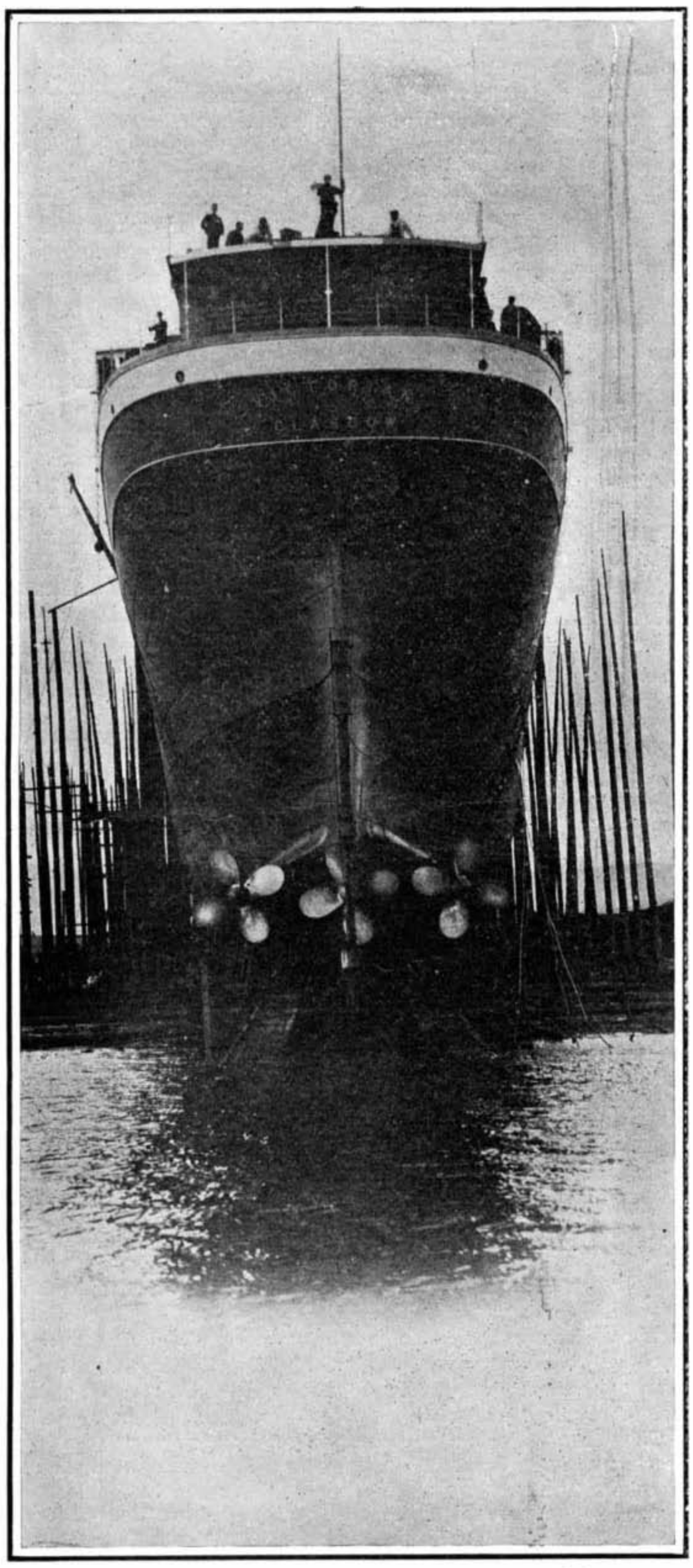
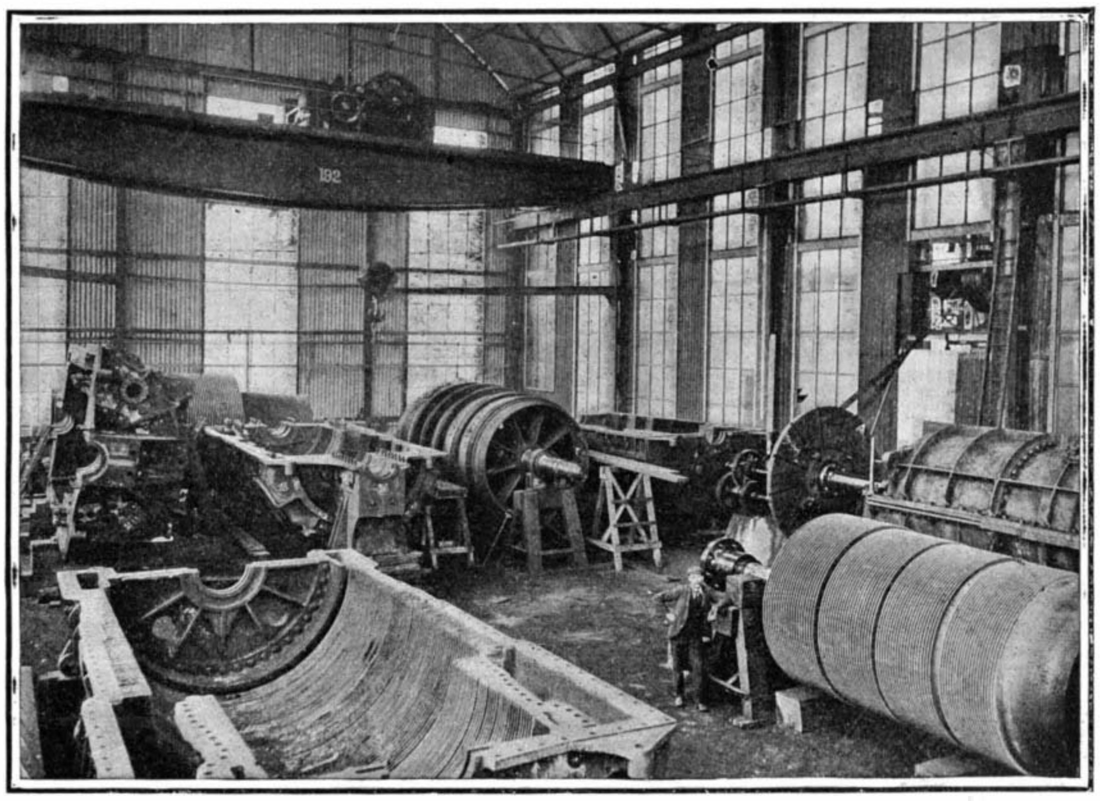
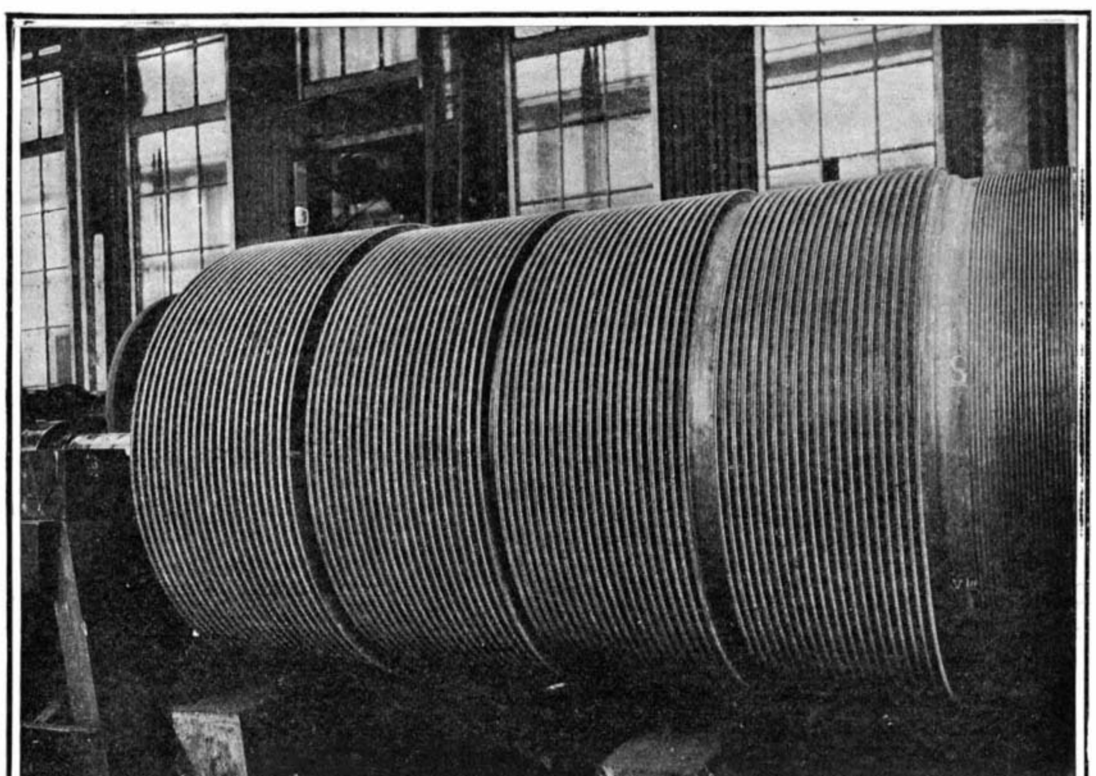
ily distinguishable by both cranial and external characters. The big creature has just been mounted in Dr. Dahlgren's Department of Preparation, by Mr. Clark, employing the clay and sculpturing method, previously described in detail in this paper by the writer, of which Mr. J. F. Ackerly, of the Field Columbian Museum of Chicago, is the originator. Huge Bruin will be the dominant figure in a family bear group, showing the female and several cubs in characteristic lifelike positions. Mr. W. H. Osgood, of the Government Biological Survey, who made a recent trip to the same regions, gives some interesting accounts from personal observation of those obtained from native hunters as to the habits of these bears. Probably the most ingenious is that of capturing salmon for food. This is done as follows: As soon as the salmon begin to enter the streams, Bruin makes fishing his chief business. The fish in large numbers usually ascend the streams for the entire summer, and the supply is practically unlimited. In fishing the bears do not get all their prey in shallow water, small streams, or on bars, as is generally supposed, but often go into comparatively deep water in large rivers. Practically all the fishing is done at night or very early in the morning, though their habits in this respect have become somewhat changed in recent years, since they have been hunted so much. The cubs do not attempt to fish, but stay on the bank and receive contributions. The old she-bear stands upright and wades in the water even up to her neck, going very slowly with the current, watching the water and scarcely making a ripple in it. She holds her arms down at her sides, with the paws spread, and when she feels the salmon coming up against her, clutches it with her claws and throws it out on the bank to the eager waiting cubs. After supplying her offspring she puts the next fish in her mouth and goes ashore to eat it. If a plentiful supply has been obtained, only the choice parts are devoured, such as the two sides, leaving the rest. The cubs, however, are not so particular, and consume their whole portion. The accompanying photographs, taken by the writer, are the first made of the subject, and are reproduced through the courtesy of the American Museum of Natural History.



