TRIPLE CALLA LILY.

We illustrate in the cut a remarkable example of a triple spathed Calla æthiopica. The specimen is in the possession of Mr. A. T. F. Lampe, florist, of Jersey City. It measures eleven inches from tip to tip of the opposite spathes, and six inches across the face in the opposite direction. Although generally spoken of as the flower of the calla lily, the white spathe is only a slightly modified leaf, and has no relation to any individual blossom. The thick pillar or spadix in the axis is covered with a thick mass of small antheriferous flowers. These are the real blossoms, and the white leaf or spathe that sweeps around the base of the spadix or flower stalk recalls by its shape the green leaves that grow on the regular leaf stalks. The well known Indian turnip and various other plants exhibit this same peculiarity in their way of blossoming. As its name denotes, the C. æthiopica was a native of South Africa. It was introduced into England in 1731. We learn from Mr. Lampe that fifteen years have passed since he saw a triple calla, and that this is the finest one that ever met his observation. The double are not so rare as the triple ones, but either kind can only be called a freak of nature. In all probability, the same plant will never again show the same phenomenon. Out of several thousand flowers that have bloomed in his greenhouses this season, this is the only one of the double or triple variety. There is no way of propagating them.

EXPERIMENTS IN ATMOSPHERIC PRESSURE AND CONDENSATION OF STEAM.

BY T. O'CONOR SLOANE, PH.D.

Since the earliest days of science, the phenomena of atmospheric pressure and different illustrations of the gravity of the air have formed one of the most interesting of the experimental departments of natural philosophy.

While various phenomena connected therewith were known from the earliest days, one of the glories of modern times is the assigning to these facts their true cause. Up to the days of Galileo, the expression of the cause was contained in the words, "nature abhors a vacuum." Inspired by this brilliant man, who was his master in science, Torricelli investigated the subject, and invented the barometer. At about the same period, Pascal, in France, not knowing fully any of the details of Torricelli's work, also investigated the subject of atmospheric pressure, which investigation was one of the classic works of his life. He reasoned out that the barometric column was sustained by the absolute weight of the air pressing upon the mercury outside the tube.

He caused a barometer accordingly to be carried to the top of the Puy de Dome, the principal peak of the Auvergne, situated near the village of Clermont-Ferrand. His brother-in-law Perrier did this for him, watching eagerly the height of the barometric column as he ascended. He found that it fell continually as a greater height was reached, until it was depressed several inches at the summit. This was in exact accordance with Pascal's prediction. In Perrier's words, the result "ravished us with admiration."

Otto von Guericke, the famous burgomaster of Magdeburg, won his title to fame by his experiments in pneumatics. Adjoining the wall of his house he erected a water barometer, whose long tube reached well up to the eaves. On the upper surface of the water within the tube he floated the image of a little

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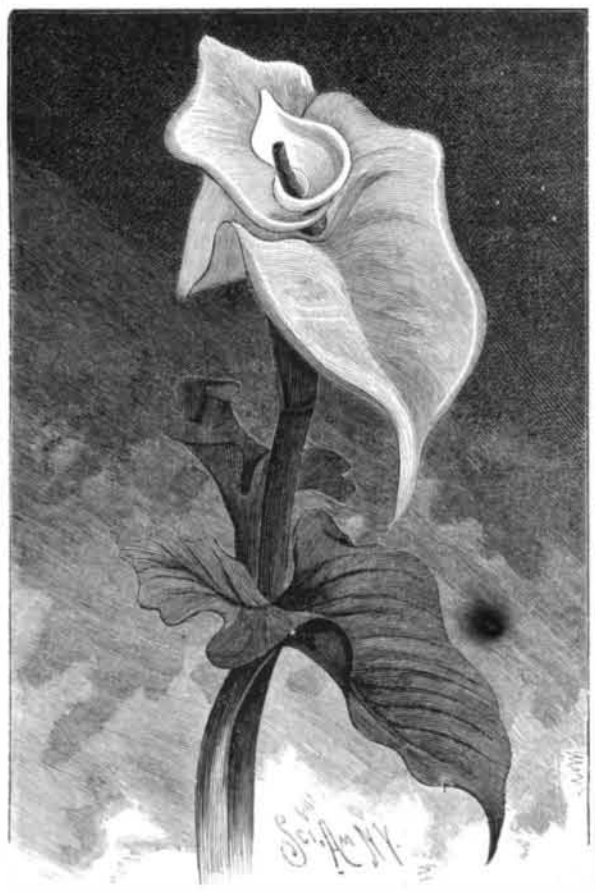
man, which rose and fell with the barometric column, prognosticating to some extent by his movements the coming weather.

