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Contents:

(Illustrated articles are marked with an asterisk.)

TOO MUCH GAS; NOT ENOUGH LIGHT.

The various companies who furnish illuminating gas to the citizens of New York appear to think that it is gas that we want, and not light. We have plenty of the former, at any rate we pay for enough, but somehow, in cold weather, the light becomes "small by degrees and beautifully less." If there ever was an absurdity, it is paying for gas by the cubic foot instead of by the volume of light it affords. What we want is light, and that is the article we ought to pay for, and the only correct measure is the photometer, not the gas meter. In every other country but this, there is an inspector appointed whose duty it is to report upon the candle power of the gas furnished by the companies; and, if it is found to be below the prescribed standard, the delinquent company is compelled to pay a heavy fine. In London, the gas inspector is a thoroughly competent man, appointed by the Government, and beyond the reach of the companies. He takes hold of the work fearlessly, and the consequence is that in that city the candle power of the gas is very much higher than with us. Some of the London companies take pride in keeping their gas up to fifteen candles, which is the maximum required of them. It is possible to make a gas of twenty-one candle power, but we could not consume it in an ordinary burner or under the usual pressure; it would be apt to smoke. The more dilute the gas is, the more readily it will pass through any given aperture; hence a gas of a very low specific gravity will rapidly run up a high score on the meter without affording any compensation in the amount of light.

If gas is to be sold by the cubic foot, then the company may pump in a quantity of atmospheric air, or let it consist of fifty per cent hydrogen, or make it of a low grade on purpose. As long as they contract to furnish gas and not light, they are at liberty to speculate as much as they please; the lapse is largely our own for not agreeing with them to give us light, and not gas.

Now that there is every prospect of a reform in many things, we propose that this question be also submitted for discussion. All we want is to have a gas of a fixed and known candle power, to have an inspector appointed to control the manufacture, and heavy penalties attached for any breach of the law; precisely as it is in London, where the whole business has long since been reduced to a system, and frauds have rarely been detected. There are certain circumstances under which the companies ought to have some indulgence shown them, for example: sudden changes in the temperature cannot be anticipated, and they affect the illuminating power of the gas in a very marked ratio.

It has been found that the amount of light emitted at 32° Fahr., is 25 per cent less than at 65° Fahr., and at 4° above zero, it is 70 per cent. less than at 65° Fahr. On the other hand, increased heat is not accompanied by a corresponding amount of light, since the temperature of boiling water causes an increase of 4 per cent over the standard, and that of 320°, only 18 per cent. The loss of illuminating power is due to the condensation of hydrocarbons, which are gaseous at ordinary temperatures, but become solid in the cold. When the companies anticipate a cold snap, they manufacture a richer gas, which will bear this condensation without too great a loss in illuminating power.

The gas companies always have competent chemists, either directly in their employ, or retained for consultation; and they know how to furnish light with gas, instead of gas without light, as soon as it is made their interest to do so. As the law now stands, there would appear to be no remedy but to quietly submit, or take it out in grumbling; in the meantime, it would be well to revive the excellent bill drawn up last winter under the auspices of the Board of Health, and put it on its passage as soon as the Legislature comes together. If that bill did not contain a proviso for the inspection of gas meters, it would be well to have it inserted, as the companies furnish their own meters, and the consumer cannot know that they give correct tally until he is so assured by the authorized inspector. It is a common observation at the present time, that persons who are compelled to work at night soon complain of weak eyes and defective vision.

