### The Dangers of Electricity.

At the recent meeting of the National Electric Association, Cape May, President Dr. Henry Morton, President of the Stevens Institute, gave an interesting paper on the dangers of electricity. Among other things he says:

The Employers' Liability Assurance Corporation, after collecting a mass of material from a great variety of sources, has formulated a series of rules for the protection of those employed in erecting and operating electric apparatus involving the use of powerful and therefore dangerous currents. These rules have been examined and approved by several of the managers of prominent electric companies, and so far it would appear as if no accidents have resulted from the use of electric currents where these rules have been followed, and that most if not all the accidents which have occurred would have been prevented had these rules been followed and obeyed. As the author had something to do with the framing of these rules, his chief object in presenting the paper was to secure their criticism by those best able to perceive their imperfections, and such suggestions as may lead to their beneficial modification or extension. The rules are as follows:

1. Do not touch or handle any electric wire or apparatus of any sort while standing on the ground, or while in contact with any iron work, gas or water pipe, or stone or brick work, unless your hands are covered with rubber gloves, and you are provided with such properly insulated tools as have been declared to be safe and in good order by the electrician or other competent officer of this company.

If it is at any time necessary to stand on the ground, or on any surface not insulated from the ground, while handling electric wires and apparatus, rubber boots or an insulated stool should be used.

In moving wires hanging on or lying over electric light wires, lamps or fixtures, use a dry hand line.

2. Never handle any electric wire or apparatus with both hands at once when this can be avoided, and if it is necessary to do so, be sure that no current is present, or that one or both hands are protected by rubber gloves or other efficient insulation.

3. When handling line wires, treat each and every wire as if it carried a dangerous current, and under no circumstances allow yourself to make contact between two or more wires at the same time.

4. Never open a circuit which has been in use without giving notice to the superintendent, or whoever is in charge, of your intention to do so, and at the same time request that the same line be opened at the main station, and kept open until you have given notice that your work on that line is complete.

5. In the dynamo room never go near the belts or dynamos, nor touch any apparatus unless you are fully informed and instructed how to do so.

Tools used by linemen should be provided with insulating handles of hard rubber or other equally good insulator. It is the duty of each lineman to look after his own tools and see that they are in good order, especially as to their insulation.

6. Lamp trimmers and others engaged in the care of lamps must see that the switch putting the lamp in circuit is turned off before they handle the lamp in any way.

7. In construction work, a space of at least 20 inches must be left between the holes for pins on the cross arms, so that a lineman may get to the top of the pole and work without danger.

The same insurance association has collected the authentic records of a number of so-called "electric accidents" or accidents happening to the employes of electric companies. I have now before me the abstracts of 91 such cases.

Dr. Morton concludes as follows: "Of course I do not mean to imply by this that these rules are perfect or complete, but only that they seem to be in the right direction, and to furnish a starting point from which further developments may proceed.

"No one having even an elementary knowledge of electricity as it existed ten years ago needed or needs to be convinced of its power to do harm where all safeguards are removed; and the occasional declarations of its harmless character which have been uttered can only be accounted for by reference to that combative disposition which impels some minds always to take a view in opposition to any which may be expressed, and gives birth now and then to a book or pamphlet disproving the law of gravitation or the solar origin of light and heat. To say this is, however, far from agreeing with the other extremists who would banish electricity from our daily walks and occupations, or place it under restrictions which *might* render it harmless, but which *certainly would* render it relatively useless for the countless purposes in which its efficiency demands its full development.

"The true opinion is that which is supported by past experience, and which advocates the fullest developments of power to which this agency can attain, combined with the use of all the means of protection by which human intelligence can protect itself while using to the utmost this potent and, therefore, dangerous weapon in our victorious contest with the inimically destructive forces of nature."

### A LADY SLIPPER ORCHID.

Hybridists are as diligent as ever in their operations among the lady slipper orchids, and one of their most recent additions is the handsome plant shown in our illustration. It was raised in the nurseries of Messrs. Sander & Co., St. Albans, England, from *C. superbiens* and *C. Roebeleni*, the latter being the pollen parent. At the meeting of the Royal Horticultural Society in the Drill Hall, July 8, it was exhibited and generally admired, receiving an award of merit as a recognition of its value.

*C. Youngianum* may be said to be intermediate between its two parents, as certain characteristics of each of them is at once noticeable to a practiced eye. The leaves are light green, having the upper surface traversed by longitudinal darker green lines, which are connected by means of dark bars. The strong, dull purple pubescent scape of the plant in question bore two large flowers, and, curiously enough, besides the usual bract at the base of the ovary, it also had another in the shape of a young leaf about a third of the

A LADY SLIPPER ORCHID—CYPRIPEDIUM YOUNGIANUM.
[From a drawing by Mr. John Weathers.]

