

probably be operated at a loss, as the copper values do not exceed 25 lbs. per ton of rock.

Coming now to the Iron Country of Michigan we find a somewhat different order of things. Here we do not have the ores in regular well defined veins, as is the case in the copper country. On the contrary, the ore occurs in blankets or deposits of more or less irregular shape, and the sustaining power of the adjacent rock is a far more uncertain quantity. The ore itself varies a great deal, some being soft and capable of caving, while much is hard, and a caving system could not be adopted. Some again is intermediate between hard and soft ore, and a combination of a caving system with some other method becomes a necessity.

BARNUM MINE, ISHPERING, MICH.

This is a hard ore mine producing a hard hematite. The system of mining is simple and inexpensive, although about one-third of the ore is left for pillars. The levels are from 40' to 50' apart, and after being driven, raises are run up to the level above at convenient intervals. When the raises are completed the miners begin at the top and mill the ore down the raise in a manner similar to the glory-hole method already described, except that the work is, of course, underground. They work from convenient benches and gradually cut out large chambers. Care must be exercised in scaling any loose rock from the roof while the men are close to it, because when they get lower down the roof will be out of reach. Wherever necessary pillars are left 22' square, one being as nearly as possible directly above the one below. Machines and tripods are employed, and the rate of drilling is slow, varying from 4' to 15' of hole per shift. The ore is also hard to break, and a 50% dynamite is used. There are no pockets in the mine, and the cars are hoisted to the surface by a single compartment shaft. As the method at the Barnum is so simple little more need be said, suffice it to say that the method is very wasteful of ore, because such a large percentage of it is left in the mine.

SECTION 16 MINE, ISHPERING, MICH.

The ore from this mine was also fairly hard and a similar method of mining was adopted. Levels were run from the shaft to the ore body at intervals of about 60', and a drift run along the foot or hanging wall as desired. From this drift raises were driven every 50' to the level above, thus making a passage for timber and ore. At 15' below the upper level the raise was enlarged into a