

THE PLUMBER & SANITARY ENGINEER.

PUBLIC HEALTH DRAINAGE WATER SUPPLY VENTILATION HEATING LIGHTING

Trade Mark registered in the Patent Office, Washington, D. C., February 12th, 1878.

Volume 2.
Number 13.

NEW YORK, SEPTEMBER 1, 1879.

Terms, \$2.00 per Year in advance.
SINGLE COPIES, 10 Cents.

Entered at the Post Office at New York, N. Y., as second class matter.

THE PLUMBER AND SANITARY ENGINEER.

CHAS. F. WINGATE, Editor.

REGULAR CONTRIBUTORS:

EDW. S. PHILBRICK, C. E. GEO. E. WARING, Jr., C. E.
Prof. HENRY MORTON, Ph. D. ROBERT BRIGGS, C. E.
T. O'CONNOR SLOANE, Ph. D. Dr. JOHN S. BILLINGS, U.S.A.

The aim of this paper is distinctively to ENLIGHTEN THE PUBLIC regarding the essentials of House Drainage and Water Supply. It is NOT A TRADE PAPER, and does not publish Price Lists. It contains matter for the Householder as well as the Professional and Practical man. It should be read by all people who either build houses or who live in them. Its reading columns and editorial opinions are POSITIVELY NOT FOR SALE. The advertising rates are published, and advertisers are responsible for any statements they may make in their cards, but no reading notices, editorial puffs, or other similar matter will be obtainable, and our canvassers are forbidden to promise such favors.

Published on the 1st and 15th of each Month,
Terms, \$2 per year, postage paid.

Newsdealers will please order through *The American News Co.*
Subscriptions to Great Britain and Australia, \$3. South America,
West Indies and Mexico, \$5. France, \$3. Germany, \$3.

FOREIGN SUBSCRIPTION AGENCIES.

Havana: R. I. Cay. Mexico: Eduardo C. Wise. Bogota, U. S. Columbia: Enriqui Ramos Ruiz. Caracas, Venezuela: Chas. J. Bandman. Lima and Callao, Peru: William Widlund. Valparaiso and Santiago, Chili, Hazen & Compton, J. P. Read. Guayaquil, Ecuador, P. M. Eder. Rio Janeiro, Brasil. Slaughter & Co. Buenos Ayres, Argentine Confederacy, J. Hibbarb. Montevideo, Uruguay, Le Bas Nuttall. Pernambuco, Brazil, Joaquin Jose Ramos. Mexico, Martinez Garcia & Co.

Foreign Subscriptions may also be sent through U. S. Agency for Promoting Foreign Trade, 54 Broad Street, New York.

Fractional parts of a dollar may be sent in postage stamps.

Subscribers will please notify us of any failure to receive the paper, and also of any change in their address.

All communications to this journal should be addressed to "THE PLUMBER AND SANITARY ENGINEER." When addressed to Editor or Publisher by name, they are supposed to be of a private nature.

For advertising rates or other information, address

THE PLUMBER AND SANITARY ENGINEER,
P. O. Box 8087. 140 WILLIAM STREET, NEW YORK.

A Pink Wrapper indicates that Subscription has expired.

TABLE OF CONTENTS.

