A NEW LIGHT.

BY LEON WARNERKE.*

This new light is the invention of Captain A. De Khotinsky, of St. Petersburg. It is an improved system of the Drummond light, viz., it is produced by heating to incandescence a refractory prism of a peculiar construction.

As in the Drummond light, combustion is produced by oxygen and ordinary coal gas; however, in the Drummond light, when streams of oxygen and hydrogen gases are directed under pressure on to the lime cylinder, it will be soon observed that a cavity is formed in the lime, necessitating either a clockwork arrangement to rotate the lime, or else constant attention to move it by hand. The shape of lime, and further the cavity formed, cause the light to be directed to a certain limited space before the apparatus. The lime itself is used up in a very short time, and is very soon rendered useless by the action of air and moisture. In the new light the novelty consists in the following:

The refractory material has the shape of a prism or pencil made of a specially prepared magnesia compound, which is unaffected by air, and is even not spoiled by water; it stands the temperature so well that, although it looks so delicate and thin, it will remain burning for 300 hours. A stream of oxygen and coal gas under very low pressure† (8 inches of water) is directed on to the axis of the prism, which becomes incandescent, and, unlike the Drummond light, it is not a point, but a line of light of about 2 inches long, and, moreover, this light radiates all round. How very steady and brilliant is the light now before you can be judged by comparing it with the full gas sun-lights, gorgeously illuminating this room. A variety of lamps are used, according to their destination, such as brackets, girandoles, table, and other forms. When coal gas is not to be obtained, it can be superseded by paraffin, spirit, or other form of lamp. In St. Petersburg, it is in use at the State Paper Manufactory, where color printing is executed on a very large scale. In the shops where colored silks and other fabrics are sold the advantage of the new white light is especially appreciated. Mr. Lewitsky has an idea of using this light in his retouching rooms, where white and steady light is of paramount importance. It can also be used for the optical lantern, which is largely used for educational purposes. The lamps for this purpose are specially constructed. The size and shape of the burners and prisms are made in great variety, so as to give light from 25 to 300 candles.

There are also some special lamps constructed for use under water by divers, also for mines, and for places where no combustible gas can be used, and for powder magazines.

These lamps are hermetically closed glass vessels, having a spirit or paraffin lamp and a small tube connected with the reservoir of oxygen. The products of combustion partly accumulate in the shape of water in a specially reserved space, and gases escape through capillary openings which permit the passage of the gases but not of the water.

A manufactory of oxygen is, however, the foundation stone of this new system of illumination. Captain A. De Khotinsky has succeeded in perfecting the system of production of oxygen to such an extent that it will be possible, if only one small manufactory is established in London, to produce oxygen at the rate of 20.000 cubic feet daily, at a cost of 7s. per 1,000 cubic feet (this includes the cost of materials, 10 per cent on capital, wages, taxes, repair of ovens and machines). The cost of refractory prisms is 4s. per 100.

This is the comparative cost of the new light per hour, based on the previous data:

		d.
25-candle burner will consume oxygen	1,755 cubic inches cost...	0·070
25-candle burner will consume ordin. gas	1 cubic foot..	0 038
	Total....	0·108
The same amount of light obtained with 12½ cubic feet of ordinary gas will cost		0·475

By comparing these data, the new light will be cheaper than ordinary gas for the same amount of work.

I conclude my paper by expressing a wish that we may soon have the benefit of this new light in London, as being much superior to gas or to the incandescent electric light, while it is also more simple and cheaper.

* Read before the Photographic Society of Great Britain.

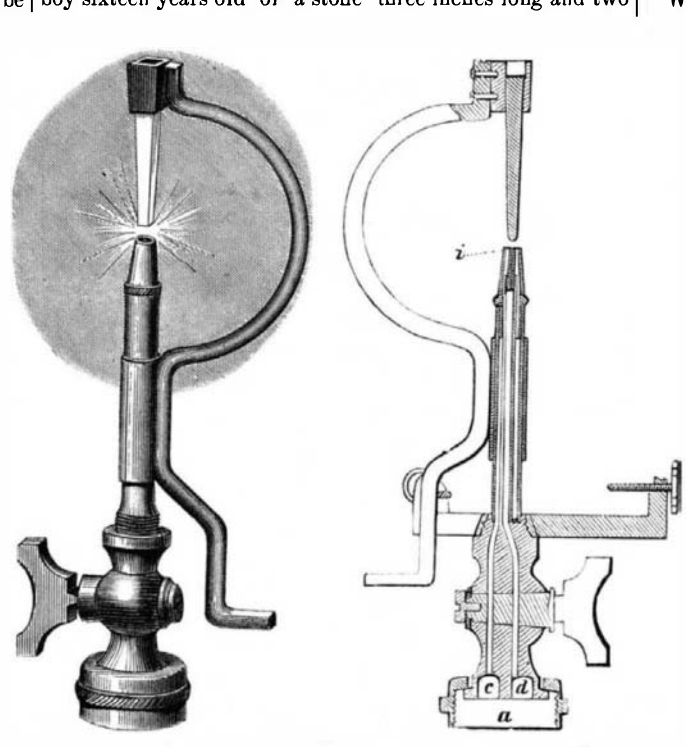
† The ordinary pressure of gas, as supplied by a gas company, can be considerably reduced by opening the taps very slightly.

