

“The Carrara of America”

By Day Allen Willey

In *Scientific American*, Vol. XCI, No. 10
November 5, 1904, pp. 309, 317-318



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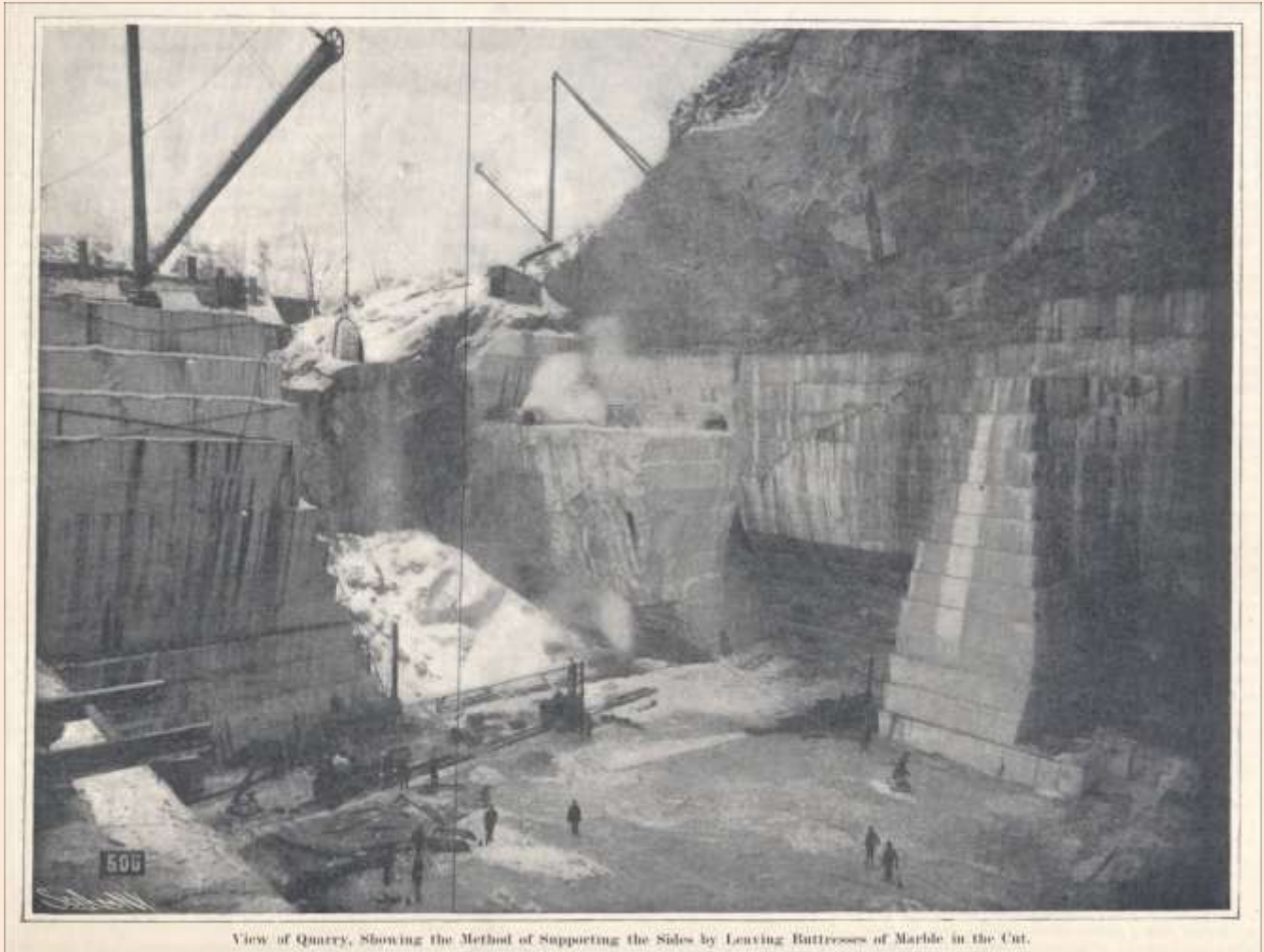
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November 2012

