

and a queerly shaped tunnel is the result. This direction is easily kept by lining in the miners with plugs driven into the centre of the roof and plumb-bobs suspended from them, or using stout screw-eyes in the caps of the timbering.

Dimensions.—In metal-mining tunnels $4\frac{1}{2} \times 7$ feet for single track, and 8×7 feet for double will be amply large when no timbers are used, but with timbers, $4 \times 6\frac{2}{3}$ feet in the clear for single, and $7\frac{2}{3} \times 6\frac{2}{3}$ feet for double will permit the easy haulage of much material, but still be none too large. In a small, cheap prospecting tunnel $3\frac{1}{2} \times 6$ feet will suffice.

Grade.—The best average grade in good work is 6 inches per 100 feet, giving a rapid fall for water and equalizing the work of taking out fulls and returning the empties. A 1 per cent. grade common in levels, with a good track, will permit a trammer to ride out, but he will have a heavy push back, especially with iron and timbers. Miners left alone will quickly work in a steep grade, they will never run level, and in good work the grade is easily kept by using a 16 to 20 foot straight-edge cut to the proper inclination and a spirit-level, laid along the mud-sills, and checked with level and rod every 100 or 200 feet, for 6 inches per 100 feet too much grade in 1,000 feet means 5 feet less of stoping ground.

Equipment.—In developing a claim by tunnelling the least amount of equipment is required. If the work is to be done with the very least outlay of money, a small, stout shed or blacksmith-shop is erected over or near by the entry and fitted up with forge, anvil, bench, vises and sufficient appliances to keep all the mining tools in good condition, such as drills, hammers, shovels and picks, and also with such supplies necessary for repairing the cars. Often all the blacksmith work is done by one of the miners working part-time in the shop, but if one man is needed just for this work, during spare hours he may be engaged in building more cars, using bought wheels, or else in cutting out mine timber setts. In more extensive work, where machine drills are used, a simple and not expensive engine-house is built, say 40×40 feet, divided into (1) the compressor-room, in which are a 4 to 8 drill-compressor, the receiver and two steam-pumps, one for boiler feed, the other for supplying cold water to the compressor; (2) coal-bunkers; (3) a small store-room, and (4) the rest of the building has a sufficient boiler, a large bench with vises, tools and fittings for repairing the air-drills, etc., and also a small