HOW SCULPTORS CHANGE THE SCALE OF THEIR STATUES.

Sculptors do not always make a full-sized model of their work, but occasionally they do. At any rate, almost none of them actually do their own cutting in marble. This is intrusted to highly skilled artisans who do the work under their direction, and the sculptors superintend all of the finishing touches and even occasionally do some of the work on face and hands. The actual cutting of the stone is a most difficult process, requiring great expert skill. In case a full-sized model is made, the sculptor sends it to one of these professional marble cutters, who roughly outlines the block. The general outline is often given to the block before it leaves the marble quarries in order to save freight. The rough carving is then done by the marble cutter, who so shapes the block as to give it the general outlines of the figure to be reproduced. To effect this he drills a series of holes in the block, the depth of each of which corresponds to an external point of the statue supposed to be inclosed in the stone. After a sufficient number of these holes have been made, he removes the entire perforated portion, and what remains gives the broad lines of the statue. This focusing can be effected simply by means of a series of vertical cords and the compasses or by a special instrument called the "sculptor's cross." In the first method a rectangular frame is secured over the head or top of the statue and from it depend a series of plumb lines around the model, and an exactly similar series depend from a frame suspended above the marble to be chiseled. These lines are marked with divisions starting from the frame. In order to mark a datum point of the statue in the marble, the workman measures upon one of the guards its vertical distance from the plane of the wooden frame, and then by means of compasses its horizontal distance from the cord. This done, he places the drill near the corresponding cord of the rough block and marks upon the drill the length of the hole which he then bores until this mark comes even with the cord. The end of the hole is then at the same distance from the cord as the real point in the model, which has been ascertained with the aid of a compass. The workman then operates in the same way for a series of datum points which have been marked in the model, so that finally the workman succeeds in determining the general scale and form of the statue by means of a multitude of facets, which, when the marble is removed in flakes, gives the general form of a statue.

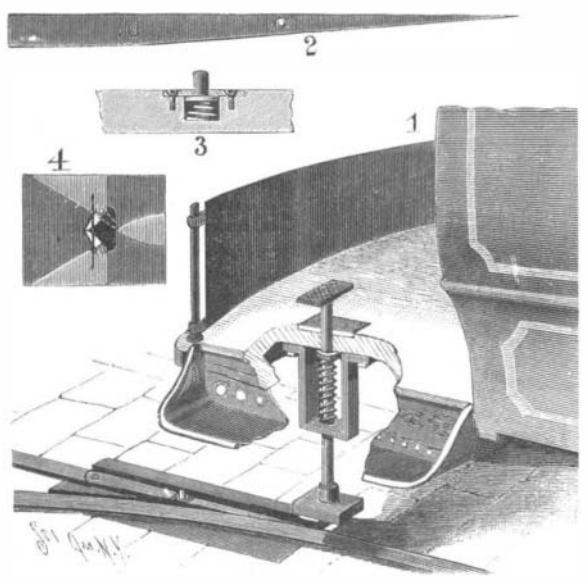
This method of procedure is advantageously replaced in many cases by an instrument called the "sculptor's cross," which is based on the principle that a point is determined by position in space when we know its distance from three fixed points. The apparatus consists of two iron rods at right angles with each other and connected by a double socket similar to that of a marking gage. The vertical rod has a slider, which holds at right angles an arm provided at its extremity with a bent point, and the lower or horizontal rod is provided with two straight points. The extremities of these three points constitute fixed points, with respect to which the positions of the different parts of the model are determined. Upon the vertical rod slides a socket, which, through a ball joint, supports the bar upon which is the exploring style. The use of the instrument will be seen from our illustration, for which we are indebted to Lectures pour Tous. The workman selects three points upon the model and three corresponding ones upon the block. The points of the apparatus are fixed once for all, so as to apply themselves either upon points upon the model, or upon the block, so that the three points may be determined with the greatest accuracy upon the rough-hewn block. After fixing the intermediate style-bar in the proper position, one of the points of the model is put in contact with the style; the screws of all the joints are tightened, and then the instrument is transferred to the block. The latter is then chiseled away until the region is reached upon which the point of the style is resting. The three fixed points rest in their places. The same thing is done for a series of points quite near each other and arranged over whole surface of the model. The mobility of the sockets and of the ball and socket joint of the stylus-carrier permits of reaching all the regions of the statue without changing the position of the points, and this insures great accuracy in the work as a whole. Finally all the contours of the figure are determined point by point. The workman becomes so expert in the use of this instrument that a sculptor can confide his model to him with a full assurance that all parts of it will be reproduced with absolute fidelity.

METHOD OF USING THE "SCULPTOR'S CROSS" IN REPRODUCING STATUARY.

GUTENBERG invented printing by using movable types, while Mergenthaler, who also marked an epoch in the art of printing by his invention of the linotype machine, virtually discarded them.

A SWITCH-THROWING DEVICE FOR CARS.

