THE SOURCES OF NATURAL GAS.

This a vital question with the entire western coal and iron districts, says *Bradstreets*, and especially with the country now adapting all its industries, as well as all its domestic requirements, to the use of gas as fuel. The western slope of the Alleghanies is the great natural gas field, but in addition to the coal formations proper, a vast area of shale and of limestone and salt-yielding formations is found to yield abundantly the natural gas, as the product apparently of chemical action constantly going on. Nearly all the land surface of Central and Western New York is at least interruptedly, if not connectedly, charged with valuable deposits of gas-generating strata. It appears that the late geological formations are all penetrated by hydro-carbon compounds in some form, and that the presence of the gaseous forms is the result of continous chemical action of the decomposition of other mineral forms, and therefore is now as free in its yield of gas as at any time since the existence of gas springs or wells was known.

Now that four-fifths of the iron and steel works of Pittsburg have prepared for the exclusive use of gas as their reliance for fuel, it is a business necessity to reduce this scientific question to the most practical form. All the cities and large towns of the coal and iron regions west of the Alleghanies, or north of them, as may be more appropriately said of western New York, are preparing for gas as fuel, as well as for purposes of illumination. The plant of piping already laid down is not unlike that of the earlier pipe lines for the transit of oil, and it is probable that the Pittsburg region may send a gas pipe line quite to the seaboard. Such a line is already projected, but it would be a serious business disappointment of the prolific gas wells of Butler county should in a year or two run dry.

Geological searches have been ordered into the probabilities of gas supply throughout the western counties of Pennsylvania, and some partial report has been made indicating a belief in the permanency of some degree or undefined measure of supply, but not on the point of continued and unfailing fullness. This is, however, the central question in the case: Can these wells be piped and tubed as far as the gas may be made to flow without the risk of early exhaustion? In answer to this question it may be safely assumed that the petroleum formations will yield gas even longer than they will oil. The strata permeated with oil will yield more gas, rather than less, by the drain which permits some air to enter the cavities, or rather permits the evolution of hydrogen from the water with the oil. Any movement of these retained fluids brings new surface in contact to work the oxygenation and hydrogenation of the carbon of the oil-bearing strata. And as all the shales are carboniferous, if not oil bearing, these shales yield gas when they do not yield oil. Such is the case in many parts of western New York and Canada, as well as in Ohio, although there are few of the deep shales west of the New York line.

The best scientific view of the case, avoiding scientific technicalities, is that this gas is continuously formed by the common presence of the hydro-carbon oils and water, and this without limit of quantity or prospective exhaustion. The whole body of these carboniferous stratas abound in free oils, and in hydro-carbons, which constantly change their forms by further hydrogenation or oxygenation, or both. The dense liquid form becomes thinner, and if exposed to the air it changes rapidly to the volatile or gaseous hydro carbon. If this change goes on in the presence of water the resulting gas is carbonic oxide, which is the best form for illumination. And the change to this form is increasingly favored by the boring and extracting of petroleum. It is in part generated when the pressure on the subterranean oil is relieved when a great new "gusher" is struck in boring.

The general conclusion is in favor of permanence in the productive capacity of the gas even more than the oil. It is probable that atmospheric air would be deprived of its nitrogen, and would acquire hydrogen and carbon by contact with these formations beneath the surface could this contact be brought about. The force with which the out-flowing gas is thrown indicates constant accretion of like matter. There would be more gas if there was room for more.

A change of stupendous magnitude has already taken place in the year elapsing since the notice of the hydro-carbon fuels were written in *Bradstreet's* of July 5th, 1884. What was then speculatively stated as being possible has become more than practical reality. The timid, who thought it might possibly be utilized, have become the most confident investors in the costly plant of piping for transportation of gas to great distances. And, as before stated, four-fifth of the iron and steel works of Pittsburg and Alleghany are now actually making their product by the use of gas fuel alone. If this should prove an only temporary reliance, and if the gas wells should soon exhaust the supply, the consequence would be singularly disastrous. They will not become exhausted, however, because the labratory of nature is even more actively in progress to create this form of matter as the earth's surface is pierced to liberate it from the submerged strata. It will continue to be generated in the expressive language employed to describe the perpetual peace insured by the early treaties with the Indians, "as long as fire burns or water runs."

STRAIGHTENING SAW ARBORS.