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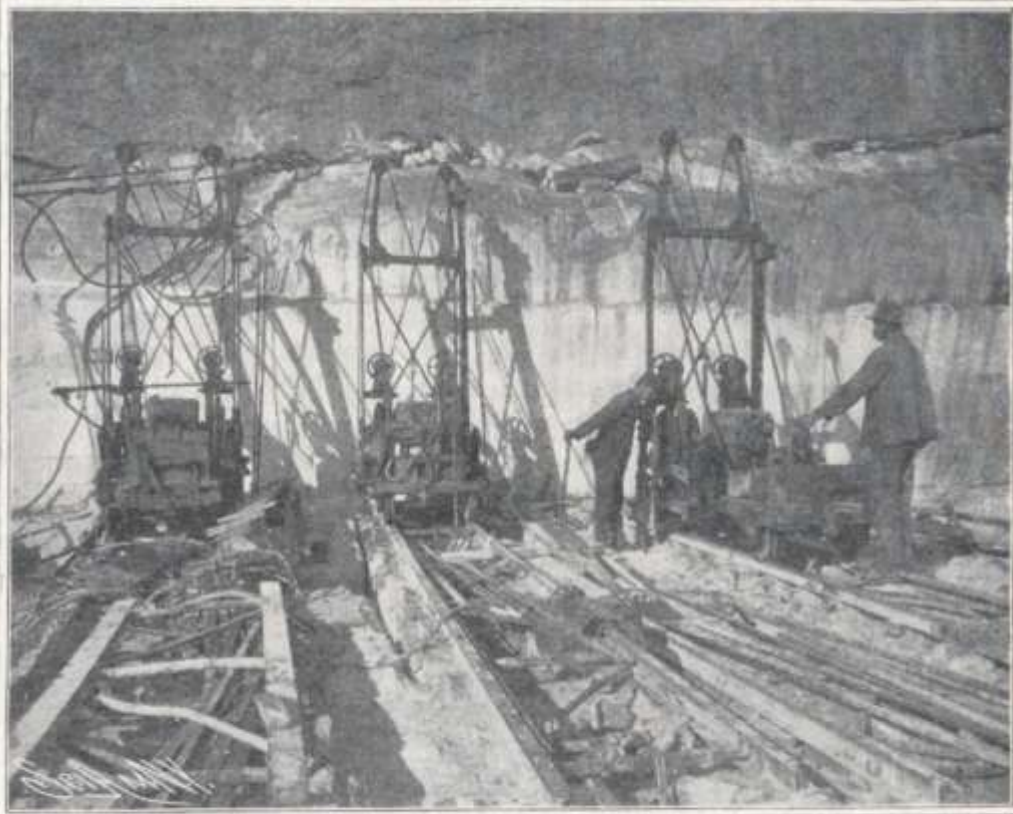
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View of Quarry, Showing the Method of Supporting the Sides by Leaving Buttresses of Marble in the Cut.

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“The marble industry of Vermont is interesting, not only on account of its magnitude, but its comparatively recent inception, although located in one of the oldest of the United States. It forms a striking illustration of the fact that New England has natural resources which are just beginning to be appreciated. Yet as early as 1792 it was known that deposits of marble existed in the State named, and a few blocks were taken from surface beds early in the present century.



Channeling Machine at Work, Showing Vertical and Horizontal Cuts.