Many students are disabled and obliged to abandon their studies, while others have substituted kerosene oil for gas. There is no doubt that poor gas has much influence in this increasing infirmity, and this fact affords another argument in favor of a change. According to the *American Gas Light Journal*, more than one hundred million cubic feet of gas are made every month in the city of New York. As the quality of coal used is manifestly very poor, the yield does not probably exceed six or seven thousand cubic feet; but even this inferior coal involves the distillation of about 17,000 tuns a month, or over 200,000 tuns a year. It is probable that, under proper legislation, the companies will be compelled to manufacture a gas practically worth one quarter more than they now furnish to consumers; and, as the annual amount paid to all of the gas companies in New York cannot vary very much from five million dollars, it follows that the community is at least one million dollars short in this transaction. It seems hardly credible that these figures can be correct, and yet they are based on the best information that we can obtain. They are so large that, even with a discount of fifty per cent, they show how imperative is the necessity for reform in a matter in which the whole population is interested. We repeat what we said in the outset, that we have too much gas and not enough light.

PROGRESS OF THE UNDERGROUND RAILWAY SYSTEM.

While the people of New York city have been threatened with the complete disfiguration of their beautiful city by a viaduct railway of unparalleled costliness and repulsive appearance, the inhabitants of Paris are promised a most convenient mode of transit along the main thoroughfares, which will unite all the railway *termini* to one central depot, and also make two connections with the Belt Railway (*Chemin de Fer de Ceinture*). The tunnel or underground system will be adopted in the work.

There is no need to say much more in favor of this mode of construction. The subject has been exhausted in the public journals, as well as by the more convincing arguments of actual experiment on the largest scale, in London, Detroit, Chicago and other cities. The Metropolitan Railway of London affords the best illustration of what is wanted in New York, and points out the most ready and economical means for its achievement.

By making a tunnel along the public highways, the cost of the land and the more expensive item of compensation to occupants is reduced to a minimum. Add to these most important considerations, the fact that the traffic already lies in the very direction your subterranean road will take, and you need say little more to convince the public of the merits of the underground system. The large majority of the opponents of the tunnel railways will be found to consist of real estate speculators, jobbers, men with axes to grind to the detriment of the public grindstone, and the large class of local politicians whose interests lie in the total abnegation of economy and convenience. The proposed railway in Paris, as will be seen in an article on another page, will follow the course of the great thoroughfare of Paris, the Champs Elysées and the Rue de Rivoli. By it, not only will rapid transit from one end of the city to the other be obtainable, but a complete union of all the depots of the main railway lines of France will be accomplished.

There is now some hope for New Yorkers that the viaduct railway, the largest and most hideous job of the almost demolished Ring, will not be constructed. More millions of dollars than we can now reckon will be saved to the people if this imminent calamity can be averted. The Parisian company comes before the public with no other demand than the recognition of the merits of the project, and disdains to ask for pecuniary aid, either from the government, the department, or the city authorities, As all works of such vital social importance should, the Metropolitan Railway of Paris stands solely on its merits as a much needed convenience to the business world, and relies, for a dividend on its capital, on the patronage of the traveling public. And the precedent of London indicates that this is not a chimerical or visionary support to which to trust. The wants of all classes concerned are surely satisfied when a thousand trains a day run in each direction, when people are conveyed four miles in fifteen minutes, with convenient stoppages, for two cents a head, and an average dividend of six per cent is returned to the stock holders.

The citizens of New York have just broken the political power of one of the most powerful combinations against liberty and private rights that ever existed in the world. Surely the same people can throw off such burdens as the viaduct railway, with its monstrous bridges, its destruction of buildings, and its trains running in full view of the horses in the thoroughfares, and substitute a cheap, convenient, and accessible road, made for the use of the public, and trusting to its usefulness and efficiency for a profit to its proprietors.

AN EXACT METHOD OF DETERMINING THE EVAPORATIVE EFFICIENCY OF STEAMBOILERS.

At the late Fair of the American Institute in this city, there were entered for competition the Allen, the Phlegel, the Low, and the Root steam boilers, and a smaller boiler of the Blanchard design.

The Committee of Judges on steam engines and boilers being very desirous of making a trustworthy test, the Board of Managers, with commendable liberality, authorized the considerable expenditure of Institute funds which the proposed method of trial necessitated, and the series of tests has, during the last week, been concluded.

