

qualities of the mineral, and the mode of its occurrence—which differs so widely from those of any other known mineral—but also upon careful, economic, and intelligent direction of the various operations enumerated.

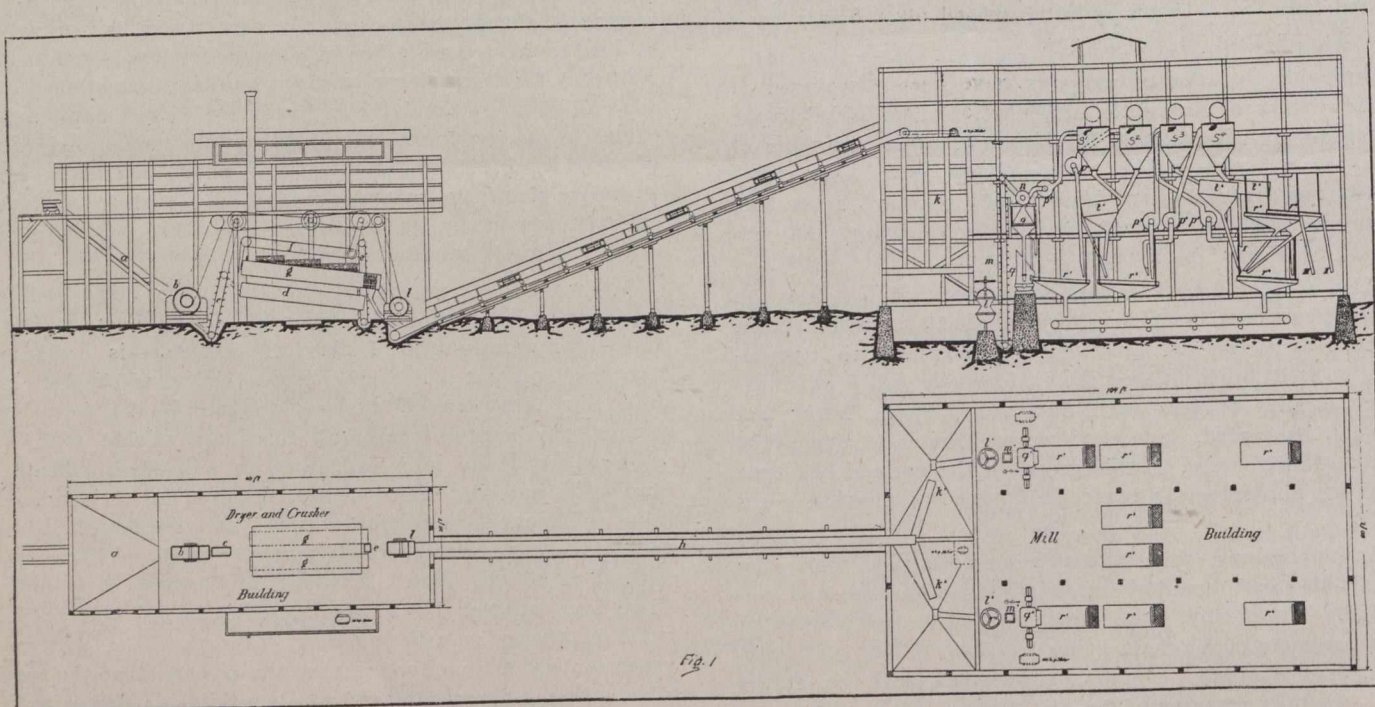
The first operation in opening a quarry is, the removal of the soil which covers most of the asbestos-bearing areas, which varies in thickness from a few feet up to 25 feet. In Black Lake, the crest and slope of the large *serpentine ridge* is for the greater part covered with a thin layer of humus, thus rendering prospecting work comparatively easy; the lower ground of this locality, however—the area between Black Lake and Thetford—is covered to considerable depth with soil, while at Thetford, the thickness of the overlying soil is, in some places, 15 to 20 feet. The removal of this soil for open quarry work is performed only in the summer time; the winter, on account of frost and snow, being too severe for this class of work.

The soil is generally cleared off with pick and shovel, and loaded into large dumping cars on trucks which are laid for this special purpose close to the work, and shifted when required.

followed in late years. The principal advantage of the system employed in these mines lies in the fact that, generally, a number of different zones—both lean and asbestos-bearing—are thus laid open, hence the work, also the supply of the ore, can be regulated to better advantage according to requirements.

As a general rule, in all the larger pits the rock is taken down in a series of benches, stopes, and terraces, which vary in dimensions according to the size of each pit. A good illustration of systematic progress in quarry work is the long pit of the King quarry of the "Amalgamated Asbestos Corporation," at Thetford. This pit has a length of 1,350 feet, and an approximate average width of 350 feet. The height of the benches and stopes varies from 5 to 30 and 40 feet in the deepest part; while the length of the terraces varies between 50 and 250 feet.

The great bulk of the dynamite used in the asbestos quarries contains 40 per cent. of nitroglycerine; the cartridges being, as a rule, 8" long, by $1\frac{1}{4}$ " diameter, and are packed in boxes of 50 pounds, containing from 85 to 95 cartridges. The price is from 14 to 15 cents per pound.



Several of the larger Thetford companies employ steam shovels for this purpose: thus bringing down the cost of moving a cubic yard of soil to a minimum.

Quarry Work.

As a rule the quarries in the smaller mines have a very irregular shape: most of them following the trend of the asbestos-bearing zones; while the lean serpentine, or intrusive dikes are left as pillars. In the larger mines, however, where the locations of the asbestos-bearing and lean rock, and the location and extent of intrusive dikes have for years been more fully studied, the quarries have, generally, a more regular outline: as at the King, and Bell pits, Thetford; also at the large quarry in Danville.

At these quarries, no discrimination has been made between dikes, lean or rich portions of the serpentine; no pillars of any rock have been left, for the reason that these would only prevent mining with advantage towards depth. The shape of the quarries is rectangular: and while the outlines of the walls are not strictly in conformity with that shape, nevertheless the execution and the progress of the work in the pits indicates that a definite system has been

Hand drilling is still in use in the smaller quarries; and, as a rule, three men are employed with lin. octagonal steel and 6 lb. or 7 lb. hammers, their average capacity in hard serpentine or granite being from 15 ft. to 18 ft. a shift. In the larger quarries, machine-drilling is in vogue for the breaking of the rock; the depth of holes ranges between 8 ft. and 10 ft., and in exceptional cases between 12 ft. and 15 ft. The motive power for drills is usually compressed air or steam, but in the latter case there is a large loss, owing to condensation, especially in the winter. With compressed air the loss in transmission is small, and the amount of drilling done is comparatively high. With steam drills the operating results are from 40 ft. to 45 ft. per shift of ten hours, while the cost per foot, including power, labor, and explosives, but not wear and tear or interest, is from 15 to 18 cents. Lately electric percussion drills have been adopted, but while their use has several advantages over those driven by steam or compressed air, many improvements will have to be made on the present design before they will become general. In most cases the power is conveyed from the electric motor to the drill by a flexible shaft. Compression springs are placed in the rear of the