The "Victorian" on the Ways.



The "Victorian's" Turbines in Course of Construction.



The Rotating Member of One of the Turbines.

THE "VICTORIAN." FIRST TURBINE LINER TO CROSS THE ATLANTIC.

THE "VICTORIAN," THE FIRST TURBINE ATLANTIC LINER.

The "Victorian" is the pioneer turbine vessel to be placed in the transatlantic service and, as such, her arrival in America is an event of more than ordinary interest. Turbines have proved a success for small high-speed channel steamers, but whether they would be an equal success for the largest ocean steamers remained to be proved. The transatlantic trip of the "Victorian" practically solves this problem.

The "Victorian" was launched from the shipbuilding yard of Messrs. Workman, Clark & Co., Ltd., Belfast. Her length is 540 feet; her breadth, 60 feet; her depth, 40 feet 6 inches. She is divided by bulkheads into eleven compartments, and with the subdivisions of her double bottom she is amply secured against foundering. She is built to the highest class of the British Corporation Registry of Shipping, and her hull has been specially strengthened above the requirements of the corporation, in order to make her doubly secure against the heavy weather of the North Atlantic. Her lines fore and aft are sharp and clean, swelling gracefully into a noble breadth amidships, which suggests high qualities of steadiness and stability.

Originally the "Victorian" was designed to be driven by reciprocating engines, but ultimately Messrs. Allan decided that she should have turbines instead. The builders made the necessary alterations in her structural design, and at the same time undertook what was a far more difficult task—the construction of the turbines, the largest ever made, which drive her. This was by arrangement with Messrs. Parsons & Co., for it was the Parsons turbine that was decided upon. A high-pressure and two low-pressure turbines drive the three propellers of the ship, which by the way are unusually small to drive a ship possessing a cargo capacity of more than 8,000 tons, besides accommodation and equipment for upward of 1,300 passengers. These propellers, however, revolve at from 270 to 300 revolutions per minute. The central one is worked by the high-pressure turbine, the others by the low-pressure turbines. Shafts of the two latter carry also a reversing turbine, which enables them to be driven full speed astern, either together or independently. Thus the ship will be almost as easily and effectively maneuvered as regards turning or backing as an ordinary twin-screw. The steam economy of the turbine has been amply established; but economy of the coal supply is not the only advantage which the turbine promises in connection with ocean traffic. There is a complete absence of the unbalanced forces which cause vibration in an ordinary steamer, and which is thus reduced to the vanishing point. Then there is very little fear of breakdown, because there are no reciprocating parts to break or get out of order. It is usually the breaking of a crankshaft, or connecting-rod, or some such appliance that causes trouble on a modern steamer. Here the steam acts directly, driving the shafts of the ship with an even turning movement, enormously reducing the stresses to which the moving parts of ordinary engines are subjected.

The steam to drive the turbines is generated by eight boilers of the usual type. The turbines were constructed in an engine shop specially equipped with the necessary plant. The turbine blades are surprisingly small; their number, however, is prodigious, there being no less than a million and a half separate pieces used in the blading of the three turbines. It is the enormous amount of time, care, and labor required in making and fitting these blades that render the turbine so expensive to build.

On her trial trip the "Victorian" made over 19 knots. Thanks to the economy of space, the builders have been able to provide accommodation on board the "Victorian" such as is probably not to be equaled by any vessel of her size afloat. They have utilized the saving, not to increase the number of passengers carried, but to give every possible comfort and luxury to all three classes of passengers. The "Victorian" will be emphatically a comfortable ship so far as perfection of appointment can make her so. Care for the humble steerage passenger has always been a leading point of policy with the Allan Line. For the "Victorian" it is exemplified in a remarkable degree. The music room, the dining room, and other special accommodation for this class challenge admiration for their roominess and completeness of equipment. The first-class accommodation, as usual, is amidships and is of the most complete and approved order. Perfectly heated and ventilated staterooms and suites of rooms, a spacious and well-fitted dining saloon, an elegantly-appointed music room, and a luxuriously-equipped smoking room are some of the features. Not less comfortable proportionately are the second-class quarters; and, as already indicated, third-class passengers are catered for in the most liberal manner. Electric light throughout, a complete printing outfit, and an installation of wireless telegraphy are among the arrangements for the comfort and convenience of passengers.

MINIATURE CAMERAS.

BY EDWARD F. CHANDLER.

Most of us have seen small cameras. In fact, comparatively small ones are to be found upon the market. Upon close examination, however, we find that the smallest box-camera fitted with finder, shutter, stops, and diaphragm is rather cumbersome to carry in the pocket. If it were not quite necessary to have a finder and the rest of the accessories, we would probably have little difficulty in locating some very small cameras of the pin-hole type, which make very unsatisfactory instruments for anything but experiment. In the current SCIENTIFIC AMERICAN SUPPLEMENT will be found a full description, with working drawings, of a method of making very efficient diminutive cameras. This article is an abstract of the account there published.