EDITORIALS: Our Sanitary Code.—Chicago Plumbing.—Memphis.—Boston Grave Yards.—Licensing Plumbers	305
How Yellow Fever is Propagated.—Col. Waring Controverted.—Newark Hatters' Disease.—Training School for Nurses.—Kentucky Vital Statistics	306
Requirements for the Drainage of Every House.—Domestic Sanitation, No. 5, by Edw. S. Philbrick, C. E., Heating Apparatus	307
A Hospital minus Air and Drainage.—Chicago Drainage.—Mr. Dickenson's Plan of Ventilation.—American Social Science Association	308
Food Adulteration Abroad, by Prof. Henry Morton.—English Sanitary Notes	309
Sanitary Defects of Public Institutions.—An Hour with the Health Board.—Polluted Water.—Early Medical Practice.—Model Tenements and Flats—London "Bosh" Butter	320
Building Intelligence—New York, Brooklyn, Boston, Philadelphia, Baltimore, Cincinnati, Chicago, Newport, Holyoke, &c.	321, 322
Gas Department, Semi-annual Meeting of the New England Association of Gas Engineers	323
Rival Schemes of Heating, by Robt. Briggs, C.E.—Gas Notes	324
Book Reviews—Long Life and How to Reach it; Appleton's Health Primers; Report Wisconsin Health Board.—Queries and Replies	325
Advertisements	326, 324

The public are gradually realizing the vast extent to which "crooked" plumbing is sapping the health of the community. Every day new facts come to light, showing the shocking way in which drains are laid and pipes put together in dwellings and, indeed, all kinds of buildings. The reports of the tenement house inspectors, in the daily papers, reveal a deplorable neglect of health and decency in these houses. When it is stated that like defects, only in a less degree, exist in the bulk of the better class of city residences, it is apparent that reform is imperative.

Mere wholesale denunciation of plumbers will not do any good. This only confounds good men with bad, and if anything, helps the latter to get work. What is necessary is to summarily put a stop to the employment of incompetent and unscrupulous men who do the scamped work so common everywhere. The whole tendency of sanitary thought and discussion in this country is in this direction. The end to be accomplished is three-fold. *First*, to exclude sewer gas from dwellings; *Second*, to check the vast waste of water which is exhausting the reservoirs of all our large cities; *Third*, to stop the general saturation of the soil with water and sewage, which fosters malaria and renders large sections of country unhealthy.

Much can be accomplished by intelligent and honest official inspection. Authority must be had to examine and pass upon all work in new buildings before they can be occupied. In order to have intelligent action and practical results it is necessary to have a comprehensive code of rules. As a basis for such a code we have prepared with considerable care what seems to us essential at this time, which will be found on another page under the title "Requirements for the Drainage of Every House."

The Chicago *Times* deserves commendation for the vigorous manner in which it has exposed flagrant cases of bad plumbing, and in mentioning the men responsible for it. This will have the effect of causing others to use more caution.

We think, however, that it should be very careful in suggesting or endorsing plans of drainage. It can hardly be expected that the average reporter, while possibly quite competent to report upon flagrantly bad work, is capable of giving sound technical advice on such matters. The *Times* will do well, therefore, to refer its readers to experts of recognized position and ability.

For the past eighteen months, this journal has pointed out the defects, to which the attention of

Chicago people is now so forcibly called, and has repeatedly suggested their remedies.

We shall be glad to receive inquiries from any Chicago residents, and give them the benefit of the experience of the ablest sanitary engineers in the country. Chicago has had its full share of skin building, and rascally and ignorant plumbers, and we hope the *Times* will keep on till it has secured a good license law, a proper sanitary code and honest official inspection.

A Memphis editor summed up the lesson of the Southern plague of 1878 in these words:—"We have had enough of charity and heroism; next year let us try common sense and drainage." If this wise counsel had been obeyed, we should have been spared the present epidemic in the southwest, with the vast damage it has inflicted on health and prosperity. It seems useless to waste sympathy where people have so wilfully neglected their duty. Precautions have no doubt been taken, but they have been neither prompt nor sufficiently radical. The public authorities have tried to do their duty, but householders have refused to keep their premises clean, and fostering conditions for contagion have been abundant. The time is past for repentance. Memphis is a doomed city. The rigid quarantine will doubtless prevent the infection from spreading, but her commerce and prosperity are destroyed. Most of her inhabitants have fled, and the remainder must remain in a state of siege till the frost comes. It is to be hoped that this second warning will then be heeded, and that proper precautions will be taken against a return of the disease.

