

and the connections between topographic forms dependent upon geological structure and the probability of the existence of veins of ore. This discussion is merely supplementary to the more extended treatment of the subject in the Department of Geology, being designed to further emphasize circumstances of practical moment to the prospector and miner.

*Prospecting.* Systematic methods of rapid geological and mineralogical reconnaissance for the purpose of discovering mineral deposits. Gossan and "float" phenomena fully discussed. Minerals found in gravel beds in water courses, and their importance as indices of near-by deposits of valuable ores. Systematic methods for locating an indicated vein. Application of pits and the method of approximation by trenching for discovery of deposits.

*Mine Development.* Preliminary consideration of conditions affecting the probable success or failure of mining operations in any particular locality; fuel, water, food supplies, transportation facilities and costs. Location of development workings. Choice of method of approach. Blocking out the ore for measurement. Systematic methods of obtaining accurate samples of ore "in place" and on the dump. Methods of estimating the value of the mine.

*Boring.* Use of bore holes. Methods of boring. Boring by percussion. Methods by rods and by ropes. Boring tools; casing; recovery of lost tools, etc. Rotary boring. Earth augers. Diamond drills worked by hand and by machinery.

*Excavation.* Tools for breaking ground. Hand tools; machine tools; steam excavators and dredgers. Hand drilling. Power drills,—types, management and maintenance. Theory and practice of blasting. Kinds and effects of explosives. Location of holes. Charging and firing holes, singly, simultaneously and in series. Precautions in blasting. Substitutes for explosives.

*Mining Methods.* Works for approach and underground communication. Shaft sinking. General principles. Protection of shaft mouth. Methods of sinking, ventilating, hoisting and unwatering during sinking. Winzes,—location, and methods of sinking and upraising. Tunnels, drifts, gangways, adits, slopes, contour levels. Advancing by single breast, and by benches. Trimming up and maintaining alignment.

Works for winning minerals. Stoping. Overhand and underhand stoping methods; their application and limitations. Cross-cut methods for wide veins. Contouring, and application of cross-cut methods to masses. Stripping. Methods suitable for soft ore bodies. Pillar and breast methods, and their variations.