

colonial-made machines, which are generally of the same design as the imported ones, are considered superior in many respects to the latter, on account of the improvements, suggested by experience, which have been added, and a summary of which is as follows:—

- (1.) The bits imported as patterns from America were of brass, and the diamonds were wedged in them with copper. The first improvement was the manufacture of the bits from Lowmoor iron; but subsequently crucible steel was used, and the diamonds were imbedded in the metal, which was then hammered round each stone until the diamonds became so firmly fixed that nothing but the wearing-away of the steel could dislodge them unless they fractured. The American brass bits never bored more than 50ft., but those set in Lowmoor iron bored from 400ft. to 500ft., while the steel bits bored up to 1,312ft., without requiring to be re-set. It will therefore be readily seen that the improvement tended very much to reduce the cost of boring.
- (2.) The next improvement was made in 1879, and consisted in the adoption of standard gauges for bits and all other drill appliances. Previous to this, bits and appliances of a special size had to be manufactured and kept in stock to fit each drill; but now every article made for one drill will fit every other drill of the same class to a nicety, the parts being perfectly interchangeable. The advantage of this is apparent.
- (3.) The core-barrels imported with the American drills were of butt and lapwelded iron tubes, and they were continually breaking; but, on the recommendation of the Superintendent of Diamond Drills, the department obtained some weldless steel tubes, which have been found to answer remarkably well, causing no trouble.
- (4.) Another improvement consists in the adoption of a method of working the valves of the drills so as to admit of using the steam expansively, thus effecting a saving of nearly one-third in the cost of fuel.
- (5.) Previous to 1880 no known means existed for ascertaining the pressure which the diamonds were subjected to in boring. It was entirely a matter of guess-work on the part of the foremen of the drills, until Mr. Palmer, the Superintendent, succeeded in affixing to each machine an indicator, by the aid of which the pressure can be seen at a glance, and varied as desired. This improvement is highly valued by the foremen, as it enables them to avoid over-pressure, which is so destructive to diamonds.
- (6.) Formerly great trouble was experienced in working the underground-drills, caused by short pieces of hard core breaking off in the bottom of the bore-hole and rolling under the diamond bits. Days were frequently wasted without the workmen being able to break the fragments of core or get them to the surface, until the Superintendent devised differently-shaped bits, which, instead of being in three parts, after the American pattern, were in one piece of less than half the length of the imported bits, and having the core-breaking ring close to the bottom. These new bits, which are now made from weldless steel tubes, rarely fail to bring up the whole of the core, and they cost only 11s. 3d. each, as compared with £3 6s., the price of the imported bits.
- (7.) The Superintendent has also devised certain tools for recovering broken rods in a bore, and the appliances were found to suit admirably recently at Portarlinton, where a drill had penetrated to a depth of 474ft. 10½in. in search of coal-seams. The rods had broken in the bore-hole and the ends had fallen into a cavity in the side, and baffled every attempt to remove them until the tools were constructed and used. The abandonment of the bore, which at first seemed inevitable, would have involved a very serious loss of time and money.
- (8.) Another improvement, which, however, has as yet been applied to only one of the drills, is the substitution of an iron tubular derrick for a wooden one. This iron derrick has been in use for a long time, but is none the worse for wear; and it can be taken down and re-erected in one-third the time required for the wooden ones.
- (9.) The latest improvement is the addition of an air-vessel to prevent the jumping of the rods, so destructive to diamonds. The foreman of the drill to which this appliance was first attached writes: "I have fitted the air-vessel on the hydraulic cylinders of the drill, and I find it to be of great advantage in rubble and broken rock, as it greatly reduces the wear and tear on the machinery and diamonds."
- (10.) The Victorian drills also differ from the American, in that the former are portable, being mounted on wheels with tires 7in. by 1in. Altogether they are stronger, more simple in construction, and considerably less costly than those imported.

Surface and Underground Drills.

The surface-drills are said to be capable of boring 2,000ft., but up to the present time the deepest bore put down by any of them for this department is 1,501ft. 2in. This was at Portarlinton, where the drill was employed searching for coal-seams. The underground-drills are capable of boring either vertically, horizontally, or at any required angle. The longest bore put in by any of them for this department up to the present time is one for the Oriental Company, at Stawell, which was put in a depth of 530ft. 5in., commencing at a level in the company's shaft 1,505ft. from the surface.

Work done by Drills.

Up to the 30th June last the number of bores put down by all the diamond drills belonging to this department, in searching for gold, was 181, and the aggregate depth 61,201ft., or about eleven and three-quarter miles. The number of bores put down in search of coal-seams was sixteen and the aggregate depth 13,165ft. 4½in., or about two and a half miles: The drills have been used by forty-six gold-mining companies in various parts of the colony, and by seven coal-prospecting companies. Several of the drills have been idle for various periods at different times since their