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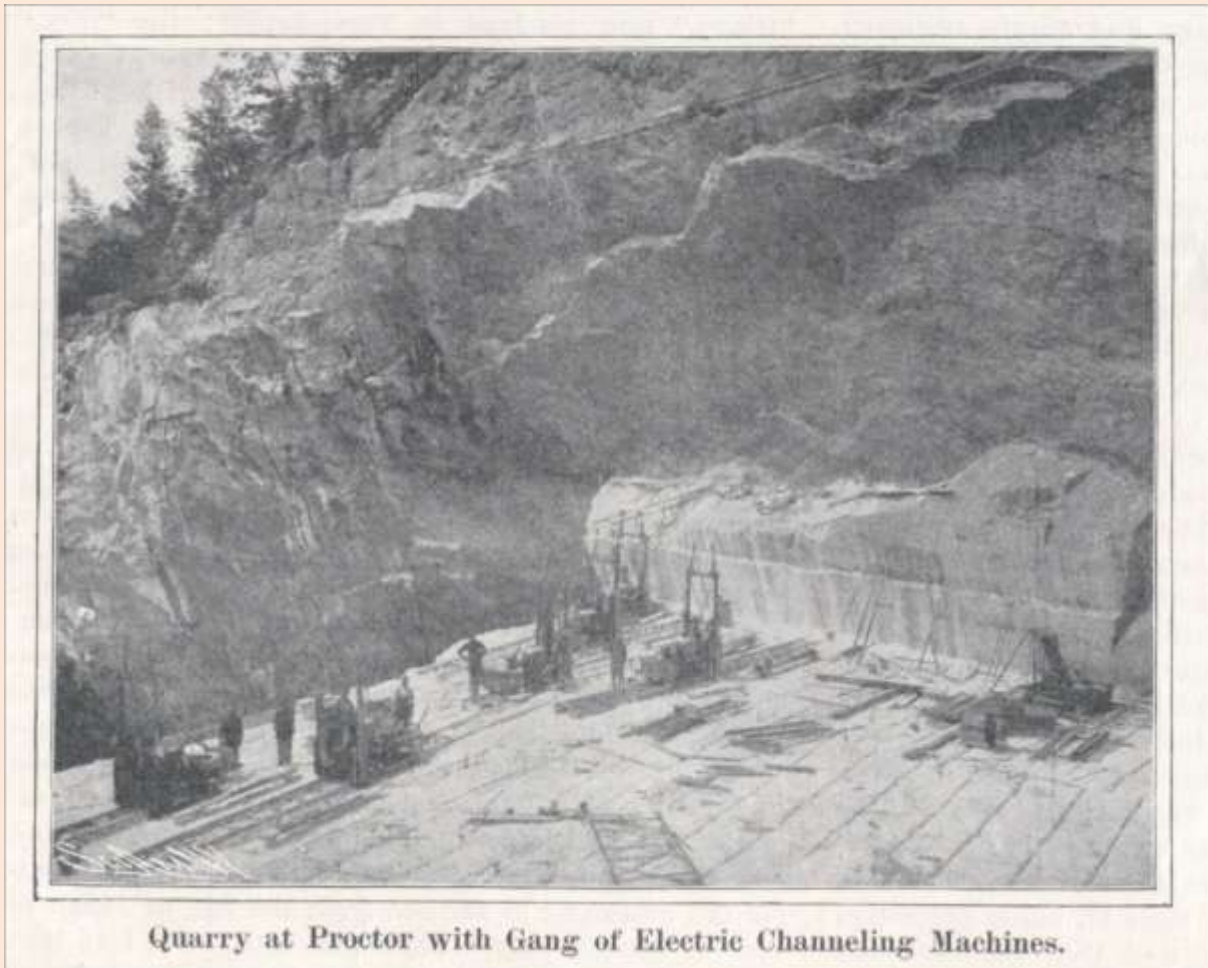
Type of Steam Drill Used in Quarrying.

