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Elastic Section  
Coiled Springs  
**CORSETS**

Every Corset is warranted satisfactory in its wear in every way, or the money will be refunded by the person from whom bought.

PRICES: By Mail, Postage Paid  
Health Preserving, \$1.50. Full Dressing, \$1.75  
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LEADING  
**CARRIAGE FACTORY**  
1410 and 1411 Dodge Street,  
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**GOLD ROPE.**  
The most durable and superior quality of our Gold Rope has been produced. It is made of the finest wire and is of a size that will stand in any service. It is made of the finest wire and is of a size that will stand in any service.

**THE WILSON & McNALLY TO ROPING COMPANY.**

**GREAT BURLINGTON ROUTE.**  
EASTWARD

In the old favorite and PRINCIPAL LINE FOR—

**CHICAGO, PEORI, ST. LOUIS, MILWAUKEE, DETROIT, NIAGARA FALLS, NEW YORK, BOSTON,**  
And all Points East and West.

**Sioux City & Pacific RAILROAD.**  
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Runs a Solid Train through from Council Bluffs to St. Paul Without Change Time, Only 17 Hours.

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SEEDMEN,  
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**HURST'S EUROPEAN HOTEL,**  
The most centrally located hotel in the city.  
Rooms \$1.00, \$1.50 and \$2.00 per day.  
First Class Restaurant connected with the hotel.

**HURST.** Prop.  
Corner Fourth and Locust Streets.  
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**J. J. BROWN & CO**  
WHOLESALE DRY GOODS  
NOTIONS,  
Boots and Shoes.

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WHOLESALE AND RETAIL DEALER IN  
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Lath, Shingles, Pickets,  
SASH, DOORS, BLINDS, MOLDINGS, LIME, CEMENT,  
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DEALERS AGENTS FOR MILWAUKEE CEMENT COMPANY,  
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**STEELE, JOHNSON & CO.,**  
WHOLESALE GROCERS  
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Flour, Salt, Sugars, Canned Goods, and  
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A Full Line of the Best Brands of  
**CIGARS AND MANUFACTURED TOBACCO.**

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**WALL PAPER,**  
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EASTERN PRICES DUPLICATED.  
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**PUMPS!**  
Steam Pumps, Engine Trimmings,  
MINING MACHINERY, BELTING, HOSE, BRASS AND IRON FITTINGS, PIPES, STEEL PACKING, AT WHOLESALE AND RETAIL.

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**HALL'S SAFE AND LOCK CO.**  
Fire and Burglar Proof  
**SAFES**  
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**PERFECTION**  
HEATING AND BAKING  
is only attained by using  
**CHARTER OAK**  
Stoves and Ranges.  
WITH  
WIRE GAUZE OVER DOORS.  
(For sale by)  
**MILTON ROGERS & SONS**  
OMAHA, Neb.

**PERFECTION**  
HEATING AND BAKING  
is only attained by using  
**CHARTER OAK**  
Stoves and Ranges.  
WITH  
WIRE GAUZE OVER DOORS.  
(For sale by)  
**MILTON ROGERS & SONS**  
OMAHA, Neb.

**WATER GAS.**  
An Analysis Made by Dr. Joseph Jones.

He Declares It Superior to Coal Gas and that it Can be Furnished More Cheaply.

Not More Dangerous and Less Objectionable in Burning.

The following report was yesterday forwarded to Mayor Patton by Dr. Jones, who was requested to make an analysis of the water gas proposed to be introduced into the city:

New Orleans, August 9, 1881.  
Hon. J. W. Patton, Mayor, City of New Orleans.

Sir—In reply to the communication of your honor of the twenty-sixth ultimo, propounding certain inquiries with reference to the chemical composition, poisonous properties, and relative value of "water gas," I respectfully submit the following outlines of the results of my investigation:

**WATER GAS.**  
The term "water gas" was originally applied to hydrogen gas, but was known as an early period in the history of chemical science when steam was passed over incandescent iron (in fine divisions) it was deprived of its oxygen, and the hydrogen was set free. The term "water gas" was applied by the chemists to the hydrogen thus obtained. It was subsequently discovered that steam passed through incandescent carbon (coal, coke, etc.) the compound formed with carbon which was as dangerous to the extent of iron found in the preceding forces was not solid but gaseous, and known as carbonic oxide gas. The gas thus produced may be regarded as consisting essentially of a mixture of hydrogen and carbonic oxide gas.

