

## Correspondence.

Mr. New-  
bigging.

Mr. THOMAS NEWBIGGING observed that the Paper presented a concise summary of modern practice in gas-works construction and the manufacture of gas. Perhaps it would have been more acceptable both for immediate use, and for future reference, had it gone into greater detail not only as to methods of construction, but also as to their cost. It would have been more satisfactory also if the Author had expressed a more decided opinion, with his reasons for such opinion, as to the desirability or otherwise of securing the maximum results attainable in the different processes. It afforded convincing proof of the importance, from an economical point of view, of railway communication with gas-works, that the cost of delivering coal, including weighing, hauling, unloading and maintenance, should, in the case of the Windsor Street Works at Birmingham, be less than  $1\frac{3}{4}$ d. per ton. The cost of trimming alone, in works lacking in such communication, was often three times the figure stated. The statement of the cost per ton was, however, not complete without the addition of another item, viz., the interest on the capital expenditure incurred in providing the necessary communication, and the various appliances incidental thereto. The comparison, by which the superiority was asserted of working with a locomotive on an inclined railway, as against a hydraulic wagon-hoist, was scarcely put in the fairest way. Undoubtedly, if the choice were within the option of an engineer, he would select the former, but it was only in rare instances (especially on old established works) that the choice was possible. To have the inclined railway presupposed an amount of available space which did not frequently exist. The engineer in those circumstances fell back on the hydraulic hoist as being the best substitute. The hydraulic lift was of the greatest advantage, being applicable to confined spaces where an inclined railway was out of the question. It would have been of interest had the Author given the figures by which Mr. Colson had demonstrated the superiority of the inclined railway over the hydraulic wagon-lift. He was inclined to be sceptical with regard to any great superiority in economy.

As to the production of gas per mouthpiece with the regenerative system he thought that the expression of a more decided opinion was desirable. For example, the Author, in giving the results of his practice at Windsor Street, had stated that "a setting of nine

retorts will carbonize with six hours' work and  $3\frac{1}{4}$  cwt. charges, Mr. New-11 tons 14 cwt. per diem, or, say, 2,100 tons per year of 180 days." <sup>bigging.</sup> Putting the yield per ton of coal carbonized at the round figure of 10,000 cubic feet, that gave a yield of only 6,500 cubic feet per mouthpiece per day—a very low production in face of the fact that an output of about 50 per cent. more was obtained in actual practice, and that too without deterioration of the quality of the gas. True, the higher results were not obtained with "six hours' work"; but there was an evident want of economy in adopting six hours' charges, when charges at shorter intervals were not only attainable and desirable, but almost indispensable, under the regenerative system of firing. He knew instances of a production of over 6,500 cubic feet per mouthpiece being obtained from retorts of the size stated, with ordinary coke firing. Surely the Author did not quote that result by way of recommending that a production of 6,500 cubic feet per mouthpiece was the economical maximum? He recognised the improvement effected in gas-purification by the introduction of rotary washers—commonly called washer-scrubbers. Without absolutely displacing the tower-scrubbers, the employment of the latter might, under the changed conditions, be limited to the duty of eliminating the bulk of the ammoniacal impurity present in the crude gas, along with a portion of the carbonic acid and sulphuretted hydrogen; leaving the complete purification from ammonia and a further portion of  $\text{CO}_2$  and  $\text{H}_2\text{S}$  to be accomplished by the washer-scrubber. In that case and for that purpose, one tower-scrubber would serve instead of two (where two were formerly required to make a set), and it could be supplied with a constant and copious stream of ammoniacal liquor.

The Author's treatment of the question of purification left something to be desired. It might be inferred from the Paper that the only purifying medium in use was lime. Oxide of iron was barely referred to, although it was perhaps as much employed in the purification of gas as lime. He held strongly the opinion that oxide of iron should never be used exclusively in the purification of coal-gas, but that it should always be supplemented by the use of lime to remove the  $\text{CO}_2$ . In so far as the Paper dealt with lime-purification, it was full and satisfactory, and the facts given were suggestive and useful. As regarded the "enrichment" question, his opinion was that the adoption of any such process in places where the prescribed standard of illuminating power did not necessitate enrichment, would not survive. The

Mr. Newbigging. folly of enriching, say, 16-candle or 17-candle gas, should be patent, and yet that was actually being done. Gas of 14 to 15 standard candle value, purified by lime, either entirely or in conjunction with oxide of iron, was a commodity which was likely to give not only a better illuminating effect than the higher standards, but also to be free from the nuisances accompanying the use of the rich gases. It was becoming increasingly evident that illuminating power, as indicated by present photometrical methods and appliances, was not synonymous with illuminating effect. The scientific explanation of that apparent paradox was not yet forthcoming in any full and satisfactory sense, and would only be arrived at after more consideration and research had been devoted to the subject. Probably the solution would eventually be found in an investigation of the phenomena implied by the two old and suggestive terms quantity and intensity, which had of late years almost passed out of the gas-maker's vocabulary. It would have rendered the Paper complete had the Author made some remarks on the distributing-plant of gas-works. There could be no doubt that much of the success of the coal-gas industry, both from a pecuniary point of view and from that of gas as an illuminant, was due to enlarged mains and service-pipes in displacement of the restricted sizes in use twenty-five or thirty years ago; so admitting of a reduction of the pressure, with a consequent reduction of loss by leakage, and practically producing increased illuminating value.

