Old Furniture and New.

The present rage for old articles of household use, table decoration, and personal adornment is a whim of fashion, in many instances the coveted articles having no element of propriety in our modern life. Very few of them are valuable in the light of sentiment, having no association with beloved friends or with historical events.

But apart from these considerations the love for genuine old relics of furniture, especially, has an excellent reason for its being. There are really valuable and useful articles of household economy which unreasoning style has relegated to the second-hand furniture store, to the attic, or tothe barn, or perhaps ruthlessly destroyed, and which have been replaced by modern articles far inferior. The present spring seat sofa with its tufted cushions and tortoise back seat is not half so inviting and restful as the old-fashioned, flat seated, broad sofa, long enough to receive the outstretched form of a six-footer, and broad enough to hold him safely if sleep overtook him. Many of these articles are of solid wood with no suspicion of veneering, and their forms are really more elegant than those of to-day. Modern veneered and upholstered furniture requires repairing every few years, or is worn beyond revamping within the recollection of a ten year old child. It is a source of regret that with the rage for antique furniture there is not also a demand for old time honesty in workmanship.

In spite of the sneer against the old style straight backed chairs, most of the old style furniture was made for convenience. There never was a more convenient article of furniture than the old desk and drawers combined—drawers below a folded-back desk, the back being pigeon holed, and the desk on hinges to be let down to form a writing shelf, and projecting far enough forward to give room for the writer's knees. The cupboard was another useful article for the kitchen or the dining room. It contained two or more wide drawers, with doors above them opening on shelves and racks, the whole standing on legs high enough to admit of sweeping under the cupboard. Memory recalls one, the framing and ends being of white walnut or hickory and the door panels and drawer fronts of cherry, both native woods, the creamy white of the hickory contrasting finely with the warm wine red of the cherry. These colors were set off by pendent pulls and door key escutcheon of polished ungilded brass that could be repolished and kept from the dilapidated appearance of the worn gilded brass of the present. Such an article of furniture would give an air of substantial comfort to any modern home.

The inferiority of modern made furniture cannot properly be attributed to machine duplicated work; it is as possible to make first class work by duplicating by machinery as by hand; else our hand tools and machine tools would be much more costly than they are. But it is undeniable that most of the furniture made within the memory of the elderly portion of the present generation compares favorably with that now made, in durability and integrity of workmanship. In these qualities it would be well if our manufacturers shared in the rage for the antique.

A Sheet of Letter Paper May Move a Ton One Mile.

The modern cargo steamer has now become a wonderfully economical freight carrier, especially as regards consumption of fuel. A freight train run under the most favorable conditions seems wasteful in comparison. The Burgos, a modern steamer especially built to carry cargo cheaply at a slow speed, lately left England for China with a cargo weighing 5,600,000 pounds. During the first part of the voyage, from Plymouth to Alexandria, the consumption of coal was 282,240 pounds, the distance being 3,380 miles. The consumption per mile was therefore only 83·5 pounds, and the consumption per ton of cargo per mile 0·028 pound. In other words, half an ounce of coal propelled one ton of cargo one mile. Assuming that paper is as efficient a fuel as coal, we have, says the *Railroad Gazette*, only to burn a letter on board this steamer to generate and utilize enough energy to transport one ton of freight one mile. It is difficult to realize that such a trifling act as burning a letter involves such a waste of useful energy, or can have any reference to the energy sufficient to perform a feat which, under less favorable circumstances, requires a couple of horses and a teamster for about half an hour.

The best locomotive performance in this country of which we can find any authentic record gives a consumption of about two ounces of coal per ton of freight hauled one mile at the rate of 13 miles an hour including stoppages. On lines having grades of from 53 to 70 feet per mile, the consumption often rises to 5 or more ounces of coal per ton of freight hauled one mile.

The engines of the Burgos are on what is termed the triple compound system, the steam being expanded in three cylinders in succession. The boiler pressure is 160 pounds per square inch. The average speed at sea in all weather is very nearly ten miles an hour.

A Beautiful Slide.

A very beautiful polariscope slide may be made, says the *Microscope*, as follows: Heat a slide until it will melt a small portion of a menthol pencil as it is drawn evenly back and forth over a perfectly clean surface. Do not use more heat than necessary to melt the material evenly. Then, as it commences to crystallize, arrest its progress frequently by passing the slide quickly over the flame of your spirit lamp; soon the crystallization will be completed, a little at a time, and a very desirable slide will be the result.