From this experiment it would seem that Von Guericke did things on a large scale.

His other work carries out this idea. He made Magdeburg hemispheres so large that the force of eight horses applied to one of them could not pull them apart. He constructed a cylinder and piston of such dimensions that a large number of his fellow burgomasters pulling simultaneously were unable to raise the piston against the atmospheric pressure. All his experiments he could not have carried out without an air pump, and he has come down to posterity with augmented honor as the inventor of this instrument.

Torricelli, Pascal, and Von Guericke did all the fundamental work in pneumatics, and what has been



TRIPLE CALLA LILY.

since done has been the carrying out of their work to its legitimate conclusion.

In the cut is represented a modification of an old experiment, but which departs sufficiently from it to possess an interest of its own. The original experiment is familiar to many of our readers. A tumbler or wineglass is partly or entirely filled with water, a piece of writing paper is placed over its mouth, is pressed against it tightly by the palm of the hand, and the whole inverted. On withdrawing the hand, the paper remains attached to the glass, and the water does not escape, being upheld by atmospheric pressure.

If the glass was only partly filled with water, the success of the experiment is due to the flexibility of the paper. The paper is pressed into the glass a little by the hand, and when the hand is removed, gives way or bulges out a little.

The effect of this is to permit the rarefaction or expansion of the air contained in the glass above the water; thus, in the usual phrase, etymologically incorrect, but very convenient, a partial vacuum is created, and the paper upheld.

In the modified experiment, an inflexible substance, a plate of glass, is substituted for the paper. To perform the experiment with this, the glass must be completely or very nearly completely filled. The presence of any considerable amount of air in it would cause it to fail, as the glass plate could not bulge out under the pressure of the water. A wineglass or tumbler with very even edge is placed on a level table, filled almost to overflowing with water, and a flat glass plate, by sliding or otherwise, is placed over its mouth, so as to exclude every bubble of air. If this be inverted, the glass plate being held in place while so doing, it will remain attached to the vessel on withdrawal of the hand, but in a state of extremely unstable equilibrium. The plate can hardly be said to be in contact with the edge of the tumbler, a thin film of water intervening, so that on the least inclination the plate slides off. To make it more secure, four pieces of cork may be attached by sealing wax to the surface of the glass that comes next to the tumbler, which prevents this sliding. It is a beautiful illustration of the low expansibility of water.

A small amount of water may be placed in the tumbler, and a little more than an equal volume of alcohol may be mixed with it. A lighted match may now be held within the vessel for a few moments, or until the vapor of alcohol catches fire. After it has got quite warm, a plain piece of glass is placed upon it and it is inverted as before. If this is properly performed, the plate of glass will adhere strongly to the tumbler under the effects of the partial vacuum.

In the other cut, the production of a steam vacuum is illustrated. A small amount of water is brought into a state of ebullition, and maintained so for a few minutes. The flask is then inverted quickly into a bowl containing more than enough water to fill it, its open neck reaching well down to the bottom of the vessel. For a moment nothing happens; but as the steam begins to condense, water rises rapidly into the flask, filling it completely, sometimes with such violence as to break it.

This experiment may be performed with an Italian wine bottle from which the straw cover has been removed. It is an historical experiment, and was performed with one of these identical bottles by Capt. Savery, one of the early inventors of the steam engine. The account of the experiment may be found in vol. ii. of *Experimental Philosophy*, by Dr. Desaguliers, published in London in the year 1734.

