gas with a good system of ventilation is preferred, on account of the unfavorable influences which might be exerted by a more than normal proportion of oxygen in the air. For metallurgical operations, this gas remains yet to be proved superior to air.

In spite of Mr. Le Blanc's unfavorable opinions, so far as we can judge from the results obtained by the use of oxy-hydrogen gas in New York, the system seems excellently suited for a variety of purposes. In one of our largest squares (Madison), a number of burners have been placed, which illuminate brilliantly a remarkably extended area, completely paling all other lights. The expense of the system is its greatest drawback for street lighting, though it is excellently adopted therefor. For the illumination of large buildings, however, we consider it unsurpassed. In the immense hall of the American Institute, in this city, this method has been employed during the recent fair; the quantity of light given far exceeded that of the twelve hundred burners of common gas ordinarily used, while the air in the building was noticeably purer and less oppressive. The cheerful effect of the illumination in rendering objects clearer to the vision, and also in causing colors to appear in greater brilliancy, closely resembled sunlight. The whiteness of the light greatly added to the beauty of the scene presented by the profusion of tastefully arranged articles in the exhibition, and formed a marked contrast to the murky yellow glare diffused by common gas. Double pipes were laid throughout the whole edifice, one serving the street gas and the other containing the oxygen, both having their outlet at single burners. The American Institute deserves the highest commendation for the admirable way in which it has thus proved the value and utility of this new system, though opposed in its introduction by serious obstacles. The oxygen had to be transported a long distance across the city from the works of the company manufacturing it, compressed in cylinders, which were placed in position and connected with the pipes, and yet a constant and efficient supply was uniformly maintained. There is little doubt that for interior illumination this gas will be extremely beneficial, both as affording an increased supply of oxygen and not impoverishing or vitiating the air, but actually rendering it purer, while the clear white light is far less hurtful to the eyes than the yellow and heated rays emitted by the ordinary street gas flame.

OUR CONCRETE DOCKS.

The work of constructing the new docks in New York is proceeding. The foundations, up to the surface of the water, are to be of concrete, made in blocks of from 50 to 75 tuns weight each. The composition consists of seven parts broken stone, three parts sand and one part of Portland cement. The concrete is cast in wooden boxes of the desired form and size, a central aperture being made in the block. After setting for a few days the boards are removed, leaving a block having a hard and comparatively smooth surface. The block is cast with central grooves for the introduction of the lifting chains, and after the blocks are placed one upon the other, the grooves are filled with cement, which adds to the strength of the entire structure. From the surface of the water up, granite blocks are to be used.

AIR GAS LIGHT IN ENGLAND.

The "Air Gas Light Co., Limited" is the title of a new bubble in the speculative share line, now extensively puffed in the London papers and said to be having success. Several prominent names are connected with the scheme. The air gas is made by passing air through a suitable hydrocarbon liquid, such as naphtha. This method, as our readers know, has for years been in common use in this country. But in England the plan is, practically, almost unknown, and the "Air Gas Light Co., Limited," are astonishing the natives with the light, and are also unloading their stock shares as fast as they can find purchasers simple enough to buy. The air gas "epizootic" had a good run in this country; but speculation therein ceased a long time ago. A reasonable, steady and extensive branch of industry is now carried on, in this line, all over the country. For country dwellings, stores and churches, the air gas furnishes excellent illumination at a small cost.

THE GROWTH OR EVOLUTION OF STRUCTURE IN SEEDLINGS.

Professor John C. Draper has recently published a pamphlet under the above title, showing from experiments made that in plants, as in animals, growth as applied to evolution of structure or organization of material provided is inseparably connected with oxidation. Regarding the lower organisms as fungi, the uniform testimony is that these plants at all times expire carbonic acid, while it is chiefly in the higher plants and especially those that contain chlorophyll or green coloring matter, that carbonic acid is absorbed and oxygen exhaled. Regarding these plants, it is stated that they exhale oxygen in the light and carbonic acid in the dark. This change, Dr. Draper considers, arises from the fact that two essentially different operations, have been confounded, namely: the actual growth or evolution of structures in the plant and the decomposition of carbonic acid by the leaves under the influence of light, to provide the germ or other materials that are to be organized; and he proposes to show that, by adopting this proposition of two distinct operations in the higher plants, all the apparent discrepancies regarding the growth of these plants are explained,