DR. OTTO GMELIN'S CUPOLA.

The cupola shown in the annexed engraving was invented by Dr. Otto Gmelin, of Buda-Pesth, for smelting iron, copper, or other metals, and has during the last few years won ground in Austro-Hungary, and is now also being introduced in Germany.

The illustration hardly requires any further explanation, considering the simplicity of the principle on which the furnace is constructed. Two concentric cylinders of boiler plates with two annular spaces between them, closed at the bottom, and open at the top, are placed on a foundation ring of brickwork. Cold water enters the annual space at the bottom, and the warmed water flows off below the upper edge of the cylinders.

The interior of the inner boiler-plate cylinder is, says *Engineering*, made rough, and is covered with fire-clay. The circular space between the two cylinders is covered over by

Fig. 1.

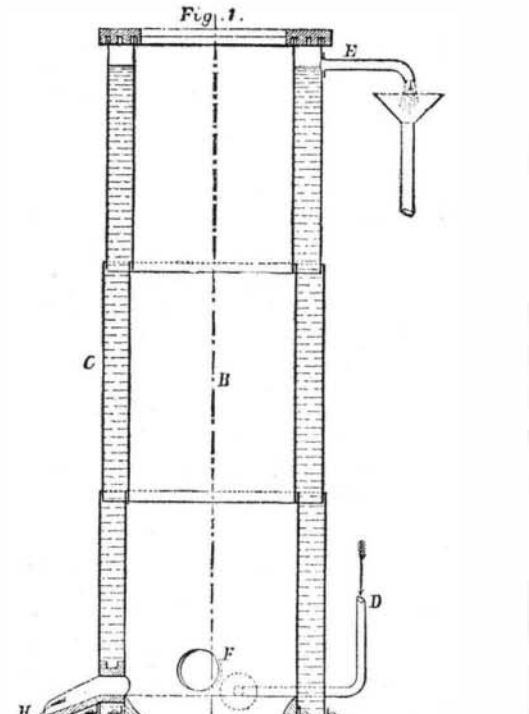
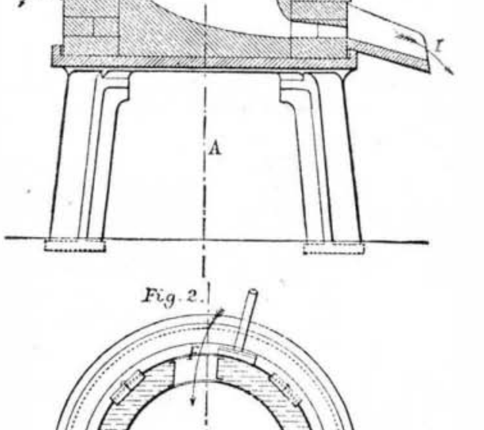


Fig. 2.



DR. OTTO GMELIN'S CUPOLA.

a cast-iron plate which lies loosely on the top of the two cylinders. Two circular grooves in the cast-iron top plate maintain the two cylinders at the correct distance from each other.

The outlet of the metal and of the slag takes place through tubular boiler-plate connections passing through the water space and attached to the inner and outer cylinders. The construction has lately been considerably simplified and strengthened by making the inner furnace cylinder of a welded tube, with tubes for air inlets welded on all in one piece.

The novelty of the above construction consists chiefly in the cooling of the smelting furnace by water without using an air-tight water space. The inner cylinder can expand and contract without any resistance as the temperature in the furnace changes, and the consequence is that repairs are hardly ever required. The first furnace built upon this principle has now been at work daily for the last 2½ years without ever having required any repairs to the boiler plates of the cylinders The smelting operations can therefore also be kept up for any length of time without interruption. The energetic cooling of the inner smelting cylinder, which takes place with this system of furnace, is also stated to afford advantages as regards the saving of fuel (equal to 6 to 8 per cent) and the decrease of burnt metal as well as the good and equal quality of the castings. The upper part of the furnace never gets hot, and the coke does not begin to burn until it arrives at the lower part of the furnace, where the smelting process takes place. The carbonic acid formed here escapes unchanged without being reduced to carbonic oxide as it passes through the upper charge of the furnace. The metal thrown in at the top of the furnace arrives completely unchanged into the smelting zone, where it is brought to the smelting point at once by a very strong blast.