Some of the "solid men of Boston" are exercised on the subject of their ancient graveyards, stowed away among the streets of the city, in Paul's churchyard, at King's Chapel, and the old Granary ground near the Common. Mr. George W. Phillips, brother of Wendell Phillips, whose family burial-place is in the latter place, recently appeared to defend the cemetery against a sanitary citation from the prosecuting attorney, Mr. Whitmore. He said that only twenty interments were made in it between 1873 and 1878. But the sense of the people at large is against such places. A story is told of a country visitor who came to Boston lately and put up at the St. James Hotel. Next morning he looked out of his rear-room window and saw the graves of Paul's Church. He migrated at once to the Parker House and asked for a front room. Having taken possession, he looked out into School

RIVAL SCHEMES OF HEATING.

BY ROBERT BRIGGS, C.E., OF PHILADELPHIA.

If the fortunate holder of funds, the depositor of money lying idle in a bank, has any question as to the propriety of making investments in patent rights and exclusive grants for the systematic heating of a city by steam, if he has doubts as to which square mile it is best to stake his capital, if he ever happens to consider the want of experience of those who with him are about to invest in these engineering problems, then he can take to the alternative method with satisfactory certainty in effecting a permanent investment. In place of steam, or the great heat distributor, he will find commercial hydrogen gas to become an alternative. The modern joke (for we believe it not fifty years old) is, "You pays your money, and you takes your choice."

The theory of the case for either competing method is based upon the relative quantities of heat which they will convey from the works of generation to the places of useful consumption. When it is found that the heating effect of a pound weight of coal gas when burned in air at 70°, and the products of combustion are reduced in temperature to 70°, compared with the heating effect of steam at 212° also reduced to 70° bears the ratio of 18½ to 1. And it is also found that in the comparison of heating effect by volume that a cubic foot of gas burned is 15½ times as efficient as a cubic foot of steam at 212°, the heat in both cases being utilized to 70°. It is also an admitted practical fact that each pound of coal will produce in the usual gas works about four cubic feet of coal gas, and will generate with boiler of average construction or economy from water of 70° about 250 cubic feet of steam. That is, the heat effect proceeding from burning equal weights of coal in gas making, or in steam generating is about as 1 to 4 in favor of the steam.

On these data it is possible to found various hypothesis for profitable employment of one or the other agent. The value of gas is readily settled. The price to-day in American cities may be taken at \$2.25 per 1,000 cubic feet. It may be urged that this price is exorbitant, too great for any supposed enlarged demand, that some novel method of gas making will reduce it materially, say to a half or a third this value; but such views may be summarily replied to. No speculative inventor of to-day would for a moment regard favorably a scheme for "investment" which does not promise quite as good return as has been "realized" by the present holder or original investor in gas stocks. The price of \$2.25 per 1,000 feet is derived from the use of accumulated plant capital of many years. It is very doubtful if it would be remunerative if new works, new mains, new services, were put in by new capital. This price is the result of undivided earnings when much larger prices per thousand were charged against consumers. In particular localities, such as are now fostering rival gas works, it can be afforded to sell gas as low as \$1.60 per thousand, but the distant spread of mains to half-built-over territory is destructive of profit to the general company. Any project which supposes a large reduction of the price of gas for heating purposes as the intermediary source of earning great dividends for new gas companies carries a fatal error in its figures.

The value of steam as a commodity to be supplied where power and heat are wanted is more indeterminate than that of gas. The difficulties of extended and of discontinuous supply arising from loss of heat in the distributing mains and branches are very considerable. In the general way that our gas distributions are planned and laid for contingent, present, or for future use, it is entirely impracticable to devise a steam pipe distribution. Both prime cost and needful economy from loss of steam call for special and particular estimates to meet the exact positive requirements of the pipes conveying the steam to some known and definite use. All the data for computing such sizes as will effect a purpose of steam heating or power at best economy are well

known to competent engineers but the limits are very positive and rigid. The steam supply pipe has three separate fluids to transmit—steam, air, and water. No protection except a heated envelope can avoid loss by condensation in steam pipes. By no possible means could a teapot be heated by steam with any economy three times each day at a point 100 feet distant from a steam main. Steam at the boiler may cost little enough; what it is worth delivered, in hot cakes, to the man or woman who wishes to warm a room in winter or run a sewing machine in summer a mile from the boiler, we leave for demonstration.