Contractors Estimating on Public Works.

The great discrepancy in the bids of contractors for engineering and other public works seems quite a mystery to the uninitiated in such matters, and one we will not attempt to explain. The *Building Trades Journal* seems also unable to explain the reason for the wide difference in the proposals.

Our readers, it says, have doubtless observed the strange discrepancies that existed between the bids on government building work published in these columns every month, and it has given rise to the suspicion that such estimates are a matter of pure guesswork. Private bids are often astonishing in their character, but the difference between them is generally confined to the limits of the percentage which is supposed to represent the margin or profit after the cost of labor and material has been deducted.

With government work there seems to be some unknown quantity not appearing in the clearly drawn specifications which creates a large additional percentage of doubt whether there will be any profit in the work.

As notable examples of the "close margins" which are supposed to be the result of open competition, we select a few figures from contracts awarded since January 1, which ought to provoke some discussion:

For stone work and setting for Louisville, Ky., court house, under advertisement dated November 25, 1886: lowest bid, $86,521; highest, $291,745, or 233 per cent higher.

For iron work for Erie, Pa., court house, advertisement of February 24: lowest bid, $5,818; highest, $10,817, or 86 per cent higher.

For plastering Pensacola, Fla., court house, advertisement of April 1, 1886: lowest bid, $3,243; highest bid, $18,521, or 475 per cent higher.

For approaches to Dubuque, Ia., court house, advertisement of December 3: lowest bid, $549; highest, $1,119, or 106 per cent higher.

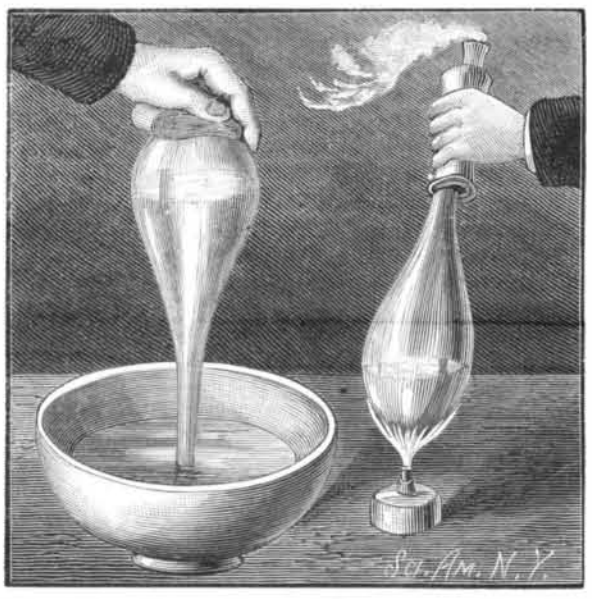
For plastering Toledo, Ohio, court house, advertisement dated November 21: lowest bid, $5,120; highest, $10,000, or 96 per cent higher.

For plaster models for court house at Lynchburg, Va., advertisement of December 10: lowest bid, $78; highest, $1,059, or 1,260 per cent higher.

For iron beams for Brooklyn post office, advertisement of December 5: lowest bid, $1,850; highest, $3,110, or 70 per cent higher.

For lathing and plastering Oxford, Miss., court house, advertisement dated January 7: lowest bid, $1,775; highest, $4,443, or 150 per cent higher.

For iron beams for Pittsburg, Pa., court house, advertisement of January 15: lowest bid, $2,360; highest, $4,617, or nearly 100 per cent higher.



EXPERIMENT IN CONDENSATION OF STEAM.

It would be natural to suppose that the difference in cost of transportation of materials from the various points of supply to the scene of operations would be some excuse for a variance in estimates, but it can hardly seem to account for more than one-fourth, at the most, of the difference of from 75 to 475 per cent between the lowest and highest ideas of the value of the work.

Will some one enlighten us upon the subject?