The furnace remains always round and smooth, which is also a very important feature with regard to economy of coke and good quality of the castings. It is likewise unaffected by chemical action, and the quality of the castings will therefore be considerably improved by the fact that this furnace admits of an addition of any quantity of basic substances without any risk of damage.

This furnace offers special advantages in cases where scrap iron can be had cheaply, as on account of the small consumption of coal and silicium much more scrap iron than usual can be used along with the pig iron, without any fear of obtaining hard castings. The arrangement also offers advantages in cases where it is necessary to produce special qualities of castings—for example, hard castings—as the foreman can with much greater accuracy calculate the proportions of the materials to be put into the furnace to procure an even quality throughout, than he can with ordinary cupolas.

The firm of Ganz & Co., of Ofen, who have a very high reputation for their chilled rolls, is now altering all its furnaces to Dr. Gmelin's principle, and a number of other firms of high standing have also adopted Dr. Gmelin's furnace; namely, the machine factory of the Hungarian Government Railway, Buda-Pesth; the Ozterr Alpine Montangesellschaft, Vienna; the Austro-Hungarian Government Railway, Vienna; the Eisenhutte, Undine; Count Waldstein's Iron Works, Sedlec, Bohemia; and Howaldt Brothers, Kiel, Germany.

A Mexican Iron Mine.

A correspondent of the *Alta California*, describing the wonders of the Cerro del Mercado in Durango, owned by the Durango Iron Mountain Co., of Chicago, says that the vast deposit comprising it is not a mine, but a yard for storing iron ore, the floor of which is iron. Its dimensions are grander than all the combined iron ore yards of Europe, added to all that there are in the United States. It is nearly a mile in length, nearly a fourth of a mile in width, and towers 650 feet above its ponderous base. This is, I have reason to think, not one-hundredth of the ore in the property—40,000 acres—which comprises the area covered by the company's purchase, for the mountain above ground, which measures fully one billion tons of ore, is but the peak of an immeasurable mountain, which nature has, in no exceedingly remote period, formed by eruptively metamorphosing other forms of iron ores than the prevailing ones, which at present comprise the mountain. At one-fourth and one-half mile points from the base of the iron mountain, on the company's grounds, are other lesser peaks of iron. The low intervening lands are but coverings over iron ore.

The iron ore of the deposit has no intermingling rock, no debris like clinkers out of or from a huge smelting hearth. The ore is magnetic oxide, producing a forged iron equal to the best in the world and far superior to the English, because made with charcoal and because there is abundant reddish oxide of iron present, which affords a liquid very necessary for the elaboration of steel. The whole mountain undoubtedly will yield an average of 62½ per cent, or five-eighths iron of the weight of the ore. Charcoal, for the making of which there are worlds of forests, is cheap, and so is labor. The ore is in bowlders. It is already mined. This is ore that is unusually magnetized. A piece of it attracts the needle at one end and repels it at the other. There is limitless coal on the Pacific slope should any but charcoal be needed. All needed accessories for mills for working iron ore after being smelted, and for manufacturing purposes, are near at hand. There is a great abundance of both heavy and light building timber, water for power, moulding and building sand, fire-brick clay, stone, lime, and the Murga River on the grounds. Mexico, by her heavy duties on iron, shields the owners of Iron Mountain. Nails, spikes, horse-nails, wagon and other springs, are charged 5½ cents per pound. Plate iron for tin (and ores of the latter are abundant) is 6 cents per pound; steel is 3 cents; iron chain, 4½ cents; iron columns, much needed in the styles of architecture used generally, are 13 cents duty per pound; screws of all kinds and iron bedsteads, 8½ cents per pound. This grandest of all iron deposits known to man is so conveniently located, so cheaply worked, and its product so pressingly demanded by the wants of its 12,000,000 people, that in the mining and metallurgical world it is peerless as an industrial enterprise.

A Chance for American Inventors.

Senor Don Matias Romero, the Mexican Minister, has transmitted to the Secretary of State, at Washington, a decree issued by the State of Yucatan, Mexico, offering a prize of $20,000 to the inventor of a machine which shall successfully extract the fiber from henequin, under the following conditions: It must be automatic and not require skilled and experienced workmen to manage it; it must be entirely free from danger to the operators; it must require less motive force than the machines now in use with relation to its producing power; it must increase the production or extraction of the fiber within a given time, diminishing its loss, compared with the various machines in use. The reward is to remain open for three years, and is without prejudice to the right of proprietorship and of patent.—*The Iron Age.*

Wood Preservation.