In combustion the carbonic oxide is transformed into carbonic acid. The carbonic oxide possesses but a slight illuminating power during its combustion; the hydrogen possesses in like manner but a slight illuminating power, but creates a large amount of heat during combustion.

It was subsequently found that when the gases, formed by passing steam over incandescent carbon, were passed through naphtha, and subjected to the action of heat in closed retorts, great illuminating powers are thus obtained upon the water gas by the addition of the naphtha vapor. The general composition of the gas produced by passing super-heated steam through a furnace containing incandescent carbon, by which means the steam is decomposed, the oxygen absorbed by the carbon, forming carbonic oxide, with some carbonic acid and hydrogen liberated, has been thus represented by chemists.

Average composition of one pound of water gas prepared according to the Turco & S. R. process:

Oxygen	0.075
Carbonic acid	0.965
Carbonic oxide	0.025
Hydrogen	0.025
Hydrogen chloride	0.017
Methane gas	0.045

A second process for the production of water gas consists in passing super-heated steam over iron scraps and chips in a closed iron retort and deoxidizing the iron by means of hydrocarbon vapor.

In this way a gas was produced continuously, of specific gravity between 1.02 and 1.05, as taken by direct observation, and which, although highly combustible, is not explosive, and can be made and stored with no more risk than ordinary coal gas.

The excess of carbonic oxide is removed to this process by an equivalent quantity of hydrogen produced.

The cost of this gas produced by the Gil process, allowing naphtha at one cent per pound, would be:

Twenty-five pounds naphtha	25
Twenty-five pounds coal	12
Steam, labor, etc.	9
Total	46

Cost of 1000 cubic feet . . . . . 30  
Cost of 1000 cubic feet . . . . . 12

By volume this gas will contain 6 per cent of carbonic acid.

In the Gil process and patents it is claimed:

First—That iron after being oxidized by superheated steam can be immediately reduced by hydrocarbon, applied in proper proportions and at proper temperature, by which a continual production of hydrogen can be secured in large quantities, and at a cost as low as that of the carbonic oxide water gases produced by the Lurgi, Sirop, and similar processes.

Second—That iron, after being deoxidized and slightly carburized by hydrocarbon vapors, can be superheated and converted into black oxide, combined apparently with graphite, presenting a smooth, polished and lustrous surface, which resists the action of all acids and alkalis, including even aqua regia.

This discovery is said to constitute a higher value than copper, and the field of its application is almost unlimited.

**WATER GAS IN NEW YORK.**  
The Municipal Gaslight Company of New York commenced manufacturing illuminating gas from water gas by the use of processes and mechanical contrivances, by certain patents—with a capital of \$1,000,000, but a few distributing gas the superiority of the light caused a demand greater than the supply. It was thus, more extensive works were determined on, and the company, increasing its capital to \$1,500,000, erected works covering an area of 200,000 square feet, with capacity to manufacture over 4,000,000 cubic feet of illuminating gas per day, and has laid through streets where competing companies are supplying gas forty-four miles of mains.

The following formula represents

**WATER GAS.**  
The general composition of the water gas employed in New York:

**CHEMICAL ANALYSIS.**

Carbonic acid	0.965
Carbonic oxide	0.025
Hydrogen	0.025
Hydrogen chloride	0.017
Methane gas	0.045
Oxygen	0.075
Steam	0.000
Water vapor	0.000
Nitrogen	0.000
Specific gravity	0.725
Specific heat	0.240
Specific gravity	0.725

The comparative statements of certain of the New York hotels show that water gas costs 31 per cent less than the ordinary gas.

It appears from the testimony thus far collected with reference to the water gas of the Municipal Gaslight Company of New York:

1. It is a pure burning and illuminating power far surpassing the ordinary coal gas flame, and equals the best of any kind of gas.
2. Regarding the purity of this gas, it is composed of "dry" gases, and almost exclusively free from gummy vapors, which are constantly such a great detriment in the oil process.
3. As regards the effects of its use on health, those who have used this gas most extensively testify to the fact that it is in no manner dangerous, and is as safe in this respect as ordinary coal gas.
4. The products or effects of burning the water gas are less objectionable than with gas from coal. An illuminating gas with a basis of water gas yields in burning less water and carbonic acid, and consumes less oxygen of the air for equal volumes, than an average gas of less combustible than water gas.
5. The important chemical law should be observed in this connection, that both marsh gas and carbonic oxide yield in burning the same volume of carbonic acid, while carbonic oxide consumes only one-fourth as much oxygen as marsh gas, which latter is now largely contained in gases made from coal.

