

taken in hand, the necessary excavations made, and the ground tested to obtain the most suitable site for the foundations of the new machinery. After carefully testing the ground by pile-driving, the site for the foundation of the new pumping-engines was fixed on the west side of the shaft. The area of this foundation was 70 ft. by 60 ft., and in this area forty piles, 12 in. by 12 in., were driven; but, as the solid formation had an underlie to the west, some piles were driven deeper than others before the solid formation was reached. The piles were then cut about 4 ft. from the ground, and the whole bound together by a layer of concrete 2 ft. in thickness, which was allowed to set firmly. On this smooth surface boxes were laid in various directions, of sufficient size to allow a man to enter, and upon these sixty-four perpendicular boxes, 6 in. by 4 in., and 18 ft. long, were placed. These were stayed and braced to keep them in position, so that the holding-down bolts from the engine-bed could be placed in position and secured below. Concrete was then placed to a depth of 18 ft., securing these boxes, and it was extended on the east and west side of the shaft to a depth of 12 ft., for the support of the pump quadrants, and thus on three sides of the shaft there is one massive concrete block fully 6,000 tons in weight. As this was required to carry such heavy machinery, it was decided by the Government Inspector and by the manager for the company that the very best Portland cement only should be used in its construction. One part of this cement to five parts of gravel and broken metal were thus used. The metal was broken on the ground by a rock-breaker of the Blake-Marsden type, the motive-power being obtained from a Pelton wheel. The amount of material excavated for the various foundations is estimated at 13,000 yards. The site for the capstan- and winding-engines was fixed on the south side of the shaft. Both these engines are in the same building, and are erected on concrete foundations, which are joined together. The foundation for the capstan-engine is 22 ft. 9 in. long, 11 ft. wide, and 7 ft. deep; and that of the winding-engine 15 ft. 3 in. long, 15 ft. 3 in. wide, and 8 ft. 9 in. deep. The necessary holding-down bolts were arranged in these foundations by providing boxes, in the same manner as described above in the case of the pumping-engine. The building in which the capstan- and winding-engines are situated is lofty and well lighted, and both engines are working smoothly and giving entire satisfaction. The present steam-power is provided by a portable boiler, with which the necessary connections are made. The winding-engines consist of a pair of what are known as first-motion engines, the cylinder of which is 14½ in., and having a stroke of 28 in. The winding-drums are of the latest design, fitted with clutch and steam-reversing gear. The rope is of steel wire, 1½ in. diameter. The man in charge occupies a central raised platform, from which he has a good view of the brace at the shaft. The capstan-engine is situated in front of and a little below the winding-engine. Its weight is 26 tons, and it is fitted with a wire-rope 2 in. in diameter, capable of lifting 25 tons. This is used for lowering or raising the heavy parts of the pumping machinery required in the shaft. The boiler-house is a fine building, 100 ft. long, 75 ft. wide, with side-studs 20 ft. high, and contains ten Lancashire double-flue boilers, each weighing about 19 tons. These are all placed in a line, and are set in fire-bricks bedded in fire-clay. The main flue with which they are connected consists of a passage 10 ft. high, 5 ft. wide, and leads to a chimney-stack which is 7 ft. 6 in. square at the base and a little over 100 ft. high. Each boiler is 30 ft. long and 7 ft. in diameter, and constructed so as to carry a daily working-pressure of 120 lb. to the square inch. The material of which they are constructed is Siemens-Martin steel. The holes were drilled and the plates bent ready to be put together on arrival here. This work was accomplished by the firm of A. and G. Price, at the Thames, and each boiler was tested to withstand a pressure of 240 lb. per square inch before being delivered at the mine. Each boiler is fitted with a Lee-Howl's patent hot-blast forced-draught furnace for economising the consumption of fuel. A new set of poppet-legs has been erected, with cap-pieces capable of bearing a transverse working-strain of 400 tons. The legs are about 65 ft. in length, 2 ft. 6 in. square at the bottom, and tapering uniformly to 1 ft. 6 in. at the top. These are set into sole-pieces, which are firmly embedded in concrete. To further strengthen them they are well braced and stayed, and capable of resisting the greatest strain that they can ever be subjected to, even if a whole column of pipes were slung from the top. The pumping-engines, the whole of which have not yet arrived, consist of a pair of compound condensing engines, the high-pressure cylinder being 30 in. in diameter and the low-pressure 60 in., having a 5 ft. stroke. Both these have been placed in position. The compound air-compressors have also been erected, and are to be driven by water-power. They are capable of driving twelve 3½ in. rock-drills. The fly-wheel, which is rope-driven, is 18 ft. in diameter. The building in which the pumping-engine and air-compressing plant are erected is 70 ft. long, 60 ft. wide, and side-studs 28 ft. high. There is also erected in this building a travelling crane, with a capacity of 12 tons, and having a longitudinal and transverse motion. This is absolutely necessary for lifting the heavy pieces of machinery during erection, and also in case of repairs being afterwards required. For several weeks past work has been practically at a standstill, awaiting the arrival of further shipments of machinery. Three vessels are already on the way, and contain fully 200 tons more of the machinery required, some of which is expected to arrive almost daily, and the remainder by the end of June. As soon as all the machinery has come to hand and the pumps are in working-order the stripping, enlarging, and retimbering of the shaft will be continued to the No. 8 level, where a cross-cut has intersected a large ore-body known as the Vanguard reef. Simultaneous with operations on this reef, which will be the first ore-body worked, sinking will be continued down to the No. 11 level, where our three main ore-bodies will be operated upon. While ore is being won from the two levels above referred to, sinking will be continued down to 1,100 ft., and the No. 12 level will be opened out at a depth of 1,000 ft., thus leaving 100 ft. of a well. The electric-lighting plant has been completed in the various buildings by the suspension of numerous 16-candle-power incandescent lamps; and two large arc-lamps of 2,000-candle power are arranged about the poppet-heads, which serve to illuminate the brace and the top of the shaft. At the 327 ft. level a chamber has been opened out on the south, east, and west sides of the shaft for a depth of 48 ft. This chamber is for the reception of the first set of plunger gear, and large steel girders are fixed to carry two cisterns 10 ft. by 4½ ft. by