Referring to the illustration, we have two cameras photographed upon a man's hand so as to show their relative sizes. The smallest one in the picture, the outside measurements of which are 1¼ inch by 1¼ inch by 1¾ inch, requires only a brief description, as it is merely a single-exposure camera, having few of the necessary features that go to make up the practical instrument. This little camera will take a picture ¾ inch by ¾ inch, and is provided with a disk shutter set for instantaneous exposures.

The larger camera shown in the photograph is quite complete in every detail, and is capable of turning out work, I feel safe in saying, commensurate with the skill of the operator. This camera takes 25 pictures upon a film ⅝ inch wide, made by cutting a conveniently wide commercial film into strips. This stripping process has to be done in the dark room, and is best accomplished by using a sharp knife, cutting against glass, the knife being guided by a metallic-edged rule.

It may not be out of place to say right here that my best negatives were obtained by using a weak developer and by suspending the film in a red bottle, which allowed me to view the film during the developing process, by holding the bottle up to the sunlight. The fixing, too, was conveniently performed in a wide-mouthed bottle. The hypo bottle need not be colored.

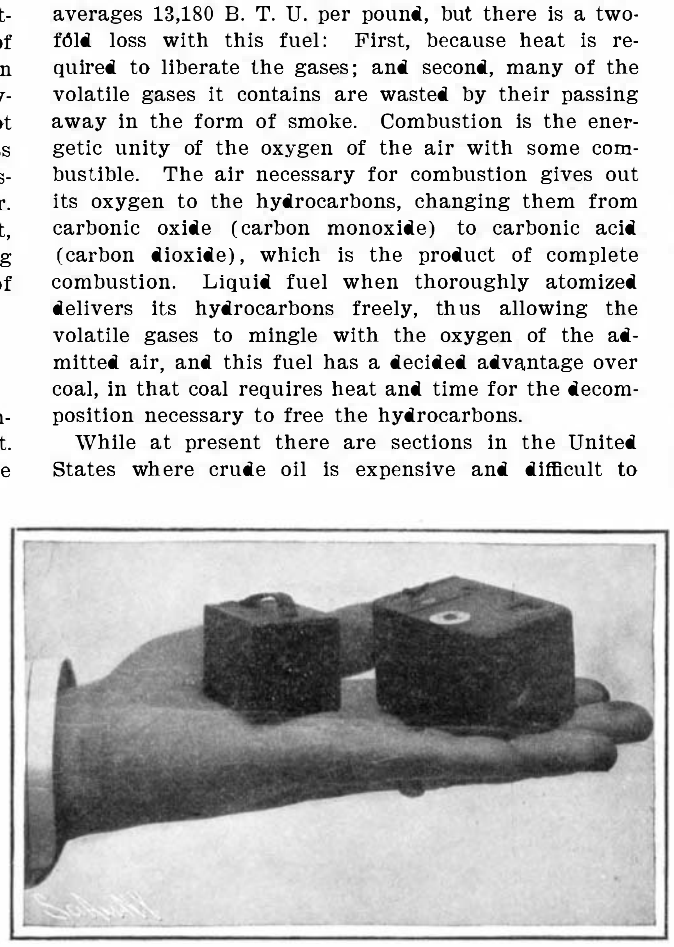
Liquid Fuel for Furnace Equipment.

BY W. N. BEST.