The Effect of Oil upon Waves.

In reply to an objection of Admiral Bourgeois that the actual effect of oil upon waves should be fully tested before it is submitted to theoretical analysis, M. G. Vander Mensbrugghe replies that he has shown from incontestable facts that the wind produces upon the superficial layer of the sea a horizontal motion of translation, which, being sufficiently prolonged, can communicate to the deeper layers, and can propagate to a great distance very decided undulations. He has confined himself to a discussion of two cases: in the first, where the calm sea is covered with a thin layer of oil, and is then submitted to the action of the wind; in the second, where the waves break. In the first case the formation of great waves is rendered impossible by the presence of the layer of oil. In the second, a simple calculation shows that the layer of oil exerts a great resistance at the base of the breaker, and thus compels it to extend itself and to subside very rapidly without producing severe wave shocks.—*Comptes Rendus.*

Successful Surgery.

A rather remarkable surgical operation was lately performed in this city at Bellevue Hospital, by Dr. Joseph W. Howe. It consisted in the removal from the bladder of a boy sixteen years old of a stone three inches long and two inches thick, weighing 3,541 grains, being a little over half a pound; owing to its large size, the stone could not be crushed and removed in the ordinary manner; an incision was made above the pubic arch, three inches in length. The patient recovered, and was discharged in about two weeks perfectly cured. Good for the boy, good for the doctor.

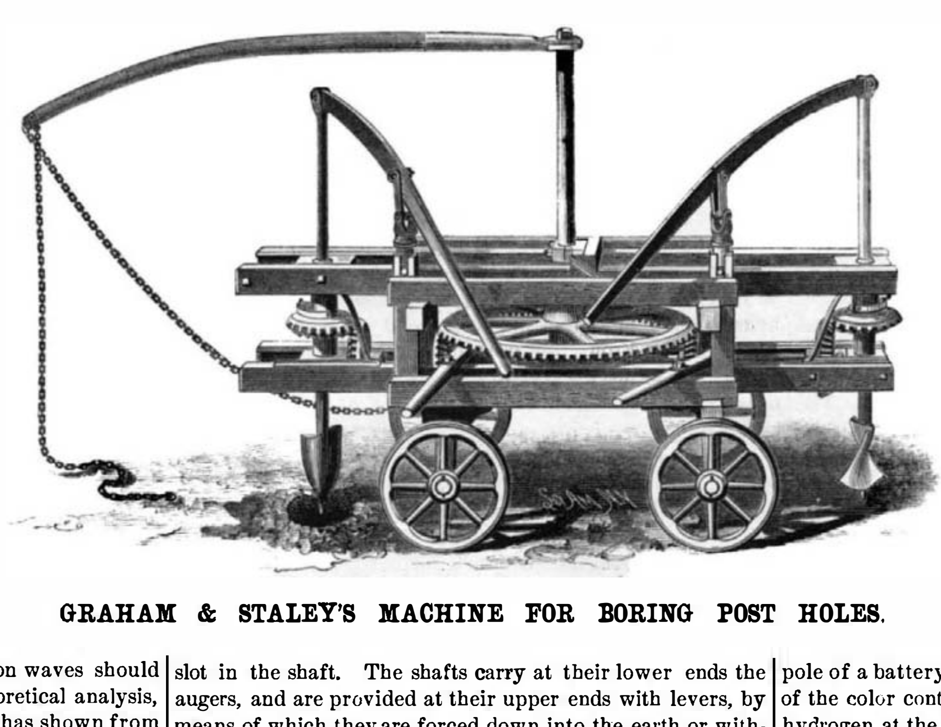


THE MAGNESIA LIGHT.

POST HOLE BORING MACHINE.

We give an engraving of a novel machine for boring post holes. It is designed for boring holes six, seven, or eight feet or more apart, according to the length of boards to be used. The machine is operated by one horse, and is capable of boring two holes simultaneously.

