which are best adapted for varnishing range from sixty degrees Fahrenheit to about seventy-five degrees, and are about the same that make the room seem comfortable to the varnisher. A good thermometer should be hung up, and great care should be taken that an even temperature is maintained during working hours, and until the varnish "sets." If possible, the heat should be preserved throughout the night.

THE BERLIN HEATING GASWORKS.

From Engineering.

During the past five years gas heated furnaces of various kinds have come into extensive use in a large number of important works both in this country and abroad, and everywhere the great cleanliness and convenience attendant upon the employment of gaseous fuel have won for it a good name even under circumstances where its economy alone would not have been sufficient to do so. Gas heated furnaces, in fact, bear much the same relative position to ordinary furnaces using solid fuel that a gas light does to a lamp or candles; and it is probable that ultimately the gaseous will supplant the solid fuel as universally for heating as it now does for lighting purposes. Under present circumstances, however, there are certain practical difficulties in the way of of applying gaseous fuel universally to heating purposes. Ordinary coal gas, as supplied from the gas works, is too dear to be extensively used as fuel, while gas producers, such as are used by Mr. Siemens in connexion with his well known regenerative furnaces, do not work well on a small scale, and, in fact, do not give the best results unless they are worked in groups of, say, four or more; and it thus follows that where merely a small supply of heating gas is required they could not be satisfactorily adopted.

This being the state of affairs, it appears to us that what is wanted is a supply of cheap gas specially intended for heating purposes; and we are glad to see that the subject has attracted attention on the Continent, and that plans have been already brought forward for furnishing such a supply to the city of Berlin. The "Berlin Heating Gasworks" Company as it is named, proposes to establish works at Fuerstenwalde, a town distant about thirty miles from Berlin, where there are extensive mines of lignite, this latter being the material from which it is intended to manufacture the gas. At Fuerstenwalde it is proposed to erect twelve retort houses, each 105 ft. long by 62 ft. wide, these houses containing seventy retort furnaces with ten retorts in each. The retort furnaces are to be heated on Mr. Siemens' regenerative system, three gas producers being provided for each furnace; and the arrangements are to be such that the lignite may be tipped direct into the retorts from the wagons in which it comes from the mines. From the retorts the gas is to be conducted to the condensers, where any unconverted tar, water, or other condensable matters will be separated, and it is then to pass to the blowing engines by which it will be forced through a 4 ft. main to Berlin.

The blowing engines are to be four in number, and each is to have a 5 ft. 9 in. steam cylinder, and 7 ft. 7½ in. blowing cylinder, the stroke in each case being 6 ft. These engines are rated at 360-horse power each, but they are to be capable of being worked up to 500-horse power each in case the extension of the works should render it requisite. The blowing engines are to force the gas into the main under a pressure equal to 16 ft. head of water, or about 7 lb. per square inch, it being considered that this comparatively high pressure will by enabling a smaller main to be used, in the long run give more advantageous results than larger pipes and less powerful engines.

The main leading to Berlin is, as we have stated, to be 4 ft. in diameter, and it is to be constructed of ¼ in. wrought-iron plates, and is to be carried above ground, being supported on piers of masonry placed at convenient intervals. This arrangement will give perfect facilities for examination and repair, and it is considered that, under the circumstances, it will be found preferable to burying the main below ground. Provision will, of course be made for the expansion and contraction due to changes of temperature. It is calculated that this 4 ft. main will, under a pressure equal to 16 ft. of water, pass 407 cubic feet of gas per second; while, if the pressure is increased to one atmosphere, the conveying power of the tube will be increased to 584 cubic feet per second, the actual weight of gas passed through per second under these latter circumstances being, of course, nearly three times as great as that flowing through in the former instance. At Berlin the gas is to be received in twelve gas-holders, each 154 ft. in diameter, 40 ft. high, and having a capacity of about 720,000 cubic feet each; and from these holders it is to be distributed by pipes to the various parts of the city in the same manner as gas for lighting purposes.

From experiments which have been made at the laboratory of Dr. O. Ziurck, the consulting chemist to the Berlin Board of Health, it is stated that it has been determined that there can be produced from lignite, by a simple process, a gas mixture well suited for heating purposes. The specific gravity of this gas mixture is 0·5451 (that of air being taken as the unit), and its chemical composition is given as follows:

Hydrogen	42·36
Carbonic oxide	40·00
Marsh gas	11·37
Nitrogen	3·17
Carbonic acid	2·01
Condensable hydrocarbons	1·09
	100·00

The proportions of carbonic acid and nitrogen are, it will be seen, extremely small, and if this chemical composition can be maintained in regular practice, the gas mixture will certainly possess very high heating power, although for lighting purposes it would possess but very little value. Experiments have, in fact, shown that 3,000 cubic feet of this gas mixture are equal in heating power to one Prussian tonne (2 200 lbs.) of lignite, or one-third of a tonne of pit coal. It is proposed to supply the gas at Berlin at the price of 6d. per 1000 cubic feet, and supposing the results of the above-mentioned experiments to be practically correct, the heating power of a tonne of pit-coal will thus be supplied for 4s. 6d., a cost which is certainly low.