What is the matter with the circular saw? Something is wrong with that machine. Listen to the peculiar noise it makes. When it starts and stops it sounds as though the saw was bent so that it struck against the saw bench. You have examined the saw very closely and find it nearly true and perfectly round. The trouble is not in the saw itself; but where is it? That is the question. The boxes are in good condition, well fitting and fit the arbor. There is no trouble there, and we are beat again. Do you give it up? Well, then, the trouble is in the arbor itself; it is "sprung." In plain English, the saw-arbor is bent just back of the collars. Here is a nice job for us. We will take that arbor to our "engine" lathe, and after thoroughly cleaning out the centres of said arbor, we will put it into the lathe and revolve it by hand, at the same time holding a piece of chalk against that portion of the arbor which runs out most, or in other words, shows the greatest desire to wabble. A nice and delicate method of doing this is to put a crayon into the tool post and bring it up to the desired spot by means of feed and cross feed.

By all means determine the exact point where the eccentric movement is the greatest. Mark this point and then take the arbor from the lathe and get a pressure upon the marked spot of greatest eccentricity. A screw press is the best method of doing so, but by placing the arbor upon two solid bearings equi-distant from the marked spot, a hammer blow delivered upon said spot will spring the arbor.

Care must be taken not to strike too hard or the arbor will get sprung too much. It will "run out" on the opposite side, and you will "laugh out of the other side of your mouth." Continue testing and bending the arbor until you can detect no error in its running. Then you can put it in place with confidence that the saw will run true.

The arbor can also be straightened without removing it from the lathe, but it is a barbarous method. It causes the lathe to suffer, and a true mechanic will not do it. The way it is done is to mark as before, turn the marked place uppermost, and by means of a block of wood and a lever, to pry up exactly underneath the mark and then strike upon the mark with a hammer. A semi-circular set to fit the arbor will prevent hammer marks. The man who uses this method will get a straight arbor every time, and get it very quickly, but the same man will be lazy enough to sit on the door step and smoke a T D pipe while his wife chops firewood enough to cook his dinner.

We have straightened saw-arbors without either lathe, press or lever. It is a "rule of thumb" method, however, and like the quack M. D.'s medicine, it is sure to "kill or cure," and kills every time if you do not guess right. We marked the arbor while running in its bearings, made the mark permanent by means of a centre punch, heated the arbor in a stove and got a pressure on the bent part by means of an iron bench vise. We guessed just right, bent the arbor just enough, and when the saw was started again it ran perfectly true. Never try this method if you have tools to do it the right way. If you have no tools and your neighbor has a machine shop full, then send the job there by all means, and not run the risk of spoiling it though trying a "by-guess" method.—*Cabinet Maker.*

THE PRESERVATION OF TIMBER.

A writer in the "W. T. I," a journal published by the students of the Worcester Technical Institute, contributes the following interesting article on the preservation of timber, a subject which is of growing importance when it is considered that the sources of supply are growing less and less every year:

"The last census gave many unpleasant revelations concerning the proximate extinction of many of the forests, which have hitherto been so bountifully productive. These revelations make it apparent that the time cannot be far distant when our people will have to stop the waste of timber which has been going on, and resort for many purposes to the artificial preservation of wood from decay. Although iron and steel are being more and more extensively employed, yet the amount of wood which is used in our mechanical structures at the present time and which will without doubt continue to be so used for a long time, is surprisingly great. Consider, for example, the enormous draught made upon our forests to supply the ties requisite for one hundred and twenty-two thousand miles of railway in this country, allotting to each mile twenty-eight hundred ties. The average life of a tie is not far from six years, and, at twenty cents a tie, the value of those laid yearly foot up $11,386,636. It will be readily seen, therefore, that any process or processes, practical and economical, which applied would prolong the life of a tie ten or a dozen years, would effect a saving of millions of dollars.

"In the thesis, of which this is an abstract, the writer made use of the the following classification of conditions, to which timber is ordinarily subjected: Timber in dry situations, timber in fresh water, timber in salt water, timber in damp situations, timber alternately wet and dry.