Our illustrations represent in perspective, section, and plan, a new form of switch-throwing mechanism, which is operated by the motorman or driver of a car. The device is the invention of Swan Parson, New Britain, Conn. In the platform of the car a foot-rod is vertically mounted in a bracket and provided at its lower end with a switch-operating plate. The foot-rod is normally held in raised position by means of a coiled spring. The switch-operating plate, as shown in Fig. 4, representing an inverted plan view, comprises two guides having obliquely-disposed edges converging toward the rear of the car. Two spring-pressed guide-fingers are pivoted in a depression at the rear ends of the guides. A pointed central guide is located in the rear of the oblique guides and is adapted for contact with pivoted fingers. When in contact with the pointed guide, the fingers and corresponding oblique guide form a straight line. The switch-tongue is provided with a projection (Figs. 1 and 3) normally spring-pressed outwardly and designed to engage the switch-operating plate on the car. In order to throw the switch the foot-rod is depressed, so that the projection on the switch-tongue engages one of the oblique guides. Let it be supposed that it engages the upper guide in Fig. 4. The oblique guide will throw the switch toward the central position until the projection comes in contact with the upper spring-pressed finger in Fig. 4. The finger will thereby be pushed back until it assumes the position shown by dotted lines and forms a continuous guide for the switch-tongue projection, with the upper oblique guide and lower edge of the rear guide. The tongue is hence gradually thrown. If the other finger were engaged by the projection, the switch-tongue would be thrown in the opposite direction. The device it is evident will throw the switch in either direction, without any difference in the operation. Even if the projection were not engaged by one of the oblique guides, the switch would still be thrown by a finger and the rear guide. The device cannot, therefore, fail in action.



PARSON'S SWITCH-THROWING DEVICE FOR CARS.

Hydraulic Elevators for the Eiffel Tower.

M. Ribourt gives, in the bulletin of Société des Ingenieurs Civils, an account of the hydraulic elevators for mounting to the first and second platform of the Eiffel Tower at the time of the Paris Exposition. These elevators are now being constructed by the Fives-Lille Company, and will be installed in the east and west pillars of the tower, assuring a total of 20,000 persons per day. They are independent of each other, and the motors of the hydraulic cylinders are operated by pumps placed in the south pillar of the tower. The elevator truck supports two cabins which will hold 50 persons each. The whole, with 100 passengers, is to weigh only 15,500 kilogrammes. The twin hydraulic cylinders have pistons in laminated steel whose diameter is 400 millimeters, with a course of about 17 meters. These cylinders operate a series of pulleys, carrying the wire cables of the elevator. For the ascent, they will be fed by two high-pressure reservoirs, containing water at a pressure of 50 atmospheres. Upon the descent, the water will be forced into a low-pressure reservoir at 20 atmospheres by the weight of the elevator. The time occupied in making the trip from the ground level to the second platform, or twice 130 meters, will be but two minutes. About 500 horse power will be required for the ascent of the elevator. For the descent, a hydraulic brake is to be used.

The Automobile in Africa.

One of the first projects for the use of the automobile in Africa is that which has been recently taken up by a French company, the Compagnie de Transportation du Soudan Française. A treaty has lately been passed with the government, permitting it to engage in the transportation of merchandise in Soudan, of which the French possessions hold an important place. Between the station of Kayes, the limit of the present railroad, and the Niger, lies a stretch of country of about 300 miles, which at present has but little transportation facilities, and it is this gap which the new company proposes to fill up with the aid of automobiles, which will thus join the railroad to the right bank of the Niger. The vehicles will be of a slow-speed pattern and will follow a kind of wide grass road running through this part of the country; this road, while impracticable in the rainy season, is at other times quite well adapted for the passage of automobiles. About fifty will be needed to supply the demands of traffic. These are now being constructed by one of the large Paris factories. One peculiarity of the service is that Chinese are to be employed as conductors, these having been chosen because they are able to support the climate of the region and are more intelligent and capable than the natives.

The Current Supplement.

The current SUPPLEMENT, No. 1250, is a particularly interesting number. "The New Bremerhafen Dry Dock" is fully illustrated. The annual address of the American Society of Mechanical Engineers, entitled "Engineering in the United States Navy—Its Personnel and Material," by Rear-Admiral George W. Melville, U. S. N., is continued in this issue. "Suggestions as to Improved Appliances for Launching Ships' Boats" is by John Hyslop. "Recent Excavations in Ancient Babylonia" is an interesting and fully illustrated article. "The Development of Iron Manufacture in the United States in the Past Seventy-five Years" is a most important paper by John Fritz. "A Unique Impulse-Wheel Generating Plant" is also fully described. "The Transmission of Electrical Energy" is an illustrated article. "Geography," the address by Sir John Murray, president of the section of geography of the British Association, is concluded.

Contents.

(Illustrated articles are marked with an asterisk.)