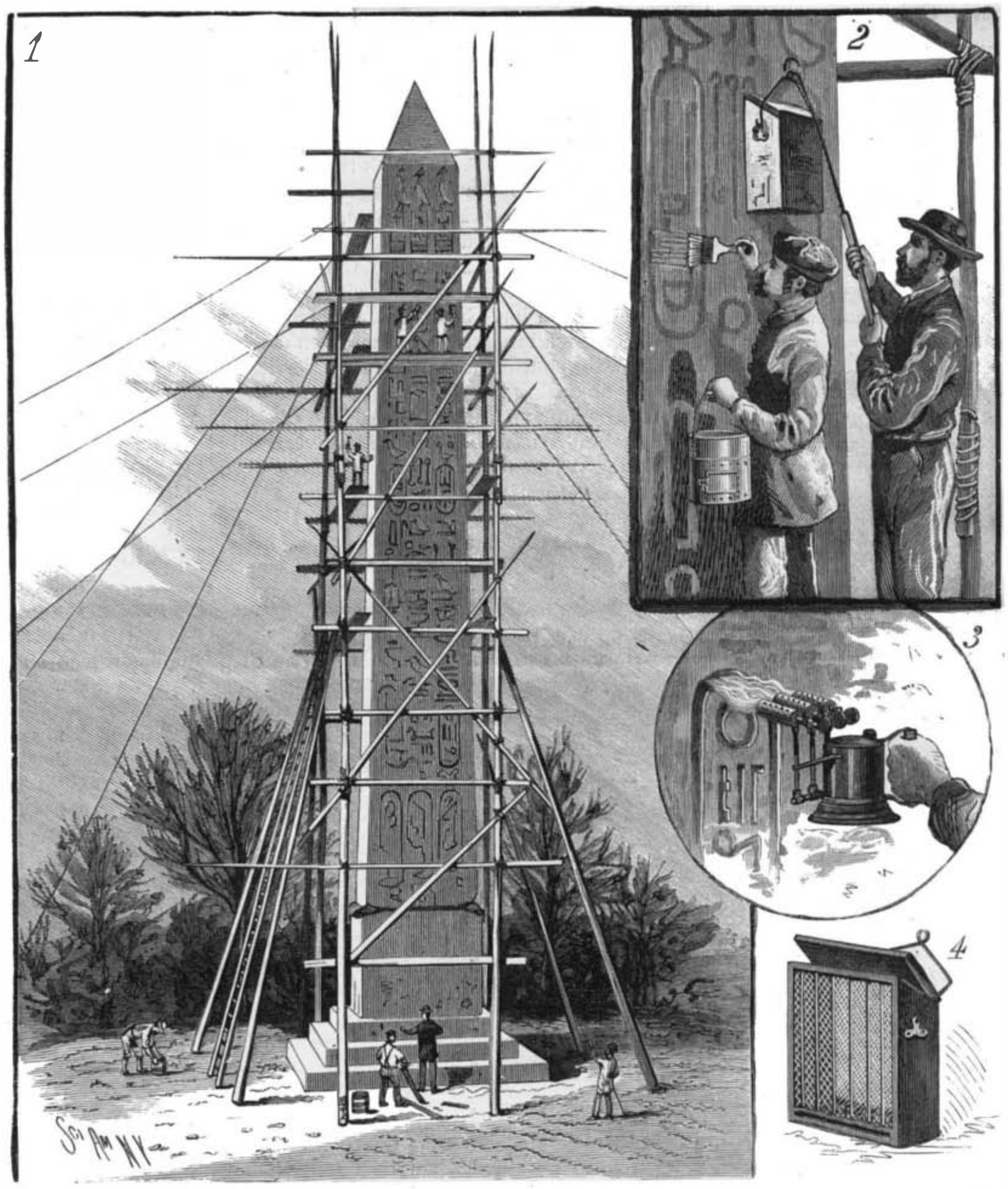
THE PRESERVATION OF THE OBELISK.