With the arrangements for consuming the gas, the Berlin Gas Heating Works Company propose to have nothing whatever to do, it being their intention to merely supply the gas by meter at the price we have named, leaving the purchasers to do what they like with it. The annual supply which the works are laid out for manufacturing, in the first instance, is about 9,500,000,000 cubic feet, or about 2,627,000 per day, and it is estimated that this quantity would provide sufficient fuel for domestic purposes for about half Berlin, or about 8,000 houses.

Whether or not the Berlin Heating Gasworks will prove a commercial success—and we really see no reason why they should not—they will certainly be regarded with great interest as the first really practical attempt to make gaseous fuel available for domestic purposes. That gaseous fuel will, when once its proper management is understood, be as generally appreciated as coal gas for lighting purposes now is, we have little doubt; and although at first there will be many prejudices to overcome, yet we fully expect that one of these days we shall regard cheap gas for heating purposes as a domestic necessity.

The British Ironclad, "Glatton."

The London *Artizan* says: "This turret ship which is in course of construction at Chatham Dockyard will be the most powerful ship, for offensive and defensive purposes yet built. The *Glatton* is being constructed from the designs of Mr. E. J. Reed, C. B., and the utmost exertions are being used to have her completed as early as possible in the ensuing year. From the circumstance of the *Glatton* being the first vessel built by the Admiralty on the pure turret principle, with an exceedingly low freeboard, more than the usual amount of interest is taken in her construction. She will be constructed with a single turret, in which will be placed a couple of 25-tun guns. The thickness of the armor plating on her sides will be no less than 12 inches above the water line, and the remainder 10 inches in thickness, worked to a teak backing of 20 inches. The inner skin plating to which the timber backing is attached consists of two thicknesses, each one inch thick, laid on the usual iron frames 10 inches deep, placed two feet apart. The total thickness of the iron and teak of the *Glatton's* sides will thus be 3 feet 8 inches. The armor plates on the turret will be 14 inches in thickness in the most exposed parts, and 12 inches thick in the remainder, worked on a backing of teak of 15 inches, with two thicknesses of skin ⅝ inch each. The entire base of the turret is inclosed by a breastwork carried to a hight of 6 feet 6 inches above the deck, the whole being covered with armor-plating 12 inches in thickness, laid on a backing of teak 18 inches thick. The turret guns will fire over the breastwork, the *Glatton* when in action having a freeboard of only two feet, measured to the deck, the turret guns being exactly 11 feet 6 inches above the water line. This arrangement of breastwork possesses the advantages of raising the turret to a convenient hight, whilst at the same time it affords great protection to the lower part of the funnel, hatchways, and other necessary openings from the deck. The arrangement for the turret are such that the 600-pounder guns will command a fire round the bows, to within about twenty degrees of the fore and aft line on each side; while a single gun can be trained and fired from this line round to a right aft fire on each side. On the top of the breastwork the plating is 1½ inch thick, and on the deck outside the breastwork 3 inches thick. When not in action her mean draft of water, forward and aft, will be 19 feet, but she can be submerged to any depth by means of water ballast, pumped into tanks specially fitted for this purpose. At her 19 feet draft her deck will be only 3 feet above the water, her armor extending 4 feet below and 2 feet 6 inches above the water, a 6-inch oak deck covering the upper edge of armor. Above the breastwork will be fitted a flying bridge, from which on all ordinary occasions the ship will be conned; in action, however, an armor-plated conning tower, specially fitted for this purpose, will be used. Stowage accommodation is provided for 250 tuns of coal in her ordinary bunkers, but this quantity can be increased to between 500 and 600 tuns by using the water ballast tanks for stowing the coals. She is to be fitted with engines of 500-horse power nominal, capable of working up to 3,000-horse power actual, and her estimated speed will be from 9½ knots to 10 knots per hour."

French Forgeries.