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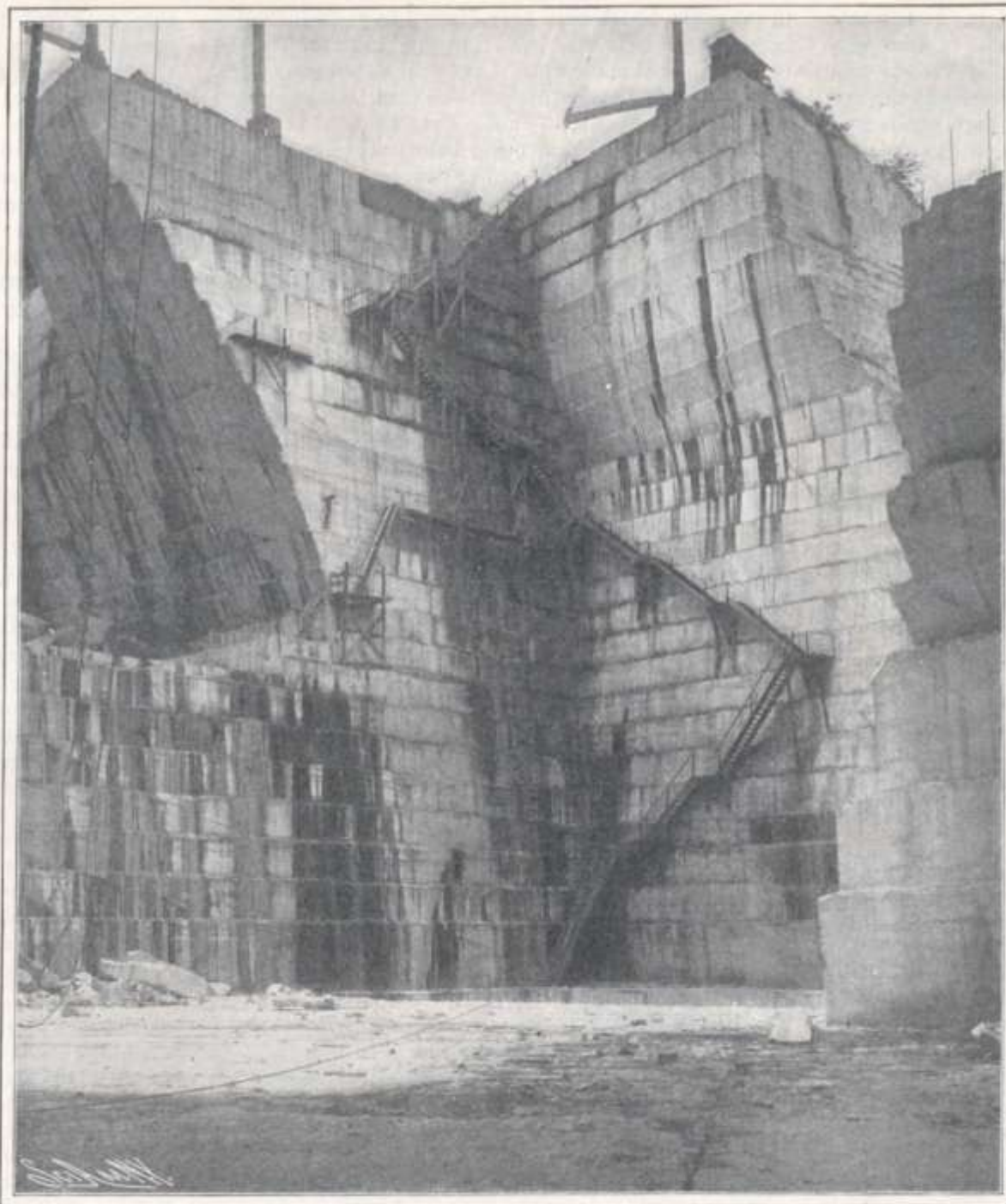
Fifty-Ton Electric Crane Used for Loading Cars.

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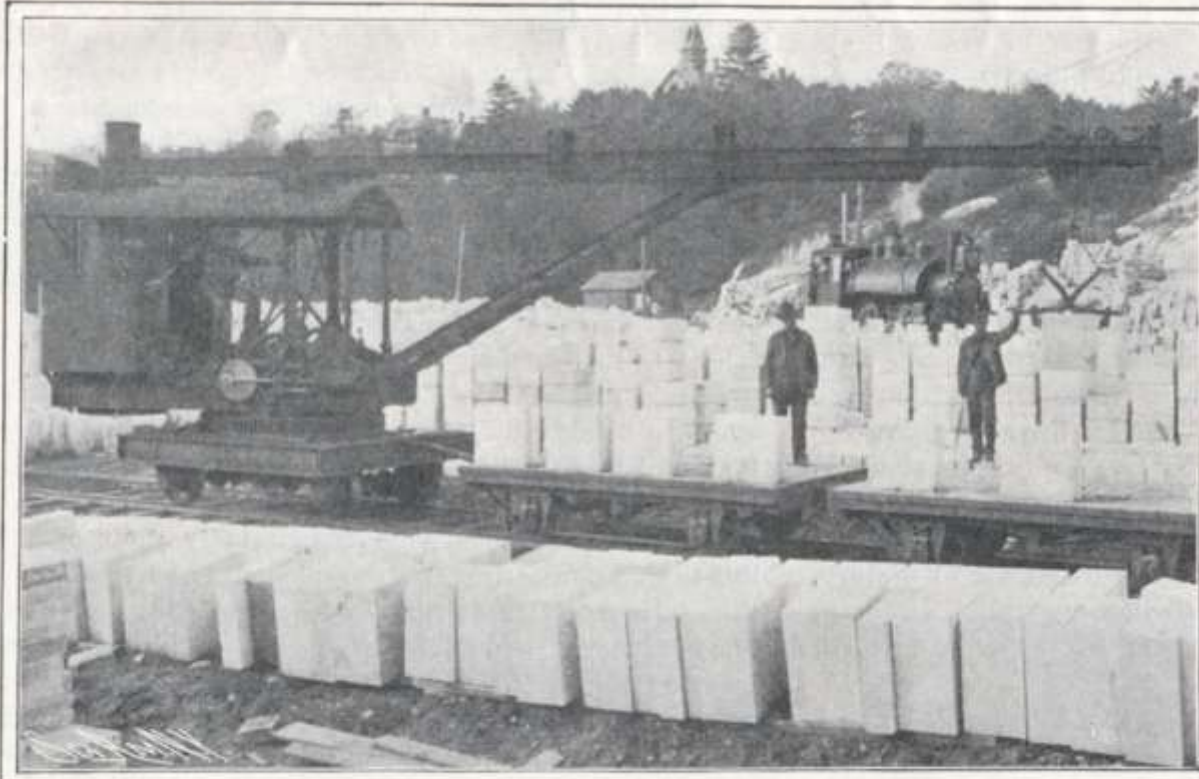
Quarry at Proctor with Gang of Electric Channeling Machines.