The work of preserving the Obelisk at Central Park, New York, has now been completed, and apparently none too soon, as the numerous storms which have since assailed the shaft would have done it material damage had the pores of the stone still remained open. The process employed was that described in our issue of Nov. 14, consisting of treating the heated stone with a mixture of paraffine, creosote, and turpentine, and has been applied by the Brick and Stone Waterproofing Co., of 55 Broadway, New York, who own the patents covering this treatment. As the manner of applying the process to a structure so tall and slight as the monolith attracted considerable attention, we have given somewhat detailed illustrations, showing respectively the general appearance of the shaft and scaffolding during the progress of the treatment, the process of heating the stone, the alcohol blowpipe used to penetrate the recesses of the hieroglyphics, and the construction of the charcoal furnaces. Now that the scaffolding is entirely removed, the stone shows to good advantage; and as it is a trifle darker in color, it resembles more perfectly the original syenite. The treatment has had the further effect of bringing out the characters into such strong relief that a number have been deceived into believing that they must have been recut. The process seems to have given entire satisfaction. It was, however, by no means experimental, as the company had already done much work in St. Louis, and during the past summer has treated a number of prominent buildings in New York, the white marble structure of the Mutual Life Insurance Company at the corner of Liberty Street being among the number. A severer test was that made at Newark, N. J., on the house of Mr. William Clark, the well known cotton thread manufacturer. The mansion is constructed of pressed brick and Wyoming blue stone, a small portion of which was treated two years ago. As the sample proved highly satisfactory, the entire building has recently been waterproofed. We also hear that the company has received a contract for treating all the stonework of Central Park.

The Montreal Cable Railway.

The cable railway or elevator by which the summit of Mount Royal, back of Montreal, is reached, has now been in successful operation for some days. The railway is 403 feet horizontal measurement, the height 275 feet, and the length of track 510 feet. It is built in a segment of a circle with a reversed side of twelve feet, and has an incline of about 33½ degrees. The road is supported by 16 iron pillars set in stone foundations, and the balances are of wood 12x12 inches. The gauge of the road is 5 feet, with a distance between the tracks of 4 feet. The cars are drawn to the top by means of a stationary engine of 75 horse power at the top of the mountain. The wire ropes are three in number, two of them being 1⅛ inches diameter and the middle one 1¼ inches. The two smaller ones have been tested with a strain of 35 tons, and the center or safety rope with a strain of 43 tons. The ropes pass over sheaves 6 feet in diameter, and are wound over two drums of wood and iron 10 feet in diameter, and are a direct pull upon the cars. The center or safety rope runs independently of the engine, and is attached to both cars, so that, in event of the two outside ropes breaking, the center one would hold the cars in check, besides which the large wheel of 11 feet diameter is provided with brakes, which may be applied from the platform at the top of the incline by the engineer. The fare on the incline is 5 cents up and 3 cents down.

ACCORDING to the *Deutsche Farber Zeitung*, the hardest indigo is easy to grind, dissolves better, and adheres better to the goods, if it is for 4 hours steeped in hot water with 1½ lb. calcined soda to 4 lb. indigo. When ground fine, 2 lb. soda and 16 lb. lime are added, and afterward 20 lb. pure copperas. The solution is made by heating in an iron boiler.



THE PRESERVATION OF THE OBELISK.

On Measurement.

Sir Joseph Whitworth asserts that the two great elements in mechanics are the power of measurement and the true plane.

The measuring machines which I have constructed, says Sir Joseph, are based upon the production of the true plane.

Measures of length are obtained either by line or end measurement.

The English standard yard is represented by two lines drawn across two gold studs sunk in a bronze bar about 38 inches long, the temperature being at 62° Fahr.

There is an insurmountable difficulty in converting line measure into end measure, and therefore it is most desirable for all standards of linear measure to be end measure.

Line measure depends on sight, aided by magnifying glasses; but the accuracy of end measure is due to the sense of touch, and the delicacy of that sense is indicated by means of a mechanical multiplier.

In the case of the workshop measuring machine, the divisions on the micrometer wheel represent 10,000ths of an inch. The screw has 20 threads to an inch, and the wheel is divided into 500, which multiplied by 20 gives for each division the 10,000th of an inch.