There is one more way to look upon the proposed general use of coal gas as fuel: that is, to compare it with coal itself, pure and simple, as a suitable fuel for consumption under boilers, in house furnaces, and stoves. A ton of coal gas (2,240 lbs.) is equal to 70,350 cubic feet, and, at \$2.25 per thousand, should bring \$158.29. As fuel this ton of gas will produce (approximately) twice as much heat as coal, consequently about \$80.00 per ton may be taken as the value of heat effect compared to anthracite coal at say \$5.00 per ton.

This view of the comparative cost of gas as fuel for general use, is, however, a very unfair one when applied to some particular instances. Thus the gas engine as a substitute for a steam engine where a small quantity of power is occasionally needed, presents the advantage of readiness in application, and economy in starting of and stopping, which makes it on the whole the more economical, even if the gas and water demanded by the engine are worth, as will cost the user, six cents per horse power per hour, while the coal to effect the same purpose will cost, (with fireman's wages), only two cents per hour. That is, there are many demands for power in a small or occasional way that fully, and more than fully compensate for the use of the more expensive fuel. For household purposes also, especially in the summer season, the prime cost of the fuel is the lesser item. The problem of boiling the tea-kettle, which is propounded as the *crisis* of steam heating, is solved instantly by the gas supply. Always on hand, effective with the least loss of heat and the smallest combustion of the fuel, "commercial hydrogen gas," delivered from the supply pipes of the system for public lighting, offer an absolute saving of cost, when restricted to domestic culinary uses, over the much less expensive but less available fuel. It is greatly for the interest of the legitimate gas companies to stimulate and encourage this new application of this commodity. All the coal gas that is consumed for other than lighting purposes they can afford to sell at a mere profit on the cost of production at their works, as the two great items of their expenses, the interest on capital expended in distributing mains, branches, and meters, and the losses from leakage of gas from these mains and connections, are not in the least increased by this kind of increase of consumption. This has been recognized by the New Orleans Gas Light Co., which makes a considerable reduction of rates to consumers who put in gas stoves or gas engines.

This investigation into the possible economy of methods of furnishing heat to meet certain requirements and under certain conditions, has led us away from our argument.

A franchise—an exclusive monopoly—has been granted by the proper municipal authorities to make use of the public highways for pipe ducts to be used by one "system" of heating. Such a right is asserted to be highly valuable; "it is worth thousands of dollars." All the newspapers take up the subject, regardless of their interests as advertising mediums, correspondents and editors concur in the opinion that the value of this franchise to the favored company must be 'immense.' With happy consciousness the company admits this fact, and offers to reserve a contingent advantage for the city. "We will be liberal," says the company, "we only ask liberal treatment to allow us to effect the great public end we have in view." The projectors willingly submit to all hard names, anxiously

desire the public to be *convinced of their shrewdness* in shutting out a rival method. When the public can be brought to believe the right of crossing under a street is worth so much to the scheme, what will it think must be the value of the invention or a share thereof?

GAS NOTES.