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A Vermont Marble Quarry 200 Feet Deep.

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One of the Locomotive Cranes in Use at the American Carrara.

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“The extent of operations in Rutland County, where the most extensive quarries have thus far been opened, indicates, however, that this resource is one of the most important not only in New England, but in the United States, and that the supply is of very large proportions. One of the most interesting features connected with the deposits is that they vary to such an extent in color and quality. The ordinary white marble used for buildings is found in abundance, but in addition a variety of the grayish-white tint for which Greece is so noted has been obtained, as well as layers with black, blue, red, and greenish hues. While much of this deposit is of one color, other beds are so blended that marbles representing a combination of tints in mottled and striped patterns are worked as well. Several of the kinds which have been secured bear a striking resemblance to the famous Pentelic marbles, of which some of the most noted structures in Greece were built; while a variety which is very similar to the statuary marbles of Italy, on account of its translucent quality, is being obtained and utilized for statuary. By reason of the extent and variety of the marbles thus far obtained, Rutland County has also been called the Carrara of America; but geologists who have studied the formation, are of the opinion that the deposit is of far greater proportions than the Italian beds referred to.

“Although, as already intimated, the industry is comparatively new, it has progressed so rapidly that some of the quarries in the vicinity of West Rutland are of unusual dimensions. One has been excavated to a depth of nearly 300 feet, and at the bottom is nearly 2,000 feet in length. From it has been taken an enormous quantity of material for buildings alone, but the beds are of such size that even at the depth mentioned, marble of such a high grade has been secured that it was profitable to work it. An examination of the strata as revealed by the walls of these quarries

shows that several varieties both in color and composition may be found in proximity with each other, the deposits occurring in regular layers separated by a natural cement, which occurs in partitions of varying thickness. The layers of marble range in width from a few inches to over ten feet, and consequently blocks of very large size can be secured for foundations, obelisks, and for other purposes where massiveness is required. As may be imagined, in securing the marble from the beds, some very interesting machinery is employed. In the quarries of the Vermont Marble Company, at Proctor and West Rutland, are installed what are termed channeling machines, which are operated by both steam and electric power. One of this type is known as the Sullivan channeler, after the inventor. It travels back and forth on a track which is pinned to the solid rock, making a ridge or channel which averages one and one-fourth inches in width and ranges from four to ten feet in depth. This incision is made parallel with the rails of the channeler track, but a few inches to one side. The machine cuts but one channel at a time, and in its operation is somewhat similar to the ordinary steam drill, with this exception, that the rotary motion is avoided. In order to cut the channel evenly, no less than five drills are assembled, each having a separate bit. They are so fastened together that they act as a single tool, but having five bits. Three of the bits are adjusted directly across the channel, while two are at an angle of 45 degrees. They are clamped into a head which forms a part of the piston or connected with the steam cylinder, so that the power acts directly on the drills through the piston. The five bits combined really constitute a drill, which would be about seven-eighths of an inch by seven inches in dimensions. The movement of the channeler on the track is controlled by a separate engine, which is geared to the trucks. The capacity of the machine depends, of course, largely upon the hardness of the formation, but frequently one hundred feet of channel will be cut in a day.