We find in practice that the movement of the fourth part of a division, being the 40,000th of an inch, is distinctly felt and gauged. In the case of the millionth machine, we introduce a feeling piece between one end of the bar to be measured and one end of the machine, and the movement of the micrometer wheel through one division, which is the millionth of an inch, is sufficient to cause the feeling piece to be suspended or to fall by its gravity.

The screw in the machine has 20 threads, which number multiplied by 200—the number of teeth in the screw wheel—gives for one turn of the micrometer wheel the 4,000th of an inch, which multiplied by 250—the number of divisions on the micrometer wheel—gives for each division one-millionth of an inch. The sides of this feeling piece are true planes parallel to each other, and the ends both of the bars and the machine are true planes parallel to each other, and at right angles to the axis of the bar; thus four true planes act in concert. In practice, we find that the temperature of the body exercises an important influence when dealing with such minute differences, and, practically, it is impossible to handle the pieces of metal without raising the temperature beyond 62°. I am of opinion that the proper temperature should be approaching that of the human body, and I propose that 85° Fahr. should be adopted, and that the standards and measuring appliances should be made and kept in a room at a uniform temperature of 85° Fahr.

In many workshops we hear the workmen speak in such vague terms as a bare sixteenth or full thirty-second, but minute and accurate measurement requires to be expressed in decimals of an inch.

In 1857, when president of the Institution of Mechanical Engineers, I read a paper on standard decimal measures of length, and I am happy to say that since that period the decimal system has been introduced to a certain extent in many engineers' works, but it is still far from being universal.

In the manufacture of our standard gauges, the workmen measure to the $\frac{1}{20000}$ of an inch, and these measures are as familiar and appreciable as those of larger dimensions.

As an illustration of the importance of very small differences of size, I have here cylindrical standards with a difference of the ten-thousandth of an inch. It is therefore obvious that a difference of $\frac{1}{10000}$ of an inch is an appreciable and important quantity.

It will be at once conceded that the only scale of measurement which can be used for such small differences must be a decimal one.

For many years the decimal system has been in use at our works, taking the inch as the unit, and the workmen think and speak in tenths, hundredths, and thousandths of an inch.

It is of great importance to the manufacturer to have the means of referring to an accurate fixed measure, as it will enable him, at any time, to reproduce a facsimile of what he has once made, and so preserve a system of the sizes of the fitting parts unaltered.

The great value of the workshop measuring machine is making difference gauges.

Every external diameter having to work in an internal diameter should have a certain difference of size; and close observation and experience can alone determine what this difference of size ought to be.

Take, for instance, a railway axle; if the bearing in which it has to work be too small, the heating of the axle by rapid rotation will be the consequence; if, on the other hand, the bearing be too large, it will be sooner worn out.

It is therefore most important, when rapid revolutions and great strains have to be undergone, that the proper difference of size, when once ascertained by experience, should be strictly adhered to.

In the manufacture of axles there should be two gauges used, the axle being made to the standard gauge and the bearing bored out to fit a difference gauge, which has to be as much larger as experience has found to be necessary, according to the conditions under which the axle has to work. Hence every manufacturer should be in a position to select his own difference gauges.

Fifty years ago the thousands of spindles in a cotton factory had each to be separately fitted into the bolster in which it had to work. At the present time all these spindles are made to gauge, and are interchangeable.

It cannot be impressed too forcibly, both upon the student in mechanics and upon the workman, that accuracy of measurement is essential for good and efficient workmanship, and that it tends to economy in all branches of manufacture, so as to have the parts interchangeable.

The Business Importance of Burglars.

W. S. Gilbert, in the London *Times*, says: "For my part, I could never quite understand the prejudice against burglars. An unarrested burglar gives employment to innumerable telegraph clerks, police officers, railway officials, and possibly also to surgeons, coroners, undertakers, and monument masons. As soon as he is in custody, the services of a whole army of solicitors, barristers, judges, grand and petty jurymen, reporters, governors of jails, and prison warders are called into requisition. Really, the burglar does more good than harm."