

H and HI, about  $\frac{1}{2}$  in. in diameter. At the end of each stroke the valve can be moved readily by pressing with the hand on the spindle when full pressure of air is turned on, so that the drill can be started at any point. In adopting this class of valve all tappets are avoided, and the full elastic force of the air is directed to the operation of the drill without any deterioration to the blow, thereby no doubt effecting a saving in the consumption of air. This drill causes very little vibration on the pole when it is at work, and its weight complete is 156lb. The patentees, therefore, claim that their drill is lighter than any other, that it stands the work better than American drills, that it will accomplish more work with less air than any other drill now in use, and at the same time all the working parts being made of the best material and simple in their construction, the repairs can be effected with very little cost, bringing the wear and tear to the lowest possible minimum. The patentees for the Wayman and Kay drill claim that their drill is much lighter than the National, and costs far less to keep in repair. Without giving a minute description of the different working parts of this drill, Drawing No. 6 will show the general design in plan and sections, which will be easily understood.

At the North Cross Reef Company there are four drills at work—one of the National, one Eclipse, and two of Wayman and Kay. This company instructed their engineer, Mr. Troutbeck, to keep an accurate account of the cost of keeping each of these drills in repair, and, from the figures supplied by him, the cost of repairs was as follows: National, £138 for 682 days' work; Eclipse, £73 for 325 days' work; No. 1 Wayman and Kay, £105 for 732 days' work; No. 2 Wayman and Kay, £97 for 724 days' work.

From this it will be seen that the Wayman and Kay drill cost about one-half either of the others to keep in repair, the cost of Wayman and Kay No. 1 being 2s. 8d., No. 2 2s. 10d., National 4s. 5d., and the Eclipse 4s. 5d. per day; and, from information received from the mine managers, the distance bored by Wayman and Kay's is equal to from 25ft. to 33ft. in eight hours; but it must be borne in mind that the rock in this district is of an extraordinarily hard nature, and what the miners here term "elvan rock." Mr. Troutbeck informed me that he made several experiments to ascertain whether the air consumed by these drills compared favourably with the others; and, after working each of the drills for four hours, the result was, the National consumed 97, the Eclipse 82, and Wayman and Kay's 70 cubic feet of air per minute; but some of the other managers state that Wayman and Kay's drill requires 10lb. more pressure of air than the National to do the same amount of work, at the same time they acknowledge that the breakage is at least 25 per cent. less than the National. The unanimous opinion of mine managers and others interested in mining throughout the Colony of Victoria is that by the use of rock-drills the saving effected in the cost of candles, steel, charcoal, and blacksmiths' time in sharpening drills more than compensates for the cost of the fuel used in compressing the air and the wear and tear of the rock-boring plant. Some of the managers in the Stawell District state that before compressed air-drills were in use the cost of sharpening and consumption of coal amounted to about 2s. 6d. per ton of stone raised, whereas now it is reduced to about 6d. per ton.

#### AIR-COMPRESSORS.

There is a great difference of opinion with regard to the most useful, economical, and compact air-compressors that are in use. Some prefer Ford's, others the National, and in the Stawell District a few of Wayman and Kay's are used. The patentees of Wayman and Kay's drills furnished me with a plan of their compressor, which gives entire satisfaction wherever it has been employed. Drawing No. 7 shows its general design. From what I have seen of the different forms of compressors, the National, to my mind, is by far the most compact, and everywhere gives satisfaction. The cylinder of the steam-engine is fitted on the same bed as the air-compressor, and the same piston-rod works both pistons. The only difficulty experienced with the National is that the steam has to be kept up at a high pressure in the boilers to work the compressor so that four drills can be supplied with air; but this is easily obviated, if the cylinder of the steam-engine is made an inch more in diameter than the cylinder of the compressor. Mr. J. W. Naylor, a mechanical engineer and manager of several mines in the Stawell District, states that he has had one of the National compressors at work for several years; and I quote his own words: "It gives us every satisfaction; it supplies air for driving four rock-drills constantly at work, and I have not heard any complaints about the want of air. The simplicity of its construction and the little care required in attending to its working, together with the rapidity with which it compresses air, compels me to give it first place in my estimation compared with any air-compressing machine I have ever yet seen."

One of Wayman and Kay's compressors has been at work at the Northern Cross Company's mine since January, 1882, and all that has been done to it since its erection was to pack the ram once in twelve months, and change the clacks about every three months. All the working parts are in water, and will leak water, and not air, should the packing of the valves be out of order. The valves are simple, and easily changed, and are similar to a leather pump-clack. The area of the ram is 144 square inches, with 3ft. 6in. stroke, and it is driven by a steam-engine with cylinder 20in. in diameter and steam pressure at 25lb. The engineer of this company states that the compressor has to run for a little over two and a half hours to supply air for working three rock-drills for eight hours.

In concluding my remarks on the quartz mines in Victoria, I would observe that the lodes have a far more permanent appearance than they have in New Zealand. The country where the quartz reefs are situated is not nearly so broken, the lodes run more regularly, and there is not the same amount of breaks and slides that occur in our lodes, which are generally found in bunches and detached blocks; but the same feature occurs in the Australian quartz lodes with regard to the gold, which runs in shots and streaks through the lodes.

As it may prove interesting to those who have had no opportunity of visiting the Australian mines to see plans and sections of the several reefs, so as to obtain a better idea of their nature, and to enable a comparison to be made, plans and sections showing some of the lines of reefs