When rough hewing a block for a piece of statuary the contours are determined by a simple gage

Tools operated by compressed air now take the place of mallet and chisel

Mechanical Aids for the Sculptor

Modern Machine Tools for Carving and Cutting Marble

By Gordon Van der Veer

It was Michael Angelo, we believe, who said that the art of sculpture consisted merely in cutting away from a block of stone the parts that you did not want, and he was wont to illustrate the definition by attacking a block of marble with such vigor that big pieces of stone flew in all directions from under his chisel and hammer. Modern sculpture is hardly effected in that way. The sculptor of today seldom puts his hand to the stone. In fact, there are many sculptors who do not know how to handle the chisel, confining their manual efforts to clay and wax. In some cases even the model is made by assistants from sketches furnished by the sculptor. Fortunately such instances are rare, but at all events Michael Angelo's definition hardly applies to present day practice.

Now-a-days a preliminary sketch is first carefully modeled in clay or wax. This is made on a small scale and it is here that the sculptor exercises his creative art. Then if the statue is to be made life-sized or colossal, an "armature" is constructed, which consists of a skeleton of iron bars roughly conforming to the pose of the figure. This is mounted on a revolving platform, so that all parts may be turned to the light, facilitating the work of the sculptor. On the armature modelling clay is applied and the miniature model is faithfully reproduced in full scale. The next step is to apply plaster of Paris over the clay to form piece molds. The plaster pieces are then removed and reassembled to form a hollow mold. A hollow plaster cast is made within the mold by pouring in a thin mixture of plaster and washin it around until it forms a coating on the mold. The work is completed by removing the piece mold and, if the mold has been carefully fitted together, the resulting cast will scarcely show any lines where the pieces were joined. The sculptor may then put the finishing touches on the plaster model. The latter the work is merely one of copying the plaster model in marble, and this is left in the hands of assistants.

A "pointing machine" is used for roughing out the work. The plaster model is set on a block and all the salient points are marked. The marble is set on an adjacent block and by means of the pointing machine the same marks are transferred to it. The pointing machine consists of a series of levers that operate somewhat on the principle of a pantagraph. The marble is bored at the points indicated by the pointing lever at such an angle and to such a depth as to bring a "needle" at the other end of the lever directly on the mark on the model. In this way the marble is bored with a series of holes indicating where and to what depth it is to be chiseled away. A man known as a *scarpellino* then cuts away the stone down to the bottom of the holes. This does not require a great measure of skill and is entrusted to comparatively inexperienced hands.

From here on, however, the work calls for an expert, and can be done only by a highly skilled *scarpellino*. The difference between the old masters and the modern sculptor is that the former combined the creative talents with the skill of the *scarpellino*, while the latter seldom possesses the ability of actually transferring his creation to the stone. On the other hand the highly skilled *scarpellino* of today seldom possesses any creative talents and no matter how expert he may become at carving, is never anything more than a copyist.

It seems strange that although stone was one of the first materials worked by man, dating back to

Copyright by Press Publishing Service

A marble carver verifying points on a figure by means of special dividers

the prehistoric ages, it was one of the last of materials to yield to machine tools. Until within recent years only the chisel and hammer were used to shape stone, even for architectural and commercial purposes. The earliest machines for sawing stone consisted of toothless iron saws which wore their way through the stone with the aid of sharp sand and water. A later development was an endless band of steel wire. This is run at high speed around a couple of pulleys. Stone pressed against the wire is slowly worn away, the cutting action

being expedited by the use of suitable abrasives. Diamond saws have also been used to considerable extent, the saws consisting of steel disks on the periphery of which black diamonds are embedded.

With the advent of carborundum, however, the machining of stone has developed by leaps and bounds. We now have machines for sawing, planing and turning stone, and to these machines the hardest of materials must yield. The stone is cut almost as readily as soft steel in the machine shop. The carborundum saw consists of a steel wheel with carborundum bonded to its periphery. The saws are often mounted in gangs, so as to cut a number of slabs of stone at a single run. Ornamental columns, newel posts and the like are first roughly shaped with a saw. The block is mounted in the lathe and slowly turned against a saw, which cuts a series of parallel kerfs to the requisite depth. Then the stone between the saw cuts is broken away and the roughed out block is pressed against a revolving carborundum drum molded to give the stone its finished shape. The final process is to polish the stone with another finer grade of carborundum drum.

In art work we can hardly expect to find machines used extensively, but the work of the *scarpellino* is now considerably expedited by the use of pneumatic tools. Chisels driven by compressed air, on the same principle as the pneumatic rivetter, eat away the stone very rapidly, and the cutting can be controlled even more readily than with the hammer. Machines are also used for forming pedestals and for cutting the curved moldings that are used to frame carved panels. A photograph of such a machine is reproduced on the opposite page. Despite the sculptors' aversion to anything mechanical, machines are actually forcing their way into the realms of art, and there is no reason why they should not, particularly as the actual carving of stone today is really a process of copying. Surely it is permissible to reduce the drudgery of this work with mechanical aids. However, the final touches express the skill of the expert *scarpellino* and for this work he usually prefers to stick to the old time chisel and hammer.

The Largest Clamshell Bucket.

The huge clamshell bucket used to dredge the approaches to the drydock at Sparrows Point, Md., is claimed to be the largest in the world. The bucket alone weighs 40,000 lbs. and will lift 30 cubic yards of mud at a bite. The capacity of the bucket has been increased by using side boards above the jaws to hold in the extra material which rises above the top. Specially dump scows had to be designed for use with this dredge to take the shock of the heavy loads dumped upon them. Ordinary scows would soon have been wrecked in such heavy service.