One of the greediest mouths which the forests of the United States are required to fill is that of the railway demand for ties, bridge timber, etc. According to Poor's Railway Manual, there were in the United States at the close of 1883, 121,592 miles of railways. The average number of ties needed per mile of track is 2,820, and the duration of a tie averages about six years; hence the annual consumption of ties by all the railways of the country amounts to the stupendous total of 57,148,240. This number of ties represents, at the lowest estimate, 144,203,933 cubic feet of timber, enough to make 1,714,447,700 feet of lumber. At 20 cents a tie, the value of the ties laid yearly foots up $11,429,648. The amount of white pine cut in the Northwest in 1883 was not four and a half times larger than the above figures, a comparison that readily shows how much timber this one branch of the railway industry demands.

It must be borne in mind that we have only given statistics here of the number of ties required for the existing railways, but this large total is being continually increased by the construction of new lines of road, and we have omitted any estimate of the quantity of timber in other forms required for railroads, wharves, bridge timbers, etc., etc.

In view of this enormous draught on the forests of the country, it is evident that the time is approaching when scarcity will cause an advance in price. The not remote prospect of such an advance, as well as the present economy of a proper preservative treatment, has induced several railroads in the United States to conduct experiments looking toward some feasible means of timber preservation; and the American Institute of Civil Engineers has been for some time past collecting information regarding the various processes for this purpose, with the object of embodying such information in a report to be shortly given to the public. The question of timber preservation is one of national importance, and as it is the aim of this journal to keep its readers informed in regard to everything connected with the lumber interest, we do not think we need to apologize for devoting considerable space to an account of the causes of the short life of timber used by railways, together with a description of some of the methods for its preservation.

There are two principal causes of the destruction of timber in use by railways, namely, decay and mechanical wear. When wood is exposed to the atmosphere, its decay may be considered a species of fermentation set up by the combined action of heat and moisture in the watery and albuminous constituents of the wood, which gradually convert it into *humus*, or rotten wood, this process being at the same time expedited by the presence of numerous boring insects, which take up their abode in the cells of the decaying wood and feeed upon its juices.

The object of any rational treatment for preserving wood is the coagulation of the albumen by substances capable of effecting this; of these the most effectual, as well as the most practical on account of its low cost, is creosote, which exercises a powerful action in the coagulation of the albumen, and is also so destructive to all kinds of insect life as to completely exclude them from any wood which has been treated with it; the presence of a sufficient quantity of creosote in any liquid at once and completely arresting fermentation for an unlimited time, and destroying all germs of animal and vegetable life.

Of the substances containing creosote, the two most important, and in fact the only ones available for this purpose, are coal tar and wood tar. When coal tar is distilled in iron vessels there is produced, in addition to other substances, as naphtha, etc., about 30 per cent of the so-called creosote, or dead oil, which has since 1850 been used in continually increasing quantities for this purpose. The quantity of coal used for gas making in Europe is about 10,000,000 tons annually, producing about 5 per cent of tar, yielding about 150,000 tons of dead oil, the whole of which is available for treating timber. There is also a very large quantity of coal tar produced as a by-product of the gas manufacture in the United States, but excepting in a few cases nothing has been done toward utilizing the dead oil contained in it.

The second substance, wood tar, referred to above is the tar produced by the destructive distillation of wood for the manufacture of charcoal. Considerable quantities of this substance are produced, but as yet it has been only considered as a waste substance or available for fuel.

As wood tar contains a large percentage of true creosote, which is entirely absent in the case of coal tar, it is a better preservative of timber than any of the constituents of coal tar, and recent experiments have demonstrated that it may be used by itself for this purpose if forced into the cells of the timber while heated and in a fluid state. Many other substances have been proposed for treating timber, but on account of their cost and the comparatively small quantities produced are not available to any important extent for this purpose.

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 preserving substance is forced into the cells of the wood under powerful pressure, the quantity of this substance being regulated according to the use for which the timber is destined. If simply to be used for bridges or elevated structures, the quantity of the preserving substance required is less than for ties, and if for use under water or exposed to the attacks of the teredo the largest amount which can be forced into the wood becomes necessary.

