most work in sinking and driving. Deeper holes did little or no work. In stoping, deeper holes were more advantageous. The drills were of four sizes—9 in., 1½ ft., 2½ ft., and 3½ ft., the smallest size being 1½ in. wide, tapering down to 1 in. in the 3½ ft. drills. Water tamping was used throughout, the works being wet, the water making at the rate of 5,000 gallons per shift of eight hours. Chisel-face drills, medium-blue temper, answered well for drilling in slate. Cock's-comb or crescent-face drills of the hardest temper had to be used for the quartz. 7 lb. hammers were used, and two men (natives), one striking and the other holding the bit, would drill 6 ft. in slate, or 2 ft. in quartz, in a shift of eight hours. The explosives used were No. 1 dynamite, blasting-gelatine, both supplied by Nobel's Explosive Company; and ammonite, from the Miners' Safety Explosive Company.

The cost of explosives delivered at the mine, 265 miles by rail from Calcutta, was—

	Per Pound. s.	d.
Blasting-gelatine	3	6½
No. 1 dynamite	3	0
Ammonite	2	8½

With the rupee at 1s. 2½d. in Calcutta, the prices are:—

	Rs.	a.	p.
Blasting-gelatine, per pound	2	6	0
No. 1. dynamite	1	13	6
Ammonite	1	8	0
Sextuple caps, per hundred	6	0	0
Felted fuse, per coil of 24 ft.	0	13	0

In quartz, gelatine by itself did not do as much work as a mixture of gelatine and dynamite. For a 3 ft. hole, four plugs of gelatine (ten plugs to the pound), and one plug dynamite (six plugs to the pound), break the ground to the bottom of the hole. The gelatine was first inserted, and the cap, with fuse attached, imbedded in the plug of dynamite, placed above the gelatine. Dynamite,

* Read before the Institution of Mining and Metallurgy.