

The average advance per round of holes is 4.5 ft., working one machine for two shifts per day. The total advance for a month varies from 70 ft. to 100 ft.; the grade of the drift is $\frac{3}{8}$ of 1 per cent. Drifting is always kept well in advance of ore extraction.

The raises are put in at irregular distances along the drifts, and are usually of two compartments, one a man-way and the other an ore chute.

DIAMOND DRILL WORK.—Two sizes of drills are used, one of $1\frac{3}{8}$ in. core diameter, and the other with 15-16 in. core diameter. The machines are seldom used for boring over three hundred feet.

In starting the drill, especially for those drifts in which tramming is carried on, a short crosscut is first blasted out to give room for operating the machine without interfering with other work. The rods are square threaded and are in 5 ft. lengths; they are pulled in 5 ft. to 10 ft. lengths, according to the space available behind the drill. The average length of

pump run by compressed air. In an eight hour shift, the average progress made is about 10 ft.

Since the rock in which the drilling is carried on is very hard, the bits require to be reset frequently, each bit drilling about 12 ft. before resetting is necessary.

If the drill hole is not deep, the rods are pulled by hand, but if 200 ft. or so the work is too severe, and a drum is then used on which is coiled the wire rope.

The core, after it has been examined and sampled, is placed in trays and put on shelves in the core-house for future reference.

NARROW STOPES.—A large part of the workings consist of narrow stopes less than 15 ft. wide. Having carried up the raise a sufficient height, stoping begins at the lowest limits of the pay ore and the stope is driven to the boundary of the pay chute. Round stulls are used and a close floor of lagging is spiked on the stulls; stoping above the floor then commences.

The broken ore is kept close up to the face so as to have a good footing for the machine men.

When the pay ore begins just above the drift, a raise is not kept in advance of the stoping, since the whole back is worked as a stope. In this case, there is a permanent tight floor left above the drift.

WIDE STOPES.—For stopes of a width greater than 15 ft. square sets take the place of stulls. The length and breadth of the ore body is first determined and the sill floor laid down. Breaking down the ore from the back is then started. Enough space is always excavated above the last floor to leave room for drilling the back. For a change of width in the ore body, the stope is extended by attacking the hanging or foot wall, or by leaving out as many sets as is necessary, according as the vein widens or narrows.

DRILLS USED.—Most of the drills used are of $3\frac{1}{4}$ inch diameter, and 6 inch stroke—Rand drills of the Little Giant type. They are set up, where possible, on drifting columns, which can be braced to the sides of the drift or to the floor and the back. Where the use of a column is impossible, a tripod is used.

Cross bits are welded to round shanks, which vary in length from 18 inches to 10 feet. One shift of eight hours dulls about thirty bits to each machine.

A round of holes for drifting in this mine generally consists of ten holes arranged as follows:—

Two back holes, three break holes, three cut holes, two lifters.

If the work is heavy a couple more holes may be added, one more lifter and one more back hole. The length of the holes varies from 5 ft. to 7 ft.

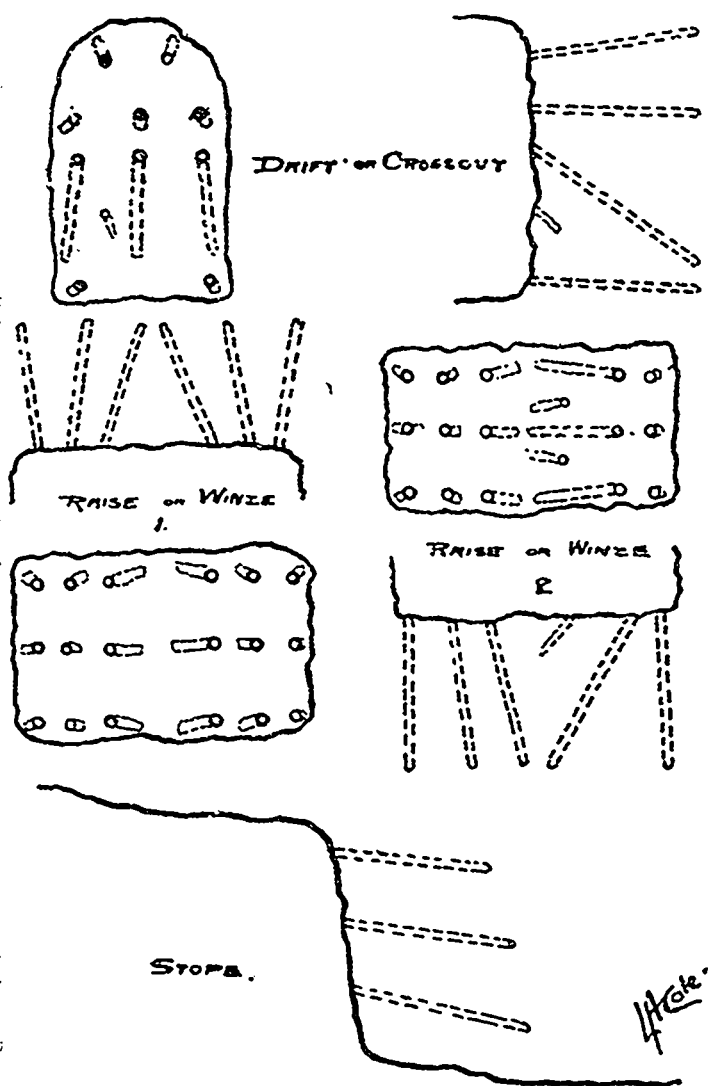
The back holes are inclined at an angle of about thirty degrees to the horizontal.

The next row of holes, called breast holes, is drilled slightly off the horizontal, just enough to hold water. They break down the portion immediately below the rock in which the back holes are placed, so as to relieve these upper holes.

Below the breast holes is another row, called cut holes, placed so as to run down at about an angle of about forty-five degrees; they remove the central portion of the rock so as to allow the other holes to break well.

The two bottom holes or lifters are drilled in at an incline downwards so as to form a wedge with the cut holes. Their object is to keep the floor on a level.

The side holes in each row are inclined either to the left or to the right according to the side they are on, in order to keep the walls at an even distance apart. Where the drift is re-



Sketch showing position of holes drilled for breaking ground
ROSSLAND B.C. CENTRE STAR MINE.

the core pieces saved is from 5 inches to 8 inches, but often the full length of the core barrel is kept intact.

The drill engines are screw fed, and fitted for 300, 700 and 1,000 revolutions per inch of advance. Their ordinary speed is 300 r. p. m. with a maximum of 1,500 r. p. m. The water is pumped through the drill rods by a small independent force