The alleged poisonous properties of water gas have been urged against its introduction, and here in New Orleans we will endeavor to show right upon this question.

Amongst the numerous products of the distillation of pit coal, the most important are marsh gas, oil, gas, acetylene, hydrogen, carbonic oxide, carbonic anhydride, sulphuretted hydrogen and ammonia.

The illuminating power of coal gas is due chiefly to light carburetted hydrogen, oil, gas, and to a small quantity of the vapor of naphtha and other volatile hydrocarbon compounds of carbon and hydrogen.

The hydrogen and carbonic oxide are not only destitute themselves of any illuminating power, but they reduce the light of the gas with which they are mixed.

The chief products of the combustion of coal gas are carbonic acid and water.

**POISONOUS PROPERTIES OF COAL CARBURETTED HYDROGEN.**  
Coal gas is a compound which acts directly as a poison when respired. Many fatal accidents have occurred from the respiration of air contaminated with it. Its composition is subject to much variation. Mitchell found that it was principally composed of light carburetted hydrogen and carbonic oxide, in the proportions of 60 per cent of the first, 21.3 of the second, 11.0 of the third. M. Trautman found that the proportions of light carburetted hydrogen and carbonic oxide were nearly equal, i. e., about 22 per cent. An analysis of coal gas as supplied to London shows that in 1000 parts it contained of hydrogen, 554.3; of light carburetted hydrogen, 359.3; carbonic oxide, 56.2; nitrogen, 28.6; water vapor, 24.8; nitrous gas, 22.2; carbonic acid, 4.6.

Some consider that a carbonic oxide is the poisonous principle; but there is no doubt that the hydrocarbon also have anoxicidic fumes, although the use of the safety lamp in mines proves that a mixture of light carburetted hydrogen with air in an explosive proportion may be respired without producing serious effect.

Coal gas, like other solid poisons, may destroy life if long respired, although as diluted as not to produce serious effects in the first instance.

The symptoms produced by coal gas, when mixed in large proportions with air, are: giddiness, headache, nausea, loss of countenance, general weakness and depression, partial paralysis, convulsion, and the usual phenomena of asphyxia. Many cases of fatal poisoning by coal gas have been recorded. It is impossible to determine exactly what proportion of this gas in air will destroy life.

Dr. A. d. observed in his experiments that in ordinary coal gas mixed with air, cats were rendered insensible in half a minute and died in a minute and a half and two minutes. There was, before death, spasmodic action of the diaphragm. This gas was allowed to enter slowly into a well of air in which the animals were placed.

An atmosphere containing from 7 to 12 per cent has been found to destroy dogs and rabbits in a few minutes; when the proportion was from 11 to 12 per cent it had no effect. With respect to man it may destroy life if long respired, when forming about 9 per cent, or when it is less than an explosive proportion.

**POISONOUS PROPERTIES OF WATER GAS.**  
The poisonous properties of water gas has been referred chiefly to the carbonic oxide gas, which enters into its constitution; but as we have just seen, this gas enters also in various proportions into ordinary coal gas. The hydrogen of the water gas, mixed with the carbonic oxide gas, is respirable, but is incapable of supporting life for any length of time, although this property is a poisonous property, as I have shown by numerous experiments recorded in the constitution of the Smithsonian Institution for 1855, and in my medical and surgical monograph, published in this city in 1876.

The vapors of naphtha without doubt produce certain effects upon the nervous system; but it is chiefly to the presence of carbonic oxide that the water gas owes its poisonous properties.

**CARBONIC OXIDE.**  
The noxious effects of the vapors of

burning charcoal are now considered as due chiefly to the presence of carbonic oxide.

The action of the gas on animal life has been made a subject of experiment by Bernard, the author of the present report and others.

An atmosphere containing from 5 to 10 per cent will destroy life. The blood is brightened in color by this gas while it is darkened by carbonic acid. I have observed in the various animals with I have destroyed in experimenting with this gas, that the bright color produced in the blood by carbonic oxide is quite permanent, and has been retained for more than one month.