Mr. Tysoe. Mr. JOSEPH TYSOE did not think that in selecting a charging-machine preference should be given to one which required the coal to be as little broken as possible. In his experience that consideration would certainly have no weight, as the coal was principally dust when it arrived at the works; and as preference was given to moderate charges, no difficulty occurred in carbonizing it. He agreed with the Author that a moderate charge was the best. Some time ago he used to employ rather heavy charges; and, although they were apparently well burnt off, he had felt convinced that the make per ton was not what it should be. He had then reduced the charge to 3 cwt. or a little less—reducing also the heat; and from that time an increased yield of 100 cubic feet per ton had been obtained. By the reduction in weight of coal carbonized there was an increase in the carbonizing wages which was more than compensated by the increased yield, whilst the employment of lower temperatures prolonged the life of the retorts. No doubt the Author had ground for his assertion that

no advantage was derived from the use of hot coke; but his own Mr. Tysoe. experience was that if from any cause a sufficient supply of hot coke direct from the retorts was not available, and cold coke had to be used, the effect was soon apparent on the heat of the setting. In stopping twelve hours on Sundays, as was the practice at the works in his charge at East Greenwich, the furnaces had to be kept up with cold coke and it usually took twelve hours for the settings to recover their normal temperature.

As regarded the advantages attending the employment of regenerator-furnaces, he was of opinion that quite as good results might be obtained by generators and that the outlay for conducting the waste heat from the settings back into the combustion-chamber by means of the ingoing air was an unnecessary expense. All the furnaces at the East Greenwich Gas-works were simple generators, constructed without the aid of a single special brick, provided with horizontal passages along the sides for the secondary air, which was somewhat heated by radiation from the furnaces. In the combustion-chamber there was always sufficient heat; and he failed to see what would be gained by constructing expensive regenerating-chambers for absorbing and retaining heat, for no other purpose than to deliver up a small portion of it to the secondary air, to be carried into a place where it was not wanted. The fuel consumed by the Author's regenerators was given as 10·38 per cent. of the coal carbonized. With the simple and inexpensive generators Mr. Tysoe had described, the fuel account for the last six years had averaged less than 9 per cent. of the coal carbonized.

Mr. CHARLES HUNT, in reply to the Correspondence, said, in regard Mr. Hunt. to Mr. Newbigging's observations, that he had purposely avoided giving figures which could have no general application and might be found misleading. No one was more able than that gentleman to give point to the suggestions contained in the Paper; and the cost he had given for coal-trimming only, viz., three times  $1\frac{3}{4}d.$ , or  $5\frac{1}{4}d.$  per ton, multiplied by the tonnage dealt with, would alone represent, in Mr. Hunt's case, a yearly saving far in excess of any possible burden imposed by the capital outlay upon railway approaches. As to Mr. Newbigging's objection to the preference expressed for inclined railways, it need only be stated that in the case of the Leicester Gas-works, a wagon-hoist had to be abandoned because it proved unsuitable for dealing with any considerable amount of traffic. The figures relating to regenerative-furnaces scarcely justified the disappointment ex-

Mr. Hunt, pressed, illustrating as they did, the rapidity with which, under the least favourable conditions, viz., six-hour work, the extra cost of those furnaces was repaid by the saving in coke. They had no reference to increase of carbonizing-capacity. This was dealt with in the succeeding paragraph, and was shown to be very much a question of quality of coal; and if Mr. Hunt had not been emphatic upon this point, it was because he had no wish to invest it with fictitious importance. The increase in carbonizing-capacity did not imply any increase in illuminating value derived from the coal, but sometimes the reverse; nor did it appreciably affect the working expenses. It did imply a small reduction in capital outlay and a saving in space, which in some cases was an important consideration. In his experience, moreover, it was as little reasonable to anticipate from varying qualities of coal uniformity of production per retort, as equality of yield per ton. With some coals he found it quite easy to work these furnaces with four-hour charges, but other coals required a longer interval between the charges.

With regard to purification, had he referred to the system mentioned by Mr. Newbigging, it could only have been to point out the extent to which it had been superseded by other methods aiming at more complete purification; namely, elimination of the compounds of sulphur other than  $H_2S$ , in addition to the latter and  $CO_2$ . His object had been to deal with these and with the most recent problems connected with them. As to enrichment, if Mr. Newbigging could succeed in relieving engineers of their obligations to supply "16-candle or 17-candle" gas, he would find them only too ready to fall in with his views as to the adequacy of "14 to 15 standard candle value."

He could not but acknowledge the excellence of the retort-setting referred to by Mr. Tysoe, and also that machine-stoking had to a great extent overcome the objection to the two top tiers of retorts in that setting being placed out of reach from the stage. It should be pointed out that the statement of coke used as fuel with and without regenerative-furnaces was merely comparative and could only be applied to the two works where similar coals were used. To apply them in the case of other works where, perhaps, coals were used which required less heat for carbonization, or produced a better coke as fuel, would not afford a fair comparison; and, good as were the results obtained by Mr. Tysoe, they would in all probability be improved by the adoption

of the regenerative system. In his own case, also, a large portion Mr. Hunt. of the fuel was in the shape of unscreened breeze; and no deduction had been made for the consumption in the retort-house for purposes other than that of heating the retorts.

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10 April, 1894.

ALFRED GILES, President,  
in the Chair.

The discussion of the Paper on "The Construction of Gas-Works" by Mr. Charles Hunt occupied the evening.

The President and Council then held the fourth Monthly Reception of the Session.

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