When photography became established as a practical art, it was found that bank notes printed with black ink lent themselves too readily to the machinations of the forger. Thereupon, the Bank of France determined to employ blue ink, which baffles the photographic imitator, and to have some engraved device or other on both surfaces. This plan has been completely successful. In regard to other modes of falsification, an experienced chemist is constantly employed in studying all new discoveries that may perchance be brought into requisition, in order to devise means of averting roguery. Forgery of the notes is now extremely rare. On one occasion, three persons attached to a deposed royal prince were found to have been concerned in a deep-laid scheme of note forgery; a packet containing twelve false notes of one thousand francs each was presented to be cashed, but the fraud was detected in time to avert loss. About 1853, a more determined attempt upon the bank was made. False one hundred franc notes came to the bank with great rapidity and regularity. They were so admirably executed that no banker, money-changer, or trader, could detect the fraud, and therefore no reason presented itself for refusing to take them in the ordinary way of trade. The experts at the bank alone detected them by means of a tiny black spot near the figure of Mercury. For eight years continuously did these notes make their appearance, defying all endeavors on the part of the authorities to discover the malefactors. The bank did not like to make the fraud known, lest it should shake the confidence of the public in the one hundred franc notes generally. At last the clever scoundrel was discovered; he was an engraver, and it was found that he had successfully put into circulation false notes to the value of nearly two hundred thousand francs. His end was strange and horrible. Transported to Cayenne in 1862, he tried to escape into the Dutch settlements; faint and exhausted, he became fast embedded in the thick slimy mud of a river, and was there *eaten alive by crabs!*

Interesting Discoveries in Canada.

During the summer just closed good work appears to have been done by the Geological Survey in the Lake Superior region. Professor Bell's party have all returned to their winter quarters, after having experienced many of the hardships and privations incident to the life of the first explorers in the distant wilderness. We understand that the results of the expedition include a complete topographical and geological survey of Lake Nipigon, and an exploration of much of the surrounding country. This lake, it appears, will rank, in point of size, with the other great lakes of the St. Lawrence, forming the sixth and last in the chain. Professor Bell has not yet been able to map the whole of his extensive survey, but thinks the area of Lake Nipigon will be found to exceed that of Lake Ontario, or even Lake Erie—some 500 miles or more of coast line having been traversed. This great lake is drained by the Nipigon river, or upward continuation of the St. Lawrence, beyond Lake Superior, which is described as a very large clear-water stream, about thirty miles in length. Upward of a dozen rivers, of considerable size, are reported to empty into Lake Nipigon from all sides. We understand that one of the most singular features in the geography of this beautiful lake, is the immense quantity of islands which are scattered throughout its whole extent, and presenting a great variety in size, form, and elevation. It appears that geological discoveries of a highly interesting and important nature have been made, and that, contrary to common belief, a large extent of level land, with deep and fertile soil, exists in the Nipigon country. Professor Bell had received instructions, in addition to his geological explorations, to obtain as much information as possible in regard to a route to our great Western territory, and his discoveries in this direction, are, perhaps, not the least important of the results of the expedition. If we are not mistaken, he has found that this country, so far from being a difficult one, offers great facilities for railway construction. Further, he has, we believe, ascertained that the elevation of Lake Nipigon above Lake Superior is very moderate, and, consequently, this lake may be found useful for the purpose of navigation in the desired direction.—*Toronto Globe.*

Hager's Rules on Treatment of Platinum Vessels.

Every beginner in chemical analysis, must learn that, though little effected by acids and other powerful agents, except its solvents, platinum may be injured or destroyed by many other articles which hardly ever effect glass or porcelain. Platinum vessels, such as crucibles, dishes, wire, and rods, are at no time to be brought into contact with, or used for fusing either of the following:

I. Alkaline or alkaline earth sulphides, or their sulphates when liable to be reduced to sulphides.

II. Nitro-muriatic acid, or anything which might evolve free chlorine, iodine, bromine, sulphur, selenium.

III. Those processes in which silica is separated at a high temperature.

IV. Fusion, and heating of the caustic alkalies and alkaline earths, as well as their nitrates, and all the salts of lithia.

V. Fusion, or reduction from their oxides, of the fusible metals, like lead, bismuth, cadmium, tin, as also of the oxides of nickel, copper, etc., which give off oxygen at high temperatures.

VI. Heating or fusion of phosphoric acid and acid phosphates with carbonaceous matter or other deoxidizers.

VII. Evaporation or calcination of readily decomposable chlorides, *e. g.*, sesquichloride of iron, etc.

VIII. Fusion of iodides and bromides.—*Chemist and Druggist.*

One of the most extraordinary passages ever undertaken and performed has recently been accomplished by the steamer Helen Brooks. On the 5th day of August, 1869, the steamer Helen Brooks left Baltimore, Md., for Bayou Teche, La. She left Baltimore by way of the Chesapeake Bay, and passed through the State of Delaware by canal; up Delaware river to Trenton, N. J.; through the State of New Jersey by canal; down Raritan river to New York city; up Hudson river to Troy; through the State of New York by the Erie canal to Buffalo; thence by way of Lake Erie to Chicago; down through the Illinois canal to the Illinois river, and thence down the Mississippi river, arriving at Napoleon, Ark., on Thursday morning, October 14, after a circuitous journey of over 3,000 miles.