A solid frame mounted on truck wheels carries a central vertical shaft having on its upper end a sweep. On this shaft within the frame there is a bevel wheel, which drives two horizontal shafts, each of which communicates motion to a vertical sleeve by means of miter gearing. Each sleeve contains a longitudinally grooved shaft, which is free to slide up and down, but is made to turn with its sleeve by means of a pawl carried by the sleeve and entering into the slot in the shaft. The shafts carry at their lower ends the augers, and are provided at their upper ends with levers, by means of which they are forced down into the earth or withdrawn therefrom. One or both of the augers may be driven by the horse hitched to the end of the sweep.



GRAHAM & STALEY'S MACHINE FOR BORING POST HOLES.

By means of this simple machine post holes may be bored with great rapidity and uniformity. When a pair of holes have been bored, the machine is drawn along by means of the chains.

This useful invention has been patented by Messrs. William Graham and William H. Staley, P. O. Box 773, London, O.

Dyeing and Printing by Electricity.

For some time past Professor Goppelsroeder has been experimenting with electricity as a direct means of fixing dyestuffs upon textile fabrics, and some of the results obtained have been of a certain success, so says the *Textile Manufacturer.* His latest trials have been with the galvanic current: (1) As a means for depositing and fixing dyestuffs upon textile fibers. (2) For the purpose of destroying the dyes fixed on the fibers, and thus producing white designs, or at the same time to produce new coloration on the original colors. (3) To prevent the oxidation of colors, while being deposited, during the process of dyeing and printing. (4) For the production of vat dyes, such as indigo or aniline black, etc.

We quote the following examples of Goppelsroeder's process, as given by him in contributions to our Continental contemporaries:

In order to show the deposit of dyestuffs, aniline black may be taken as an instance. The cloth is saturated with a watery solution of an aniline salt, by preference a chlorine hydrate. It is then deposited upon a metal plate, which is isolated by resting upon a sheet of glass or India-rubber. This metal plate is placed in communication with a galvanic battery or a small dynamo machine. A second metal plate, containing in relief the pattern to be produced, is then placed upon the cloth and brought into communication with the other pole. If now the necessary pressure is applied, and the electric current passed through the damp cloth, the design will be produced in black. The time required for this deposit varies from a few seconds to about a minute, according to the ductility of the solution, the thickening medium, the nature of the acid of the salt, the temperature, and the intensity of the current. Medals and coins can thus be copied accurately, but at the same time with all imperfections. By an imperfect development this black may be changed into the green called emeraldin, or a mixture of black and green. In place of the upper plate a metal pen may be used, and thus drawings or writing be produced.

Professor Goppelsroeder is still occupied with trials as to the best thickening medium, so as to obtain sharp outlines, and so far he has obtained the best results with gum tragacanth, gelatine, or starch, while his experiments also tend in the direction of temperature, the nature of the electrodes, the concentration, and the reaction of the solutions which are subjected to the electrolysis, the necessary pressure, strength of the current, and other concomitant items.

As a practical application of this invention, Professor Goppelsroeder suggests its use in bleach and dye works for the purpose of marking or stamping the ends of the cloth so that these marks are not obliterated by the subsequent dyeing or bleaching. Where it is desired to dye yarn aniline black, it is necessary first to mordant it by a deposit of a metallic composition. It is then dipped as a positive electrode into the solution of aniline black, which also contains the negative platinum electrode, which produces dishydrogenation of the aniline or formation of black on the fiber, and its fixation at the moment of its formation.

The discoloration of certain dyes, as, for instance, turkey red or indigo blue, is produced in a similar way. For this purpose the cloth is saturated with saltpeter, common salt, or chlorine of alumina, the other arrangements being similar to those described above. On the passage of the current nitric acid is produced on the positive pole in the first case, and chlorine in the two latter cases, both of which produce white. If salts are used which, on being decomposed, form bases which are qualified to act as mordants, it is possible thus to produce new colors.

The professor is occupied with trials to deposit in this way not only bases forming mordants, but also the dyes themselves, such as artificial alizarin, purpurin, etc. In like manner aniline black has been deposited upon turkey red goods for the purpose of marking them with figures or writing.

As to the application of the galvanic current, mentioned at 3, it is to be noted that here the negative electrode plays the chief part. Metals are thus deposited, and at the same time fixed upon the fiber, by first saturating the cloth with a thickened solution of the salt of the desired metal and then bringing the negative electrode into action.

To prevent the oxidation during printing the color box is brought into contact with a wire from the negative pole of a battery or a dynamo machine, while a small channel of the color contains the positive electrode. This produces hydrogen at the negative pole and thus intercepts oxidation. This is valuable in printing with many colors, such as solid blue, and especially aniline black.

The galvanic current is useful in the manipulation with indigo by the formation of hydrogen on the negative pole, which produces a reduction of the dye in the same manner as copperas, zinc, glucose, etc.

As an idea suggested by these experiments, we may also mention the possibility of writing at a distance by the direct application of telegraphic or telephonic communication.