A German statistical paper recently published the following details relating to the gas-works in the Empire:—Number of private works, 262; annual production of gas, 3,814,671,000 cubic feet; maximum production per 24 hours, 16,559,500 cubic feet; number of public lights, 51,256; number of private lights, 1,059,225; amount of capital employed £2,713,117. Number of municipal works, 220; annual production of gas, 7,955,959,500 cubic feet; maximum production per 24 hours, 38,048,000 cubic feet; number of public lights, 86,481; number of private lights, 1,744,713; amount of capital employed, £5,748,425. Total number of works, 482; total annual production of gas, 11,770,630,500 cubic feet; total maximum production per 24 hours, 54,607,500 cubic feet; total number of public lights, 137,737; total number of private lights, 2,803,948; total amount of capital employed, £8,461,542, or at a rate of 14s. 4.53d. per 1000 feet of make.

An explosion occurred in the Dartford, England, gas works July 1st. The gas holders worked in a cast iron tank, which rose 16 feet above ground. The tank gave way, sending torrents of water all over the works when the gas exploded *in the holder*, which seems somewhat mysterious. It blew the water casing plates all about raised the brick wall surrounding the works to its base, but only injuring one man. The gas holder was 100,000 cubic feet capacity recently erected.

A meeting of gas engineers was held July 8th, at the office of Mr. F. S. Sherman, engineer of the New Haven Gas Light Co. The meeting resulted in the formation of the "Connecticut Gas Engineers' Association." John P. Harlin, President; F. C. Sherman, Vice President; Charles H. Nettleton, Secretary and Treasurer. Meetings quarterly, on the third Wednesday of March, June, September, and December.

Dr. D. H. Wahl says: "The time is not far distant, when we shall have 'heating-gas' laid through the streets of our cities and towns, side by side with lighting-gas and water-mains, and when our mills and factories and workshops, our parlors and kitchens will be supplied with heat from that source, and when fires of wood and coal, with their abominations of dirt and ashes, and extravagance, will be looked upon as nuisances of the 'good old times' when they knew no better."

A Denver correspondent of the N. Y. *Sun*, writes that in that city bills are run up strictly as a matter of convenience, and their collection seems to be surprisingly easy. The amiable President of the Gas and Water Works, Col. Archer, told him, for instance, that all the gas company lost last year in bad debts was \$3.75, and that only one attempt was made on the part of a householder to escape paying the water tax, by helping himself at the tank of his neighbor.

The London gas companies are endeavoring to extend the use of gas for cooking and heating purposes, and report an increase of business consequent on the growing demand in this direction. "In Paris these objects," says the *London Engineering*, "have long added to the prosperity of the gas company, and will doubtless have the same results here, when by improved apparatus, certain prejudices against gas have been overcome."

The certificate of incorporation of the Goshen, N. Y., Gas-Light Company was filed recently. The trustees have authorized the company to use the streets for laying gas pipes, and exempting them from taxation for three years from date. The work of building works will commence at once.

The electric light is said to burn as well in a rain storm as in fine weather. One of the large hotels at Saratoga has its grounds lit by electricity, and the effect of the light on the raindrops is described as singularly beautiful.

The *Engineer and Mining Journal*, says: "The great lighting question of the future, is the distribution of cheap fuel-gas, and those who are wise will shape their course toward accomplishing this."

The City Council of Columbus, Ind., has required the Mutual Gas Co., which is about to lay its mains, to deposit \$5,000 as a guarantee against damage to the streets.

Gas in Rockford, Ill., costs \$2.70 per thousand.

SHE KNEW HE WAS THERE.—It was a warm afternoon, and young Mr. Cummagin did not go into the house, but sat down in the pleasant porch, as was his custom, after ringing the bell. Her little sister came to the door and looked at him with some curiosity. "Does your sister Mabel know I am here, Nellie?" he asked. "Oh, yes," replied the innocent prattler, "I guess she does; she told me to come out and see how shaly it made the front yard when you put your feet up on the porch railing."

A good story is told of Pierre Lorillard, the great tobacco manufacturer. A friend says to him, "Why do you let your paper sell at so high a rate?" Lorillard says, "Does it, how much?" The rate being named to him, he says, "Well, I don't think that is a high rate for a man's notes to sell at that keeps racing horses and racing yachts."