The usual method of testing steam boilers has been simply to determine the quantity of water passing through the boiler and the amount of fuel consumed during a given time, and to state the ratio of these quantities as the evaporative efficiency of the boiler. It is, however, evident that, unless the steam leaves the boiler unmistakably superheated, there is no certainty that a part, and a large proportion, perhaps, of the water may not have been carried over unevaporated, and we know how frequently ignorant or dishonest steam boiler vendors have imposed, upon uninformed purchasers, stories of fourteen, fifteen, or even more pounds of water evaporated by the pound of fuel in their very economical (!) boilers.

With a view to ascertaining accurately the relative performance of the boilers offered for trial, and at the same time giving honest and intelligent builders a weapon with which to meet such competitors as are above referred to, the Committee of Judges, Messrs. Thurston, Sloan, and Weir, caused to be built a large surface condenser of about 1,100 square feet of condensing surface, and with meters attached to measure the amount of condensing water.

The steam was delivered into this condenser from the boiler, where the pressure was, as nearly as possible, seventy-five pounds per square inch.

The trial of each boiler was twelve hours long. Steam was raised with wood to a pressure of seventy-five pounds, when the exhibitor was allowed to use coal and the trial was formally begun. The feed was measured by a meter, the water of condensation was weighed on a carefully adjusted platform scale, and the temperatures of feed, steam, water of condensation, injection and discharge of condensing water, and of the temperature of flues were all carefully recorded by selected students of the Stevens Institute of Technology, under the direction of Professor Thurston, chairman of the committee.

The quantity of heat carried off by the condensing water being known, and the quantity of water of condensation, it becomes an easy matter to determine the quantity of heat transferred to the tank by each pound of the latter, and thus to determine precisely its condition, and if wet, the amount of water brought over unevaporated.

The publication of the report will be anticipated with great interest by engineers. It is only known that the results are quite creditable to the exhibitors, and indicate that persons claiming an economy much superior to about ten pounds evaporated from 212° Fahr. by the pound of combustible may be looked upon by purchasers with great suspicion.

CONCRETE BUILDING.

The recent fire in Chicago has called forth a general discussion on the subject of fireproof building and building in general, and although we have said much at different times on the subject of concrete building, the present seems a favorable opportunity for calling our reader's attention again to this important subject.

Slowly but surely, in spite of many failures on the part of experimenters, is the truth becoming established that artificial stone can be made as durable as most natural stones. There have been many humbugs practiced, but these, though they have hindered progress, have not totally checked it. The artificial stones made by the Sorel, Frear, and Ransome processes, and those made with Portland cement, are all good, reliable stones. Of these, however, only the latter can be used *in situ* for concrete walls, and it is of the latter that we propose to speak more particularly in this article.

The erection of concrete buildings, or at least partially concrete buildings, promises, we think, a complete solution of the problem of cheap building for working men. Of all materials we know of, none compares with good Portland cement for this purpose. It has proved its value in extensive works in Europe, where, in addition to the usual effects of weather, it has had to endure the constant action of sea water. It hardens perfectly in a few hours, and forms with sand a concrete rivaling, in hardness and compactness, the best building stones in use. It can, by the addition of coloring matters, be given tints resembling brown sandstone or Nova Scotia stone, while it is far more durable than either. It is much cheaper than bricks and mortar, and can be easily molded in ornamental forms. It possesses far greater strength than ordinary brick work, and looks better when finished. It is as well adapted to inside as outside work, and may be wrought into floors and partitions. It is incombustible and as impervious to water as any stone in use.

With all these advantages, it is steadily making progress against prejudice, and we have not the slightest doubt that it is destined to a far greater popularity in the future than it enjoys at present.

This cement unites readily with sharp clear sand, gravel, broken bricks, pebbles, cinders, etc.; and hydraulic limes may, in some climates, be economically used in connection with it.

To erect buildings of this concrete requires only the skilled labor necessary to place properly the frames, in which