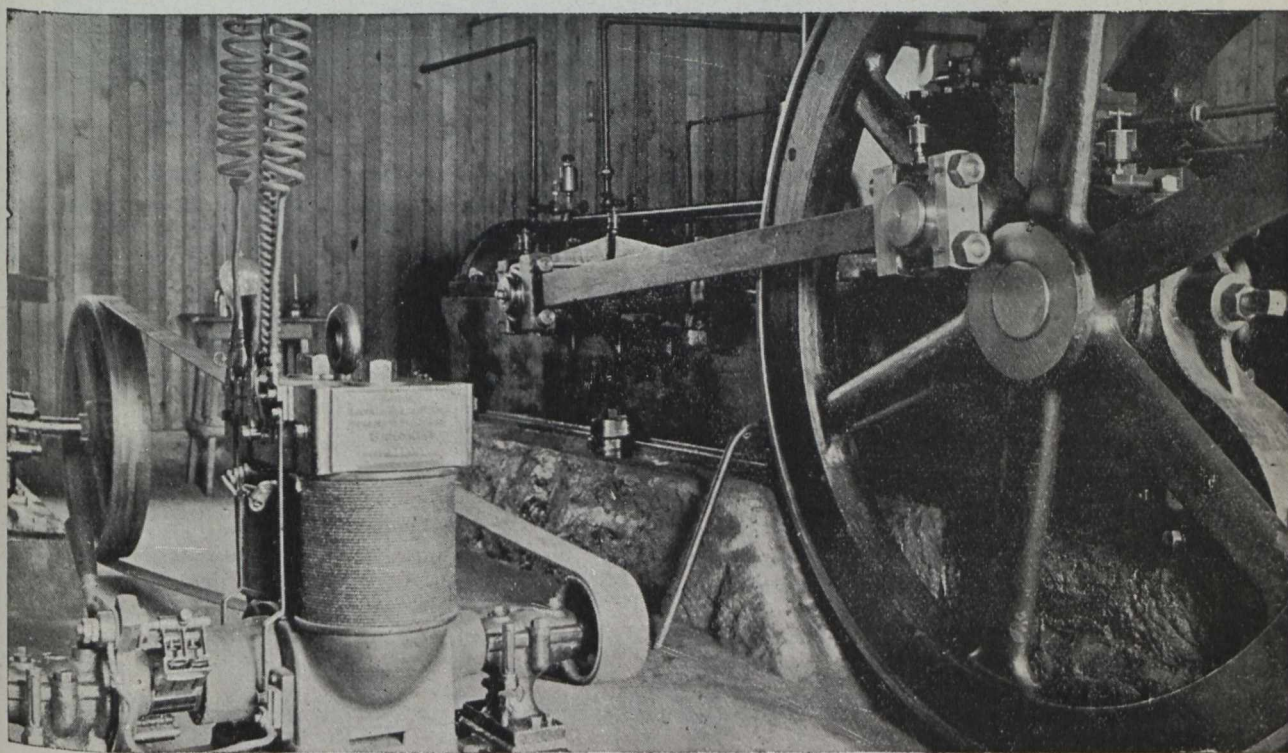


were left, these being frequently pierced to allow inter-communication and ventilation." The accompanying plan and section illustrate the general arrangement of the workings.

Afterwards the quarrying system, briefly noted by Mr. Keffer in his first paper, was so greatly extended as to admit of the hoisting of ore from the underground workings of the mine being discontinued for two or three years. Last year, however, in preparation for the considerably larger output that would be required to provide for the much-increased treatment capacity of the company's smelting works consequent upon the installation of three 600 to 700 ton blast furnaces, underground development was resumed in the mine. The main shaft was enlarged to a four-compartment shaft and deepened to 475 feet; a level was opened at 400 feet depth, and a second connection between the 300 and 400 foot levels was made by means of a winze. Much exploratory work was done by diamond drill with gratifying results, new

drift, and its width as much as 200 feet. The foot wall is for the most part limestone, and the wall an altered diabasic rock. Sometimes there is a sharp demarcation between the lode and its walls, but in other instances the boundary is obscure. The ores themselves (so far as found) may be classed into three general groups: (1) A calcite carrying copper pyrites and iron pyrites, these sulphides sometimes being massive and sometimes scattered in small crystals throughout the rock. Some quartzite is also often present; (2) a silicate of lime, iron, magnesia and alumina, carrying both copper and iron pyrites, massive or scattered, and often also carrying quartz, or garnets, or serpentine, or often all three. Now and then a small amount of zinc blende occurs in this class of ore. (3) An excessively hard magnetic oxide of iron, with silica and copper pyrites; not often much iron pyrites. All these carry gold, and the calcitic and silicious varieties also carry small amounts of silver, about 1 or 2 ounces."



TEN-DRILL AIR COMPRESSOR. INSTALLED IN 1898.

bodies of ore of a shipping grade having been located. Beside preparing for stoping ore on all three levels—200, 300 and 400 feet—much work was done on an intermediate level opened at about 100 feet below the surface in a big body of sulphide ore. As a result of these developments underground, and of further additions to plant and machinery, the daily shipping capacity of the mine has been increased to about 1,000 tons of ore, crushed to a size suitable for charging into the blast furnaces at the smelter without further preparation.

Concerning the character and extent of the Mother Lode ore bodies, Mr. Keffer, in his first above mentioned paper, said: "The croppings are in places soft oxides of iron from decomposition of ore-bearing rock, and in others unaltered magnetic iron oxides very solid and compact, carrying copper pyrites, iron pyrites, more or less quartzose material, and also carrying gold. The extent of the lode is surprisingly great, its length being some 1,100 feet to where it disappears under the heavy

After two or three years' experience of these ores had demonstrated their smelting characteristics, Mr. Keffer wrote:

"From a smelting standpoint, the ores of the larger Boundary properties have, as a rule, grown less basic as the workings have been extended and deepened. That is to say, the proportion of iron oxide ores to the whole ore body has sensibly diminished, there being no great change in the amount of other base. Whether or not this reduced proportion of base to acid ore is to be permanent, it is (at any rate in the case of the Mother Lode mine) impossible to predict. Long experience in mining these deposits has shown that it is not possible to make safe predictions as to occurrence of zones of mineralization, new ore bodies frequently having been found in unexpected places. On the 200 foot level of this mine there has been found considerably less oxide of iron ore than in either the quarries or the 300 foot level. The iron oxides of this latter level are uniformly of higher