“Another type of cutting machine is known as the Wardwell, and can be operated either by steam or electric power as desired. It is also moved back and forth on a track, but makes a channel on each side of the track and a parallel with it. In this apparatus the drills are also arranged in clamps in groups of five, the up and down stroke of the drills being obtained through a double system of levers connected with a crankpin on the crankshaft of the engine. Between the levers in a system of springs, also between the lower lever and the frame, and the motion of the machine along the track is secured by connecting the crankshaft of the engine with the trucks through a system of gears. With this type of the channeler there is a constant relation between the speed of the machine and the strokes of the drill. When electricity is used in place of steam power, a connection is made between the electric motor and the shaft by means of bevel gears. The Wardwell cutter is of special advantage for up and down or vertical work, where the channel can be made at fixed distances apart, but the Sullivan is generally used where the layers are of widths which vary considerably. In addition to these machine independent drills are used for what the quarryman calls ‘gadding,’ and where it can be employed with more economy than the channeler.

“It is perhaps unnecessary to say that the use of explosives in connection with marble quarrying is practically impossible, since so much of the material would be shattered that the process would be attended with such waste as to be by far too expensive. Therefore a large number of the channeling machines referred to are installed. For elevating the blocks to the surface, powerful boom derricks are used, similar to many of those employed in the construction of large office buildings, the motive power being furnished by steam engines. For transferring the blocks from the quarry openings to the yards and marble ‘mills’ as they are termed, several varieties of cranes are used, in which both steam and electricity are employed. The locomotive cranes are very

valuable in connection with the industry, those at Proctor being provided with a horizontal jib or arm of unusual dimensions. It is built of steel girders, and is so massively constructed that it will handle loads of several tons without difficulty. The most powerful crane employed by the Proctor company is of the Whiting pattern. As the photograph shows, it is electrically driven, having a bridge available for use, of no less than 160 feet, with an overhang on each side of the legs of 50 feet, the distance between the legs being 60 feet. The crane travels on a track, and the loads are handled by two trolleys mounted on a bridge each of 25 tons capacity. By means of an equalizing bar the trolleys can be connected and used in moving a single load, making the maximum capacity of the crane 50 tons. Material can be lifted to a height of 35 feet. This apparatus is principally used for loading trains, the cars being hauled beneath it, and the blocks quickly swung into position. In connection with the mills a crane of 10 tons capacity is used, which is called a half-gantry, from the fact that one leg moves upon a rail at the edge of the loading platform, while the truck at the other end of the crane travels on a rail which is attached to the mill building. This arrangement affords a clear passageway in the center, so that the material can be carried in an overhang, and facilitates the loading of cars.

“At the Vermont quarries much of the marble is fashioned into tombstones, statuary, and other forms in the mills, which have been erected in some instances immediately over the beds. In the work of cutting the blocks pneumatic chisels are now extensively used. For cutting the slabs into suitable sizes sand-saws are used almost entirely. The saws are made of soft iron but without teeth, sand being substituted for the latter. Operated by steam power the iron blades move back and forth, forcing the particles of sand against the material, and thus cutting it. The sand is applied to the marble in a stream of water which is continually poured upon the surface. The process is somewhat lengthy, for from four to five hours are required to cut through a single foot, but the number of saws give this portion of the works a large capacity. It might be added that all of the sand used is brought a distance of several miles entirely by mechanical power and on its way is carried to a considerable altitude over a mountain by means of an endless cable carrying a line of buckets, which are automatically unloaded.

“The recent date at which this industry was undertaken on an extensive scale can be appreciated, when it is stated that in 1870 the census reports show that the total valuation of marble obtained from the Green Mountains of Vermont was but \$130,000. At present one company alone extracts material yearly to the value of \$2,500,000. Over three thousand hands are employed in all of the quarries and mills, while the total investment of capital represents nearly \$5,000,000; the value of the marble for buildings, statuary, monuments, and other purposes sent yearly from this district being nearly as much as the total investment.”