Two series of experiments were arranged, in which growth in the dark might be studied and compared with similar growth in the light. Peas were selected as the objects of trial, and each seedling was planted in a glass cylinder one inch in diameter by six inches long, loosely closed by a cork and filled to within half an inch of the top with fine earth or vegetable mold. The cylinders were then placed erect in a covered tin box in such a manner that the lower ends dipped into water contained in the box, while the whole of the cylinder, except the top, was kept in the dark. Warmth was was supplied by the external temperature, varying from 70° to 80° F., and the supply of moisture was retained uniform. One box containing five cylinders was kept in a dark closet, and another, exactly similar, placed in a window where the direct rays of the sun fell upon it five or six hours per day. Similar means were provided for determining the growth of the plants during night and day. One seed in each set failed to germinate. From the results obtained by the experiments, Dr. Draper arranges tables which give the following conclusions: In the seedlings grown in the dark, the time with which the structures were evolved in each plant is uniform—about the 17th day. Six periods of evolution are indicated, uniform in each plant, notwithstanding the difference in the weight of the seeds. In the first period, the growth consists of the formation, close to the stem, of two partially developed pale yellow leaves; in the second, the leaves are larger; in the third, a lateral stem projects, bearing two more leaves, between which is a tendril; in the fourth, the twig and tendril elongate; in the fifth, the tendril bifurcates; and in the sixth, it trifurcates. Stems, leaves, twigs, and tendrils are therefore evolved by the force pre-existing in the germ without the assistance of light. In the case of the seedlings grown in the light, the leaves and tendrils were many times larger and of a brighter green color, but the light developed no new structure. The average weight of dry plant and the proportion of root to total weight of plant was nearly identical. It was also found that, in the pot in which the peas were grown in the dark as well as those in the light, the soil was so poisoned by the roots that a second crop failed to sprout, thus affordiug another proof that the processes in the plants must have been similar.

From careful observation, the author concludes that the act of growth or evolution of structure is independent of light, and that the manner of growth during the day is similar to that at night. He says that the whole history of the plant, from the time the seed is planted to its death, is a continuous story of oxidation, except when sunlight is falling on the leaves. The seed is put in the ground and, during germination oxygen is absorbed and carbonic acid exhaled. If kept in the dark, only carbonic acid is exhaled, oxygen never; and the plant not only grows, but all visible structures, except flowers, are formed in a rudimentary condition. In the light, the growth during the night time is attended by the evolution of carbonic acid, while during the day time the bark of the stem and branches is throwing off carbonic acid. When flowers and seeds form, the evolution of carbonic acid attending this highest act of which the plant is capable is often greater than that produced at any time by animals. The final conclusion is that all living things, whether plants or animals, absorb oxygen and evolve carbonic acid or some other oxidized substances, as an essential condition of the evolution of their structure.

PROGRESS OF AMERICAN IRON INDUSTRY.

The iron business in the United States has never been in so flourishing a condition as at the present day. In Pennsylvania more iron is now being produced than by all the combined furnaces of England and the Continent of Europe, and yet the demand is far greater than the supply. A correspondent of the *New York Times* states that in the valleys of Eastern Pennsylvania there averages a furnace for every five miles, and still millions of dollars are being invested in further extension and development of the iron industry. All the iron masters are reaping golden harvests. Pig iron can be produced at an average first cost of from $13 to $17 per tun, according to location and conveniences at hand. A clear profit of from $35 to $45 per tun is made, and when the produce ranges from one to two hundred tuns per day, the aggregate gain of a day's business can be readily calculated. This very encouraging state of affairs is considered to be due in part to the fact of the country being thrown upon its own resources, England having discontinued shipping pig metal hither altogether, because under the present state of the market in Europe she cannot afford to do so. In the cheap times of the Kingdom, ore was plentiful and labor was to be had at very little cost. Now the mines are old and well worn; native ore is rare and labor at advanced rates, so that Spanish ore is imported, which, by the time it reaches English furnaces and is smelted by English labor, is advanced fully 100 per cent over the first cost of produce. One of the most prominent operators in Pennsylvania publishes the information that for the first time in the history of this country, America has shipped iron to England with advantage.

Our supply of ore is unlimited. In nearly every State new veins are being developed, and in almost every case an accompanying discovery of coal is announced. The track of furnaces will eventually find its way to Western Virginia, thence to Texas, and in time we may look to the Territories of the great West for our valuable pig metal. This year's produce of iron, there is every reason to believe, will exceed that of last year by fully a million tuns, and if the producing capacities continue in like proportion with the present increase, the following years will swell the figure by two or three millions more.

IN Georgia, the picking of the cotton crop is rapidly going forward, and if the weather continues as fine as it now is, the whole of it will be gathered by the 15th or 20th of November. Two thirds have already been gathered, ginned, baled, and are either on the road to market or already there. So it seems that the caterpillars have not taken all of the crop.

Shoeing Oxen for Pavements.

In regard to the matter of shoeing oxen so that they can work on pavements, Mr. P. P. Sibley writes to the Boston *Journal* as follows:

"As I have worked twenty-four years at blacksmithing, and claim to be master of my trade, I will give my opinion in regard to shoeing. In the first place, turn the shoe as usual, only a little thicker at the toe, then weld together at the toe, and put a calk on the toe about an inch long and one quarter inch high; heel calk the same. In setting, care should be taken to keep each claw in its natural position, that is, spreading them as the ox would usually stand, and also fit the shoe well. Put six nails in each half of the shoe. I have always used the Vulcan No. 6 nail. I have shod cattle in this way that were driven through a river twenty times a day, and did not lose a shoe for weeks, when if shod the common way they would soon become lame."