"A careful study of the above conditions gave the effects produced in timber, and also certain of the causes of these effects. For the determination of the remaining causes, the germ theory of decomposition, as advanced by Pasteur and Tyndall, furnished a ready means. This theory, in brief, is that the phenomena or organic decomposition are caused by the presence and action of living germs. Examine a crack or wound in the trunk of a living firtree. It will be found that, by a natural process, a resinous sustance exudes, which closes the wound against the agents of destruction. The bodies of mammoths preserved intact through countless ages; the trees of primeval forests, excluded from the air, beneath thick deposits of peat, the fragments of wooden piles, which have endured undecayed for centuries, when driven deeply below the surface of water, all confirm the belief of Pasteur and Tyndall, and prove that the exclusion of germs prevents putrefaction. The writer made no attempt to draw the dividing line between the decomposing action of germs and the action of ordination. It was sufficient to submit that all influences which either destroy or exclude germs, will prevent decay, only permanent effects must not be expected from agents which are not themselves permanent and abiding.

"The germ theory then becomes a salutary test in choosing antiseptics for the treatment of timber. Such treatment is of little value unless its effects will endure for long periods. Reliance must not be placed upon those germicides, however potent, which will readily volatilize or dissolve in water. The substances to be employed should by preference be antiseptics in a double sense; they should be both germicides and germ excluders. From all research and experience, it would appear that the best antiseptics for timber are to be found among oils and bitumens, preference being given given to those that contain germicides. Of all processes, looking toward the preservation of timber, the one called creosoting has unquestionably given the best results, and it has practically forced all its rivals into obscurity by a species of 'survival of the fittest. As the name of the process implies, creosote is the preserving agent, and is obtained by distilling coal tar. But first let us see what the term 'creosote' implies. This is important, seeing that it does not imply any compound of fixed chemical composition. It is in fact a composite liquid, made up of a variety of chemical bodies in differing proportions; the quality depending first, upon the kind of coal from which the tar is obtained: second, upon the details of the distillation and treatment. Broadly speaking, it is that portion of the distillate which comes over when the temperature is three hundred degrees Fahrenheit. It may be taken that about one-third the bulk of coal tar consists of creosote, or, as it is commonly called, 'dead oil.' It contains, first, germicides in the shape of carbolic and cresylic acids; second, germ excludes in the shape of certain bituminous bodies which solidify within the pores of the wood.

"The method of treatment which is generally considered to be the most thorough, practical, and rational is, that which involves, first, the subjection of the timber in close vessels to the action of high pressure steam for a sufficient length of time to enable the steam to penetrate all the cells of the wood, and to vaporize the liquids contained therein, these being afterward removed by a vacuum pump. After this preparatory treatment, the creosote is forced into the cells of the wood under powerful pressure, the quantity of this sustance being regulated according to the use for which the timber is destined. If simply to be used for bridges or other elevated structures, the quantity of creosote required is less than for ties; if for piles exposed to the attacks of the Liredo, the largest amount which can be forced into the wood becomes necessary. A railroad tie, skillfully and conscientiously treated with creosote, will endure, undecayed, until it is actually destroyed by the mechanical action of the rail, a period varying from twelve to twenty-four years.

"In many localities the cost of timber is still so low as to preclude any treatment of this kind, but there are many others in which its cost has already increased beyond that point where creosoting may be profitably employed. The area of such localities is continually increasing, hence no prophet is required to foresee that in the near future the adoption of some preservative process for timber will become imperative."

BRITISH COLUMBIAS BIG TREES.

Speaking at Winnipeg, the Governor-General (Lord Lansdowne) thus referred to the timber of British Columbia, from which Province he had just returned:—

I shall always consider myself fortunate in having been compelled to ride on horseback by easy stages over this most interesting section of the line. New wonders are revealed at every turn of the road. Snow capped pinnacles of vast height and fantastic shape, great glaciers, precipitous cliffs, raging torrents, tranquil lakes, while almost throughout the whole length of the journey there rise on all sides trees the like of which I had never seen nor dreamed of. I shall never forget the spot in which our camp was pitched on the evening of one of the two days which we spent in traversing the gap. Our tents stood in a narrow glade surrounded on every side by cedars, not the cedars which we are used to in old Canada, but the variety to which the botanists have very properly given the the name of Gigantea, and which tower 200 feet and more towards the sky. By the light of our camp fire it was possible to see these huge grey stems stretching upwards till they lost themselves in the darkness, reaching, for all we knew, to the stars which twinkled down upon us from the vault above, and this grove, the trees of which were probably nine or ten feet in diameter, was only a fair sample of the forest which, composed partly of these and partly of the beautiful Douglas fir and hem lock, clothed the hillsides for miles on either side of us.