way up. But this was probably an abnormal state of affairs, which is unlikely to occur when the plant blooms again. The upper sepal is creamy white, tinged with green at the base, and handsomely marked with dark madder brown stripes, while each of the intervening spaces is decorated with a row of spots of the same color. The lower sepal is not so large; it is white, with pale green stripes. The petals remind one very much of those of *C. Morganiæ*, but they are not so long nor so broad as in that fine hybrid. They are also white flushed with rose at the margins, which are fringed with dark grizzly hairs, and heavily spotted with madder brown on the front surface. The blunt, oblong pouch is of a soft olive brown color in front, passing into pale green behind, while the inflexed basal lobes are sparsely studded with small, reddish brown warts, and the surface of the pale green roundish staminode is marked with dark green reticulations. On the whole, notwithstanding its lateness in the field, *C. Youngianum* may be considered a success, and will no doubt take its place among first-class hybrid lady's slippers.—*J. W., in Gardeners' Magazine.*

BRICKS boiled in coal tar are rendered hard and durable, and machine-made brick, if boiled for a long period, say twenty-four hours, become waterproof. Bricks thus treated are well adapted for sewers, cesspools, and the foundations of buildings.

### Gas Service Pipes.

*Progressive Age*, referring to gas pipes in our streets, states most truthfully that services are commonly made of a material that under conditions of moisture and atmospheric contact deteriorates rapidly. Under the frequently occurring conditions of moisture and the contact of soil containing salts, iron worksrefuse, ashes or manure, or subject to seepage of uric acid, wrought iron will rust out in a few years or months. Easy to lay and strong to resist crushing or cutting strain, it is, except for susceptibility to corrosive action, the ideal small diameter gas conduit. Steel pipe, which is stronger, has an advantage in its greater resistance to rupture while in the lathe or under the tongs; but aside from this it is practically the same as wrought iron as far as adaptability to service work is concerned. Where the corrosive action of the soil on iron is particularly bad, lead pipe is sometimes used for services. Except its resistance to corrosive action, everything is against it. First cost, ease of manipulation, strength, and resistance to cutting strains are all in favor of the iron or steel. If these could be adequately protected from the present ill effects of contact with corroding substances, little would be left to desire in the way of service materials.

Galvanizing or zinc coating naturally suggests itself. Against moisture and the oxidation due thereto this is a protection. But soil often contains corroding agents against which a zinc coating cannot protect an iron pipe. This fact is too well known to require proof. Something better is needed. Tar is extensively used. It helps somewhat, but it is, if ever only when used in quantity and with much care that it can be called a complete protection. Various compounds of tar, glue, rubber, etc., are used, and some with considerable success. They all require care in the preparation and application, add to the difficulties of laying pipe, and are easily removed by erosive action. It is not, perhaps, improbable that our successors in the next century will use a non-corrosive aluminum pipe for service work. It would be a near approach to perfection. But that is far in the future. At present the most encouraging prospect is in the direction of lead-coated pipe. We have seen, the writer states, samples to which the lead adhered so tightly that the abrading action of tongs and wrenches was not competent to remove it; and we have in our possession an iron nail, similarly coated with lead, which spent several months in a bath of corrosive acids without apparent damage. Evidently if this coating can be done at or near cost of galvanizing, lead-coated pipe is destined to have an extensive application to service work.

One fruitful cause of the destruction of service pipes the writer believes to be the grounding of telephone and telegraph wires over them. He has seen services honeycombed as the result of electrolytic action caused by the passage of small currents of electricity over them to damp ground.

He also believes that the question of tightness in a cast iron gas main is mainly one of joints; in a service, of the material of the conduit. To discover leaks in mains is comparatively simple. Bare down to the joints and you locate the smaller leaks. The large ones due to fractures ordinarily announce themselves. A service has almost the same liability to leakage at each point throughout its length, and the only thorough examination consists in stripping it. How important then it is that it should be properly laid, and of the most enduring material, which has the necessary strength to resist the strains which may ordinarily come upon it.

### Locomotives for the St. Clair Tunnel.

The Baldwin Locomotive Works, Philadelphia, have the contract for building four decapod tank locomotives for service in the new railway tunnel under the St. Clair River between Port Huron, Mich., and Sarnia, Canada. These engines are to have cylinders 22 by 28 inches, five pairs of driving wheels 49 inches in diameter outside of tires, and will weigh in working order, including 1,800 gallons of water in the tank, about 180,000 pounds. They will have boilers 74 inches in diameter, carrying 160 pounds steam pressure. The firebox is 11 feet long by 3½ feet wide. There will be about 280 tubes, 2¼ inches in diameter and 13 feet 6 inches long. The cab is placed centrally over the boiler with foot plate and coal box at the rear of the boiler. The wheel base is 18 feet 3 inches. As the track through the tunnel is straight, the engines are not required to pass curves on the main line, and are only required to enter ordinary sidings. Additional play will be given the tires of the extreme driving wheels. The second and fourth pairs of driving wheels will be flanged with the usual play, and the distance between their centers is 8 feet 9 inches. The tires are to be secured by Mansell retaining rings, and each engine will be fitted with two sandboxes and two headlights, a Cooke steam bell ringer, and the Westinghouse automatic brake, with equalized driver brake fixtures acting on all the wheels. The fuel will be anthracite coal or coke. The load which these engines are intended to haul is about 760 tons, and the grades are 105·6 per mile. They are to be delivered in January.