Chemistry, Physics, Technology.

GLASS AS AN OBSTRUCTOR AND REFLECTOR OF LIGHT.

Mr. F. W. Hartley has recently contributed to the London *Journal of Gas Lighting*, three interesting papers in which he aims to arrive at the amount of light absorbed by the various kinds of glass globes and also by sheet glass. This work has been done from time to time by others, but in no case has the subject been treated in the exhaustive manner which characterizes Mr. Hartley's experiments. The author mentions the work done in this direction by Mr. W. King, of Liverpool, and Mr. A. H. Wood, of Hastings and adds, "the statements of these two gentlemen embrace all the published facts upon this subject." We would call attention to the experiments made some years since by Prof. F. H. Storer, of Boston, which certainly deserve mention as having been made with great care, and in which so important an item as the thickness of the glass was taken into the consideration. This may account for the varying results obtained by different experiments. For instance, one reports the light absorbed by a ground glass globe to be 40 per cent., while another gives it as 29.5 per cent. The point of discrepancy cannot be settled, as neither one mentions the style of globe experimented with. Then too, there is considerable difference in ground surface in different globes, some obstructing somewhat more light than others.

Mr. Hartley in all of his experiments used the Methven light unit—mention of which was made some time since in these columns—and he says that "without its aid it would have been impossible for me to make the tests with sufficient rapidity and certainty."

In experimenting on clear sheet glass with the Argand burner, it was found that the loss of light with the glass at 3½ inches was 12 per cent., which increased to 17 per cent. when the glass was placed 20 inches from the light. The cast glass used for gratings, coal-hole plates, etc., absorbs from 13 to 16 per cent., according to the distance from the light; and in the same way the corrugated plate with fine lines, absorbs from 19 to 27 per cent.

With ground sheet glass (24 oz.) the loss of light was 39 per cent. at 3½ inches, and 60 per cent. at 20 inches. It should be mentioned that the burner used gave a light of 17.5 candles. There is a greater loss of light when the rough side of the glass is toward the flame, than when the smooth side is next it, by from 2 to 4 per cent.

With both ground and opal glass the percentage loss of light was less as the illuminating power of the flame increased. Experiments were made with a sheet of thin glass in connection with a reflector of clear sheet glass placed 3½ inches behind the flame, and the gain with the reflector was 3 per cent. With regard to globes it was found that a 7-inch clear glass globe with a 19 candle gas, absorbed 3 per cent. of the light, a globe ground outside absorbed 18 per cent., while an opal globe 7 inches diameter, absorbed 56 per cent.

Mr. Hartley concluded with some interesting experiments on the influence of globes on lights placed overhead. For instance, a bat-wing burner gave, when overhead, the light of 6 candles; when surrounded by a clear glass globe there was a gain of 5.50 per cent. in the light; with a ground glass globe the gain was 9 per cent.; and with an opal globe 21 per cent.

The following are the conclusions which Mr. Hartley deduces from his experiments.

Horizontal Lighting.

Sheet Glass.

1. That ordinary sheet glass, apart from thickness, varies in its obstructive power to the passage of light. That the percentage loss increases with the distance of the glass from the flame, and increases also as the light grows stronger.

2. That ground sheet glass, apart from thickness, also varies in obstructive power. That the percentage loss increases with the distance of the glass from the flame, and decreases as the light grows stronger. That the percentage loss depends on which side, clear or ground is presented to the flame.

3. That with flashed opal the losses follow the same law as ground glass for distance from, and for power of light.

4. That with clear glass as an obstructor of light in front of the flame, and clear glass behind the flame as a reflector of light, the reflected light reduces the loss to a degree dependent on the distance of each glass from the flame.

Globes.

5. That a clear glass globe obstructs light from an Argand flame, but increases the sensible light from a flat flame.

6. That globes of ground glass obstruct less light than sheets of ground glass. That the percentage loss diminishes as the light grows stronger; and is, for an average light, from eighteen to twenty per cent.

7. That opal globes obstruct an amount of light equal to 33 to 65 per cent.

Overhead Lighting.

8. That the amount of light yielded by a flame in an angular direction is much less than it yields in a horizontal direction.

9. That glass globes with elevated or overhead Argand flames reduce the power of the light—clear globes, about 3 per cent.; ground globes, about 21 per cent.; and albatrine globes about 23 per cent.

10. That glass globes with flat flame burners, at a certain elevation and within a certain radius, increase the power of the light—clear glass, about 6 per cent.; ground globes, about 9 per cent.; albatrine globes about 23 per cent.; and German opal globes about 21 per cent.

11. That reflectors greatly increase the power of the light within a radius dependent upon the shape and size of the reflector; the range of the experiments being from 52 to 92 per cent.

12. That screens at the base of an Argand flame cause a reduction in the power of the light, whatever be the size and form of the reflector.

THE ALBO-CARDON LIGHT.

There is probably no article of consumption which is so much wasted as coal-gas. This waste arises from various causes; uncontrolled pressure and defective fittings, both assisting to rob the consumer of a large proportion of the light obtainable from that which is too often in itself impure and always an expensive though necessary adjunct to the premises of business men and the conveniences of domestic life. Any new discovery, therefore, which offers a fair remedy may with reason be judged on its merits. Our attention was recently directed by a large consumer to the saving in his gas-bill which had resulted from a brief employment of that which is now known as the Albo-Carbon Light, and further investigation has fully shown that the invention is possessed of considerable merit. Some details may be interesting. The material used, of course, in conjunction with ordinary coal-gas, is pure white carbon, in a solid form, and the only addition to the chandelier or bracket is a metal reservoir which requires to be fixed at a short distance from the burner, the heat from which acting upon a small conducting plate vapourizes the carbon which combines with the gas before reaching the point of ignition. Some elaborate experiments have been made by Professor Keats, in his capacity of consulting chemist to the Metropolitan Board of Works, from which it appears that five cubic feet of gas burnt in a Bray's No. 1 burner, in connection with the Albo-Carbon apparatus, gave a mean light of 36·7 candles, showing a gain of 20·7 candles against a similar quantity of gas consumed in another burner unconnected with the new appliance. The latter when subjected to photometrical test gave 2½ times increase of light in favour of albo-carbon. The experimenter also found that light for light much less heat was evolved. We understand that the more extensive trial at the Westminster Aquarium more fully demonstrates these economic results. A further photometrical test which has been carried out at the office of the gas inspector to the Great Western Railway Company affords the following data.

Burner.	Consumption of Gas.	Candle power.	Pressure of Gas.
Bronner's Burner, No. 4.....	3·80	8·02	9·10
Bray's No. 1, without Carbon.....	2·50	1·08	9·10
Bray's No. 1 with Carbon, 20 minutes after ligthing.....	2·70	9·06	9·10
Do. 30 minutes after lighting....	2·70	13 06	9·10

Such self-evident facts speak more eloquently than words. The experiment was made on the 5th inst. and the report is signed by Mr. J. Mauder. To this we now add no more than our testimony to the exceeding brilliancy of the light as improved by Mr. George Kent, of High Holborn, under whose auspices albo-carbon is likely to become more widely known, especially if the conversion of the carbon into gas can be accomplished in a briefer period of time.—*Building and Engineering Times.*