The action of carbonic oxide on animals or man is that of a pure narcotic poison. M. Jourdes has reported that he had administered in twenty-three minutes when he is in an atmosphere containing one-fifth of its volume of pure carbonic oxide; when the proportion was one-tenth, he died in thirty-seven minutes, and when one-eighth, he died in twenty minutes. On a white rat, he administered, in a glass jar, a mixture of carbonic oxide and air, and reported that it was not possible to breathe in the case of a white rat, when the carbonic oxide was in a proportion of one-fifth of the mixture.

The action of carbonic oxide is more potent than in the case of ordinary air, and is more potent during the night, as with carbonic oxide, the animal is more sensitive to its action. Double the amount of carbonic oxide is as effective as twice the amount of pure carbonic oxide, and is as effective as twice the amount of pure carbonic oxide, and is as effective as twice the amount of pure carbonic oxide.

From numerous comparative experiments with carbonic oxide, carbonic acid, and the other gases, and the oxide of nitrogen, I am convinced that the popular belief that carbonic oxide is an exceptionally poisonous gas is erroneous.

While admitting that carbonic oxide is poisonous, the real question is whether it is more poisonous or dangerous under like circumstances than gas from coal.

When used improperly as a fatal poison upon animals in comparison with gas from coal, Lillidge and Trautman found that twelve per cent mixed with air killed rabbits in seven minutes, while Trautman also found that two per cent of coal gas killed such animals in twelve minutes. Dever, Trautman and Adams Wentz all agree that nine per cent of coal gas in air will prove fatal to man, while Trautman states also that six per cent of the same kind killed rabbits in a few minutes.

When largely diluted with air, however, the effects of carbonic oxide in man appear, from very extensive observations, to be very uncertain, and at the worst but not fatal. Heat, cold, indicating slightly nervous disorder, appear to be entirely lacking.

As to the dangers that have been imagined of poisonous or even acrid injurious impregnations of the air of dwellings or rooms by any appreciable leakage of water gas, resulting in the formation of carbonic oxide, the mathematical calculation of Prof. Henry Wentz has proved it to be altogether inadmissible.

Thus a leak of one cubic foot per hour would be a very large one, and would be immediately detectable by the odor. In a medium-sized bedroom, of say 15 to 20 by 10 feet, containing 1500 cubic feet, this would import during a night of eight hours two cubic feet of carbonic oxide, or 1750 h part—a wholly inappreciable proportion. A wide-open such a room, in eight hours, a cubic foot of carbonic oxide, or (if the rooms were actually) two cubic feet of it. In less than eight hours, however, a similar evaporation of some illuminating gases (carrying hydrocarbon) would reduce a sleeping occupant to a state of hopeless asphyxia. The absurdity of attributing such occurrences as this to the carbonic oxide alone is very apparent.

**CONCLUSIONS.**  
From the preceding facts we conclude:  
First—Water gas is superior to the ordinary coal gas in heating and illuminating power.  
Second—Water gas can be furnished at less cost to the consumer than ordinary coal gas.  
Third—Water gas is not more dangerous in case of leakage than that made from coal gas.  
Fourth—The products or effects of burning water gas are less objectionable and less injurious than those arising from the combustion of gas from coal.

JESSE JONES, M. D.,  
President Board of Health, State of Louisiana.

The report has been circulated by Coal Gas men that "Water Gas" (so-called) is poisonous. That this report is the result of ignorance or a wilful perversion of the facts, cannot be a matter of competition from this more economical and brilliant illuminator, will appear from the perusal of the following letter of one of the foremost scientific men of America, who is president of the New York Board of Health and Professor of Chemistry in Columbia College.

Health Department,  
New York, April 15, 1881.

To the Honorable the Board of Health:

At a meeting of the Board of Health, held on the 13th inst., the following report of the president was unanimously adopted, and a copy was ordered to be forwarded to your honorable body:

"I have the honor to report that the petition of citizens referred to the Board of Health by the Honorable Board of Aldermen, with regard to the illuminating gas which is manufactured from anthracite coal and naphtha, the so-called 'Water Gas,' has been duly considered.

This gas has been extensively used in the City of New York for some years, in public and in private buildings. While it differs somewhat in composition from illuminating coal gas, it involves in its careless use the same source of danger, if allowed to escape into the air, without being burned with the air, and is liable to suffocate persons who may remain for any length of time in the atmosphere thus contained. There are no facts which give any substantial foundation for the apprehension

of the petitioners, that this gas is in any way more dangerous than the gas previously in use. I would further state that the allegation that this "water gas" has been prohibited in Paris, is directly denied by Prof. Adolph Wurtz, of that city, in a letter which I have before me; that the greater density of the gas causes it to pass more readily from leaks, than is the ordinary coal gas; that it is not so readily as in the case of other gas. In conclusion, I would say that I see no reason why any official action should be taken on the subject."