For many years liquid fuel has been successfully used in the heating of iron, especially in forges for the heating of rivets in boiler shops and structural work. These furnaces are of proportions adapted for the sizes of rivets to be heated, and many are portable. In boiler shops liquid fuel has been found to be far superior to coal for fuel, not only in furnaces for heating rivets, but also in large furnaces for sheet and annealing purposes, because large furnaces can be heated so quickly and evenly that there is no comparison between this and other fuels. For the past five years on the Pacific coast, where liquid fuel is abundant, extensive experiments have been made to use crude oil as fuel in blacksmith shops in place of the ordinary blacksmith coal or coke. The tests have been highly satisfactory, and this fuel has proven to be superior to every other fuel because, first, the welds are perfect, as there is no corrosion of the metal, as is the case with coal or coke fuel; second, the iron is made more homogeneous; and third, the output of the shop is greatly increased. A small oil furnace can be constructed at a very small cost without skilled labor, in which a blacksmith can heat several pieces of iron or steel at the same time and can turn out the same amount of work with one oil furnace as can be turned out by five ordinary coal forges, because the iron is always waiting on him instead of his being compelled to lose so much time making the fires and waiting on the iron to heat, as is the case when coal is used in forge work.

It is because of this increased output, and because of the superior quality of metal produced, that liquid fuel is fast becoming a potent factor in the manufacturing world; and when we look upon the various fuels from the thermo-chemical standpoint, it is surprising that the world has been so slow to recognize the value of the new fuel. California crude oil contains 20,680 British thermal units (B. T. U.) per pound; Texas crude oil contains 19,060 B. T. U. per pound; while gasoline contains 14,200 B. T. U. per pound; and coke contains 13,500 B. T. U. per pound. Bituminous coal averages 13,180 B. T. U. per pound, but there is a two-fold loss with this fuel: First, because heat is required to liberate the gases; and second, many of the volatile gases it contains are wasted by their passing away in the form of smoke. Combustion is the energetic unity of the oxygen of the air with some combustible. The air necessary for combustion gives out its oxygen to the hydrocarbons, changing them from carbonic oxide (carbon monoxide) to carbonic acid (carbon dioxide), which is the product of complete combustion. Liquid fuel when thoroughly atomized delivers its hydrocarbons freely, thus allowing the volatile gases to mingle with the oxygen of the admitted air, and this fuel has a decided advantage over coal, in that coal requires heat and time for the decomposition necessary to free the hydrocarbons.

While at present there are sections in the United States where crude oil is expensive and difficult to obtain, yet developments are rapidly advancing, and oil is being found in many parts of our country and in Canada and Mexico in localities where a few years ago the inhabitants would have laughed at the mere suggestion of there being any oil in their neighborhood. When we consider that forty gallons of crude oil are equal to one ton of coal in blacksmith practice, and the increased output of iron or steel effected by its use, as well as the economy in time and labor, because this fuel does not have to be handled and there are no ashes to be disposed of, the price of fuel is scarcely worthy of consideration. In manufacturing centers coal tar and oil-water-gas tar are obtainable at small cost, and may be used where oil is scarce. They are valuable fuels in that they contain greater heating properties than either coal or coke. Tar from coke ovens contains 16,263 B. T. U. per pound, and tar from oil-water-gas contains 16,970 B. T. U. per pound.



MINIATURE CAMERAS.

Although crude oil contains more heat units per pound than any other fuel, yet the results obtained depend largely upon the method of equipment. Properly-constructed furnaces and perfect atomization of the fuel are essential features for success. Thousands of furnaces are daily being operated at a serious loss to their owners, who are wholly ignorant of their great loss in both output and fuel. Of all the poor constructions in the shop equipment in large or small plants for marine, railroad, and contract work, furnaces are the most prominent; and strange to say, often the officer in charge of the department thinks his furnaces are ideal in construction. Often liquid fuel is tried in furnaces and condemned, when the fault lies not in the fuel itself, but in its application. I have met many competent officers who stated that a welding heat cannot be obtained with this fuel, because they had not considered the heat values of the several fuels; but after they have once seen it properly applied, they are delighted with it, and become staunch admirers of the new fuel.