The apparatus needed for treating timber by this method is simple and comparatively inexpensive. It consists of a cylinder of boiler plate, the size of which depends upon the dimensions of the timber to be treated. This cylinder is made strong enough to resist a pressure of 300 pounds per square inch, and has a track extending for its whole length along the bottom, the ends of the cylinder being closed by strong iron doors, provided with suitable means of rendering them air and water tight. Iron cars, having wheels of small diameter fitting the track on the bottom of the cylinder, are provided to carry the timber or ties while under treatment. A steam boiler with vacuum and force pumps, and also reservoirs fitted with steam coils for containing and heating the preservative substance, are also provided. The operation may be briefly described as follows:

After the cars loaded with the timber for treatment are run into the cylinder and the doors closed, steam at about 100 pounds pressure is injected into the cylinder, and the supply continued for a length of time depending upon the nature of the wood and its dryness. The steam is then shut off, and the vacuum pumps started and kept at work as long as any liquids or vapors are obtained. The vacuum pumps are then stopped, and the hot preserving liquid allowed to flow from the reservoir into the cylinder until it is filled. After this the force pumps are started, and their action maintained until the pressure in the interior of the cylinder rises to about 100 pounds per square inch, the pressure being maintained at this point until a sufficient quantity of creosote oil or other preservative liquid is forced into the cells of the wood. The force pumps are then shut off, and the creosote oil or other liquid contained in the cylinder discharged into a suitable cistern, after which the doors at the ends of the cylinder are opened and the car carrying the timber or ties run out.

When wood has been creosoted in the manner described, paying proper attention to the complete removal of water and juices previous to the injection of the creosote, the density of the wood will be found to have considerably increased, and that its tenacity for holding spikes, etc., as well as its ability to resist mechanical wear, has also increased to a very notable extent. One of the Southern railroad constructors stated some time since in a report on this subject that in his opinion (we quote from memory) a soft wood tie properly creosoted is much more valuable, both as regards resistance to decay and to mechanical wear, than the best white oak tie; in fact, he considered creosoted soft wood ties worth $1 each for railroad use.

One of the principal causes of the rapid destruction of ties from mechanical wear is imperfect road beds, but we think that as ties become less abundant and more valuable, more attention will be paid to devices for protecting them from the direct action of the rails; and, as the life of a creosoted tie when exposed to decay alone, is practically unlimited, the advantages of creosoting will under those circumstances become still more apparent.

The principal item in the cost of preserving is the quantity and cost of the preserving substance. In the case of ties, three gallons of dead oil or of wood tar will be required, while for bridge timbers a smaller quantity will suffice.

The cost of treatment, aside from the cost of the preserving agent, will not in the case of ties vary much from 5 cents per tie. The cost of dead oil ranges from 7 to ten cents per gallon.

Ties for creosoting should be carefully selected, as it is manifestly poor economy to creosote a tie in which decay has already commenced.

The necessity of a most thorough preliminary treatment of the ties for the removal of fermentable substances cannot be too strongly insisted upon, as the value of the subsequent preserving process depends almost wholly upon its proper performance, and its neglect has been the cause of frequent failures in wood preserving operations. It is not long ago that complaints were made in some European journal that creosoted beech wood ties became rotten in the middle of the tie, while the outside for an inch or two in depth remained perfectly sound. The reason for this condition of the tie seems clearly traceable to neglect of a proper preliminary treatment of the tie; the water and juices had been removed from the surface of the tie, but not from the interior. Consequently, the creosote oil was unable to penetrate that portion of the tie on account of the cells being already filled with water.

We do not wish to be understood in this article as advocating the immediate adoption in all cases of wood preserving processes, for this will depend largely upon the cost of the ties. In many localities their cost is still so low as to preclude any treatment of this kind, but there are many others in which their cost has already increased beyond the point where creosoting may be profitably employed; the area of such localities is continually increasing, and it needs no prophetic vision to foresee that in the near future the adoption of some preservative process for wood will become universal.—*N. W. Lumberman.*

THE *Quarterly Therapeutical Review* says methyl salicylate (oil of wintergreen), mixed with an equal quantity of olive oil or linimentum saponis, applied externally to inflamed joints affected by acute rheumatism, affords instant relief, and, having a pleasant odor, its use is very agreeable.