(Signed) C. F. CHAMBERLAIN,  
President.

**DEPARTMENT OF PUBLIC WORKS.**  
COMMISSIONER'S OFFICE,  
No. 31 Chambers Street,  
New York, June 13, 1881.

Hon. Wm. R. Grace, Mayor.

Sir—In answer to the enclosed letter of Mr. Samuel M. Todd, of New Orleans, which you have referred to me, making reference to the alleged "water gas" in this city, I beg to say that the so-called "water gas" is made by the Municipal Gas Light Company, and is about 40 per cent of gas made, and the balance being about 3,000,000 cubic feet of gas daily. The company owns the right to make this gas in this city by the "Wentz-Murray" process.

The New York Gas Light Company—the oldest in this city, organized in 1825—has purchased from the "Wentz-Murray" process to make this gas for its customers, and has charged no works to that end, sending out about 1,000,000 cubic feet of gas per day.

From their facts, and from general information on the subject, it appears that the water gas is satisfactory to consumers and profitable to the company. Very respectfully,  
(Signed) HENRY O. TRAUTMAN,  
Commissioner of Public Works.

**OFFICE OF GAS SUPERVISOR.**  
CITY HALL, BALTIMORE.  
June 14, 1881.

Some M. T. E. Secretary of the Baltimore Gas Light Company, Baltimore, Md., has written to me, asking the Mayor of this City, I have a great pleasure in the fact that.

What is known as the "L" process of water gas, is particularly useful in Baltimore, and has been for the past two years. It appears to give universal satisfaction to all who use it.

There are three gas companies here, two of which make "water gas," and the other manufacturer of "water gas."

Yours truly,  
F. W. KISS,  
City Supervisor of Baltimore, Md.

**MUNICIPAL GASLIGHT COMPANY.**  
At \$2.50 per 1000 cubic feet.

1877	8 37.6
1878	8 7.0
1879	8 9.0
1880	8 7.5
1881	8 7.5
1882	8 7.5
1883	8 7.5
1884	8 7.5
1885	8 7.5
1886	8 7.5
1887	8 7.5
1888	8 7.5
1889	8 7.5
1890	8 7.5
1891	8 7.5
1892	8 7.5
1893	8 7.5
1894	8 7.5
1895	8 7.5
1896	8 7.5
1897	8 7.5
1898	8 7.5
1899	8 7.5
1900	8 7.5
Total	893.75

**MANHATTAN GASLIGHT COMPANY.**  
At \$2.50 per 1000 cubic feet.

1877	8 17.00
1878	8 12.50
1879	8 11.25
1880	8 13.00
1881	8 11.75
1882	8 11.25
1883	8 11.75
1884	8 11.25
1885	8 11.75
1886	8 11.25
1887	8 11.75
1888	8 11.25
1889	8 11.75
1890	8 11.25
1891	8 11.75
1892	8 11.25
1893	8 11.75
1894	8 11.25
1895	8 11.75
1896	8 11.25
1897	8 11.75
1898	8 11.25
1899	8 11.75
1900	8 11.25
Total	814.50

The following column of statements will explain these facts:

(Signed) C. F. CHAMBERLAIN,  
COLUMBUS, O., Sept. 14, 1882.

To Hon. Wm. R. Grace, Mayor of Baltimore, N. Y.

Please advise me if the associated water gas, manufactured by the Municipal Gas Light Company, of your city, gives satisfaction to consumers.

(Signed) E. C. BRIGGS,  
Member City Council of Columbus, Ohio.

**WESTERN UNION TELEGRAPH COMPANY, NEW YORK,**  
September 14, 1882.

The gas you speak of, manufactured by the Municipal Gas Light Company of this city, of superior quality and is, I think, a decided success.

(Signed) C. R. PARSONS,  
Mayor.

**ROCHESTER GAS COMPANIES.**  
PROF. LATIMORE'S TABLES AND STATEMENTS OF CHEMICAL LAWS—COMMERCIAL VALUE OF THE GASES—SOME PRACTICAL DEDUCTIONS.

The Municipal Gas Light Company