A furnace constructed for the burning of coal as fuel requires various changes to meet the requirements of liquid fuel, but these changes can be made at a slight expense, as the body of the furnace need not be altered. With the requisite changes made, any degree of heat desired, from a cherry red to a welding heat, can be attained in much less time than with coal, and an almost incredibly even distribution of heat maintained, because radiation is perfect, and hence the metal is evenly heated. An oil furnace should be of such design that the oxygen can so unite with the atomized fuel that an incandescent heat and not flame is seen in the charging space of the furnace. A box-shaped oil furnace means a waste in fuel, a decreased output, and disappointment to the owner and operator.

Oil furnaces and forges can be constructed to meet the requirements of the class of work without regard to the shape of forging to be handled. In the blacksmith shop of the Bureau of Construction and Repair of the Norfolk navy yard, not one pound of coal or coke is used, for here liquid fuel has proven its superiority over all other fuels for all classes of work; and certainly in marine service the requirements as to the quality of metal are as severe and the forgings are as intricate to heat as in any other branch of service. In furnace practice compressed air should always be used to atomize the crude oil, distillate, or tar used as fuel, as it assists combustion, effects a saving in fuel, increases the output, and also increases the life of the refractory lining of the furnace. When compressed air is not convenient, steam may be used to atomize the oil, and a volume blast of air produced by a fan blower or a rotary blower should be admitted into the furnace to furnish the oxygen necessary to effect combustion.

A hydrocarbon burner of such construction that it will thoroughly atomize the liquid fuel by dashing every drop of it into ten thousand molecules, and which will produce a flame that will spread the full width of the modern oil furnace, and thus give the necessary reverberation, should always be used. Some people attempt to economize by making a burner out of gaspipe, but after sixteen years' experience with liquid fuel in marine, locomotive, and stationary boilers and in various kinds of furnaces, I am compelled to term such burners dismal failures, because such contrivances do not and cannot atomize the fuel. The quantity of fuel used through the burners should be carefully regulated, for a superfluous amount of hydrocarbons in the furnace means a waste in fuel and is detrimental to the materials being heated, while not enough of the hydrocarbons means a superfluous amount of air and oxidation of iron. All oil forges and furnaces used in blacksmith shops should be of such construction that only one burner will be required, for a blacksmith can regulate a modern oil furnace equipped with one burner very quickly and so perfectly that it will require no further attention; but if a number of burners are used, it will certainly take him longer to regulate them, and will require almost constant attention, in order to keep the heat evenly distributed in the furnace, and the result is unsatisfactory in both the quantity and quality of the output. In an oil furnace equipped with a hydrocarbon burner which thoroughly atomizes the fuel, combustion is so perfect that a smokestack is not needed, and should never be used, for it allows a quantity of heat to pass away.

The superiority of oil over coal as fuel is as great as that of coal over wood, and each succeeding year will note great advancement in the use of liquid fuel, for a test always convinces the most skeptical of its real merit. The increasing demand for this fuel is a compliment to its value, and will stimulate the development of new oil fields until the supply equals the demand.

A New Book on Gas-Engines and Producer-Gas Plants.

A new book has just been issued entitled "Modern Gas-Engines and Producer-Gas Plants," by R. E. Mathot, which is so clearly written and which so admirably fills a niche that has hitherto remained empty in technical literature, that we may be pardoned for calling it to the attention of our readers. Without the help of mathematics the author has shown forcefully how a gas-engine ought to be built, installed, and maintained in good condition, how defects in its operation may be remedied, and how the user ought to proceed in buying an engine for his purpose. Many a useful suggestion as to the proper method of designing vital parts is thrown out. Most valuable is a thorough discussion of producer-gas—the fuel of the future. Indeed, no book in English presents anywhere near so exhaustive a treatment of this important subject. Excellent diagrams stud almost every page of the work. The publishers of this paper will furnish descriptive circular on request, or send the book postpaid on receipt of $2.50.

The degree of humidity of the atmosphere, says M. Jaubert, a Paris meteorologist, is shown by the state of the pavements. When these remain covered with mud there will be no immediate change in the weather.