A New Steamer.

The Victoria is the name of a new and splendid steamer, lately arrived at New York on her first voyage from Liverpool. Her burthen is 3,600 tuns. She was built on the Clyde by Messrs. Alexander Stevens and Sons, her length being 380 feet, breadth of beam 42 feet, depth of hold 30 feet, and having engines, two in number, of the compound vertical direct acting principle. The cylinders of these are 108 inches low pressure and 60 inches high pressure, with a stroke of four feet. Steam is supplied from six tubular boilers, with superheaters for each. The propeller is 18 feet in diameter and 20 feet pitch. Then there are smaller engines for pumping and deck purposes, weighing anchors, loading and unloading cargoes. Fire engines are all over the ship, and the forward part of the deck is so constructed that the seamen, in the worst of weather, may not suffer from exposure in their duty.

PATENT DECISION.

The Supreme Court of the United States in the suit of Wells *vs.* Gill, Hat Body Machine, has sustained the Wells patent. One of the allegations was that the Commissioner of Patents had, in the reissue of the Wells patent, granted claims for subject matter not contained in the original patent. The Court refused to go behind the Commissioner's action.

PROFESSOR JAMES HADLEY.

This learned and distinguished linguist died at New Haven, Conn., November 14, 1872, in the 52nd year of his age. He occupied the professorship of Greek at Yale College, was President of the Oriental Society, and enjoyed a worldwide reputation as a master of languages.

The Epizootic among Deer.

We learn from our Western exchanges that the dreadful horse disease, the "epizoötic," has now taken effect upon the wild deer, and is likely to diminish our supplies of venison and skins. Many deer are found dead in the woods. No deer is shot now, and when one is found dead the skin is removed to be made into leather. The horses used in the woods are all sick, and the men treat them to hemlock fumigations and sweats, with good results.

NEW STEAM LAUNCH.—A trial of a steam launch, built for the government of Costa Rica by Messrs. Yarrow and Hedley, of Poplar, England, recently took place on the Thames. This little steamer is 43 feet in length, and the chief feature of its construction is that it is built in three entire sections, so as to enable it to be thoroughly tested under steam in England, and can be afterwards divided into three separate pieces for shipment, each section being of such a size as to enable it to be lowered down a vessel's hatchway. At the joints there are double bulkheads, rendering each section buoyant in itself. This method of construction avoids the necessity of obtaining skilled labor to put the launch together and set to work on arrival at its destination, thereby rendering the introduction of these useful little steamers possible in many foreign parts otherwise impracticable. The launch in question maintained easily a speed of ten miles an hour on a consumption of half a hundredweight of coal.

The Boston Fire---Newspaper and Magazine Offices Burned out.

The following is the list of the newspapers, magazines, etc., which were located in the burned district:—*American Homes*, monthly, 51 Water; *American Painter*, weekly, 58 Congress; *American Railway Times*, weekly, 66 Federal; *American Union*, weekly, 63 Congress; *Ballou's Monthly Magazine*, 63 Congress; *Banner of Light*, weekly, 158 Washington street; *Boston Almanac and Business Directory*, and the *Boston Directory*, 47 Congress; *Cabinet Maker*, weekly, 50 Congress; *Christian Monthly*, 19 Lindall; *Freemason's Monthly Magazine*, 51 Water: *Gleason's Home Circle* and *Gleason's Monthly Companion*, 42 Summer; *Harness and Carriage Journal*, weekly, 40 Pearl; *Boston Journal of Chemistry*, monthly, 150 Congress; *Little Christian Monthly*, 19 Lindall; *Monthly Novellette*, 63 Congress; *New England Postal Record*, 40 Liberty square; *Saturday Evening Gazette*, weekly, 37 Congress; *Pilot*, weekly, 19 Franklin; *Shoe and Leather Record*, weekly, 40 Pearl; *Shoe and Leather Reporter*, weekly, 40 Pearl; *Shoe and Leather Trades Journal*, weekly, 3 High; *Sierra Magazine*, monthly, 100 Pearl; *Temperance press*, weekly, 46 Congress; *Transcript*, daily, 150 Washington; *Yankee Blade*, 40 Liberty square; *Waverly Magazine*, 50 Lindall; *Journal of Applied Chemistry*, monthly, 40 Pearl.

B. F. Chandler, C. E., of United States Navy Yard, Portsmouth, N. H., writes us that the large cotton mill in that place is lighted with gas made from paraffin, which proves to be far preferable and 50 per cent cheaper than coal.

A SCIENCE teaches us to know; an art to do. In art, truth is a means; in science, it is the end.