STOPING DRILLS AT SUDBURY, ONTARIO*

By Albert E. Hall.

In late years the stoping drill of the hammer type has been steadily improved, until now no mine manager can afford to overlook the possibility of using it as a means of reducing his working costs.

A stoper is cheaper to operate, since it can be handled by one man instead of two, as required on a large machine. In some cases a helper is assigned to two or three stopers, but, as a rule, this is not advisable. In addition, the use of stopers permits a larger proportion of the total time to be spent in actual drilling. With a big drill much time is consumed in setting up after a blast or after moving to a new working place; with a stoper, on the other hand, the preparations for drilling are simple. As a rule, a stoper can be rigged up and set to work 30 to 40 minutes earlier than a big drill. One disadvantage of the stoper, when used for shrinkage stoping, is its tendency to create a large amount of shattered and partly loosened rock on the roof and walls of the working place. The men must first scale of this loose ground, which takes from 30 minutes to an hour. With a sufficient number of working places, however, this scaling can be done by a special gang of scalers, while the machine men are drilling in a previously scaled place.

As a result of the extra time applicable to drilling, and also of the more rapid drilling, stopers make an average of 30 to 40 linear feet of hole per shift, while a large drill will make 20 to 30 feet. As a rule stopers work on a bench in the back. When necessary a bench is created by taking out a diamond cut, and is then followed across the stope. The holes are made about 6 feet deep. The amount of powder used (40 per cent. dynamite) as computed from several groups of holes, average 0.63 lbs. per cubic yard of ore. The amount of air consumed by a stoper is estimated to be about two-thirds of that used by the largest drills.

Some workmen object to the stopers on the ground that stoppages for small repairs are too frequent. It is true that the dust, which is a disadvantage in itself, from the runner's standpoint, sometimes clogs the valve and prevents the extension leg or standard from working properly, but only a few minutes are needed to clean out the valve, and if a screen or a bit of waste be put into the hose, this trouble is almost eliminated. Water sprays can also be used. On the basis of total repair bills, the stopers do not compare unfavourably with the larger machines.

In many places it is impracticable to use a stoper, and a big drill becomes necessary; for example, in hard rock, where the light drill makes little or no headway; but in shrinkage stoping the smaller machine does excellent work. The stoper has one advantage, which is probably realized fully only by the men working underground; this relates to the matter of block-holing. Where the muck is being drawn off through chutes, the size must be fairly small, so as not to block the chute and so hinder tramming and hoisting. With small stoping drills, the ground is generally broken small enough to pass readily through chutes, and very little block-holing is required. With large machines, on the other hand, considerable block-holing is necessary.

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SOME APPLICATIONS OF CONCRETE UNDERGROUND*

By H. T. Mercer, Painesdale, Mich.

The rapid growth in favor of concrete for certain classes of construction has been one of the most noteworthy engineering developments of late years; and in this the applications made to the mining field have played an important part. This is owing to the decreasing supply of suitable timber and to the limited life of even the best timber when exposed to underground conditions.

Concrete has been used for many years in building underground dams, bulkheads, etc., some notable examples of which can be seen at the Chapin Iron mine at Iron Mountain, Mich. The principal uses of concrete in mines, however, is in connection with shaft support, and it is the purpose of this paper to describe some of the work that has been done along these lines in the Michigan Copper Country. Good examples of concrete shaft collars can be seen at many of the mines, and although the details vary somewhat, a description of one or two will perhaps suffice to illustrate this form of construction.

At the Trimountain mine it was decided to replace the old timber collars with concrete, and work was begun at No. 2 shaft, where the overburden was 80 feet deep, consisting for the most part of sand, with more or less clay and some boulders. To guard against any possible "running" of the sand, and to make the operation of the shaft during construction easier, as well as to reinforce the concrete, it was decided to replace the timber with steel I beam sets, and then concrete between and around the steel sets. The sets would provide a support in case it became necessary to put in lagging to hold back the sand before the concrete was placed. A foundation was first prepared at the ledge by placing heavy steeel beam box girders across the shaft from foot to hanging under the dividers and under the south e—nd plate (Fig. 1A). At the north end there was a natural rock ledge or shelf. Starting from the foundation thus formed the steel sets were built up, two or three at a time, and concreted in. The work proceeded as follows:

First, the old timber on the ends and footwall was taken out for as great a height as was deemed safe; then two or three of the steel sets were placed and bolted up, after which the forms were erected, and the concrete poured. Then another space would be opened up and the operation repeated, and so on until the surface was reached. Fortunately the old hanging wall plates did not have to be removed, as there was sufficient clearance to permit the new concrete lining being carried inside of them. Care was taken to leave no timber or blocking under the foot wall side of the concrete lining which might by rotting permit settling.

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