



“Granite Quarries,” in *Scientific Magazine Supplement No. 1574*,
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(Note: The photograph of the granite quarry that is included in this article is on the last page of this document.)

“Quarrying is unquestionably one of the very early steps in the development of human culture, and the stone age, the earliest recognized stage in the progress of civilization, is that period when man first began to supplement the implements afforded him by nature by fashioning crude, artificial weapons and utensils. Beyond doubt there existed prior to the stone age a period when man employed exclusively more perishable material, such as wood, but we are absolutely without knowledge of it, for while these ages are defined by the prevailing material of the relics, rather than by the actual implements then in common use, we can but conjecture the state of cultural development during that vague period between the indefinite beginning of the age of stone and the time in primitive man’s emergence from the anthropoid ape. In the beginning of the stone age man certainly contented himself with the use of bits of stone such as adaptably shaped, water-worn rocks; but it is not a far cry from gathering loose stones to loosening others from the greater masses, and to this we may ascribe the beginnings of the quarry. The science of quarrying advanced rapidly, especially after the introduction of the metals, and that, in fact, it outdistanced the metallurgical arts, is evidenced by the historic ruins still existent and containing those vast monolithic blocks, columns, and ornaments, unparalleled even today, which were carved out of the living rock by the hands of men whose civilization arose, flourished, and passed away scores of centuries before the Christian era.

“The beginning of quarrying in America was to all intents and purposes coincidental with the settling of the country, and it is probable that many, even of the very early pioneers, cut and roughly shaped hearth-stones and door-sills of stone for their cabins. It was not till much later, however, that the industry began to assume anything like the importance which it now holds. Granite quarrying, the subject of the accompanying illustration, was begun on a large scale in the United States at Quincy, Mass., in 1820, and since that time New England has been the principal granite-producing section of the country. Maine leading the individual States. The industry developed gradually but steadily, owing to the low freight rates by water, and to-day the value of the stone of all kinds produced annually for structural and ornamental purposes is nearly seventy

million dollars. In the old days the labor of quarrying was all done by hand, but at the present time steam or compressed air gadding-drills largely take the place of wedge and sledge hammer, and the steam derrick, electric hoist, and crane have generally supplanted the old horse-sweep for lifting the blocks from the quarry. Improved pneumatic shaping and pointing machinery and polishing apparatus have also long been in use. Paradoxical as it may seem, the introduction of modern machinery has not altered the underlying fundamental methods used in quarrying and preparing the material; and so, for instance, while the artisan formerly 'finished' a stone by rubbing it painstakingly with some polishing substance, to-day this is performed by a machine which practically does nothing more than substitute an arm of iron for the human member, and which executes practically the same motions in the same manner as the other.

“The photograph illustrates the method of removing a large block from the parent mass. The stratification of the granite is used to advantage in obviating undercutting of the stone. A stratum of proper thickness for the required block is chosen, and then the section is loosened by making vertical cuts extending from one horizontal seam to the next below. Sometimes the cuts do not extend entirely through the stratum, and in this case the block is riven from the ledge by means of wedges and hammers. The cuts are made by drilling a series of circular holes, about two inches in diameter, close together, and then joining these with a connecting cut. The drills are of the usual steam type, but in order to avoid the necessity of setting up the machine for each hole, it is suitably mounted on a long steel rod, along which it can easily be moved from point to point as required. Very little blasting is made use of, as this operation is extremely liable to injure the granite.

“After the block is loosened it is removed to the side of the quarry and roughly split into the shape desired. Lines are marked upon the surface of the stone, and a series of holes drilled into it along this marking. Two flat, thin strips of iron are inserted into each hole, and the protruding ends bent outwardly to prevent the strips from entering too far. An ordinary iron wedge of suitable shape is inserted between each pair of the strips, which are used to prevent the edges of the hole from chipping as the wedges are driven in. The tightening of the latter is executed as uniformly as possible, and if properly done the granite will split smoothly unless it contains faults. If flat slabs, too narrow to be obtained by the wedging process, are desired, a sawing operation is resorted to. The saw is not of the usual type, but consists of a flat bar of soft iron, which is notched by a series of drill-holes just intersecting the lower edge. The saw is fed downward, and as the cut progresses water and coarse emery are introduced from above through a sort of clay funnel plastered onto the stone. For certain varieties of softer stone, circular steel saws or diamond saws are employed, but the hardness of granite makes the use of these impracticable here.

“The next operation after the block has been approximately split or sawn into shape is called pointing. The operation consists in smoothing down the surfaces to the exact shape and dimensions outlined, by means of pneumatic tools of various sorts and shapes, depending on the character of the surface desired. These grinding tools are so mounted upon a movable arm that they can be easily shifted in all directions by the workmen engaged in the operation. The machine is not unlike, in certain respects, the ordinary dentist's drill.

“When the final shaping is completed, the stone is polished according to the purpose for which it is intended. For flat surfaces a machine is used in which a revolving iron plate or grating is attached to the lower end of a vertical shaft. The shaft is so arranged that it can be moved about freely, the workmen guiding the polishing plate to various parts of the surface. The latter is inclosed in a framework or rim of wood made water-tight by means of plaster of Paris, so that the water and abrading material which is constantly fed onto the surface may not escape. In the first polishing, a flat plate is used, with water and emery or corundum powder. In the second operation the plate is replaced by a series of flat concentric rings held in their relative positions by radial ribs, and the water and abrading substance, finer than in the first polishing, are fed in between the rings. In the final operation a felt-covered plate is used with pumice stone and polishing putty or oxide of tin. Small blocks are often ground, first with wet sand and then with finer material upon a revolving iron bed-plate. Pendulum machines are used for polishing simple moldings, which are first cut as smoothly as possible with the chisel. A plate of cast iron, fitted as accurately as possible, is made, by means of a long arm to travel back and forth along the molding with water and an abrasive. Where it is not possible to use a machine, granite is polished by hand with water, polishing material, and a small piece of similar stone presenting a finished surface.

“The turning of a column in a lathe is a method entirely analogous, with the exception of the form of cutting tools, to the one used in metal work. The cutter consists of a steel disk 6 to 8 inches in diameter, mounted rotatably on a shaft and presenting a sharp beveled edge. The shaft of the disk lies in the same plane as the center line of the object turned, but at a sharp angle with it. The disk revolves with the stone against the shoulder of the cut, which is small and is made at a slow rate of speed. The edge wears off very rapidly, and the disks must be frequently replaced. To-day, pneumatic tools are used almost exclusively in cutting ornamental stonework, though chisels and hammers are still essential for certain portions of the work.”