Patent Office Business, Fiscal Year 1883-84.

Hon. Benjamin Butterworth, the Commissioner of Patents, has made a report to the Secretary of the Interior of the business of the Patent Office for the fiscal year ended June 30, 1884. For purposes of comparison we add to the figures thus presented those for the preceding fiscal year, as follows:

Applications.	Fiscal year to June 30, '84.	Fiscal year to June 30, '83.
For patents.	35,204	32,845
For design patents	1,322	1,039
For reissue patents	244	247
For registration of trade marks	1,077	854
For registration of labels	975	749
Total	38,822	35,734
Caveats filed	2,672	2,688
Patents and Trade Marks Issued.		
Patents granted, including reissues and designs	22,822	21.185
Trade marks registered	903	883
Labels registered	833	618
	24,558	22,686
Expired and Withheld for Non-payment.		
Patents withheld for non-payment of final fees	2,461	2,056
Patents expired	10,230	7,471
Receipts and Expenses.		
Receipts from all sources	$1,145,433	$1,095,884
Expenditures (not including printing)	901,413	677,628
Surplus	244,020	518.255

The number of applications awaiting action by the office June 30, 1884, was 9,186, an increase of 5,087 over the accumulated applications at the end of the preceding year.

Firefly Light.

MM. Aubert and R. Dubois have recently made a number of interesting observations on the light emitted by "pyrophores," or fire-bearing insects of the family Elateres, genus Pyrophorus. These pyrophores have three luminous organs, one situated at the ventral part, and two at the superior part of the prothorax. The last are always visible, and were submitted to the tests. The light was produced by rubbing the insect with a light brush, and was examined by means of an ordinary spectroscope with a prism of very refrangible glass and a micrometer. The spectrum was very fine, continuous, and showing neither brilliant nor dark rays. This peculiarity has already been pointed out by Pasteur and Gernez, who studied the light from a pyrophore belonging to the late Abbé Moigno, editor of *Les Mondes*. The spectrum occupied about seventy-five divisions of the micrometer, and extended on the red side to the middle of the interval which separates the rays A and B of the solar spectrum, and on the blue side a little beyond the ray E. When the intensity of the light varied, its composition changed in a remarkable manner. When the brightness diminished the red and orange disappeared entirely, and the spectrum consisted of green, and a little blue and yellow. The green rays lasted longest. The contrary took place when the light grew in brightness, the green appearing first and the spectrum extending a little on the blue and a great deal on the red side. The least refrangible rays are therefore emitted last. No other luminous source known appears to behave in like manner. The only case which bears a resemblance is that of sulphate of strontium becoming phosphorescent under the action of light at a growing temperature. As the temperature rises, rays less and less refrangible appear in the spectrum, but at the same time, as Edmond Becquerel has shown, the less refrangible rays disappear. When the light of the organ begins to appear, the central and forward part only of the organ is luminous. It is only when the light is very bright that the periphery of the organ is luminous, and then the red rays are visible. The light was found to give photographic images on a gelatino-bromide plate; the insect being two centimeters from the plate, and the time of exposure reduced from an hour to five minutes. The photographs show that the light of the pyrophore is capable of producing intense chemical effects, if the smallness of the quantity emitted be taken into account. The light also determines the phosphorescence of sulphate of calcium, after an exposure of five minutes; and eosine and azotate of uranium are rendered fluorescent by it.

Natural Gas vs. Coal.

The steadily increasing use of natural gas in Western Pennsylvania, West Virginia, and Ohio, for manufacturing purposes as well as for lighting, suggests the possibility that its employment may soon have a depressing effect on the anthracite and bituminous coal business over a considerable section of country. A Pittsburg paper, referring to this matter, says: "In so far as natural gas has been applied to the manufacture of iron, steel, and glass, the quality of the products is rather in its favor. For steam raising it is very superior to solid fuel, not merely in the lessening of labor and freedom from ashes, but in that the heat can be more equally distributed lengthwise and around the boilers, to the benefit of the latter in the matter of safety and durability. It is safe to say that the use of gas fuel in this locality now supplants the use of several thousand tons of coal each week, and there is no doubt that the use of gas fuel will largely increase in the near future. Coal proprietors who have depended upon manufactories for their business already feel the local rivalry of this wonderful and valuable agent for the industries, and this competition between coal and natural gas can only be measured by the gas developments of the future."