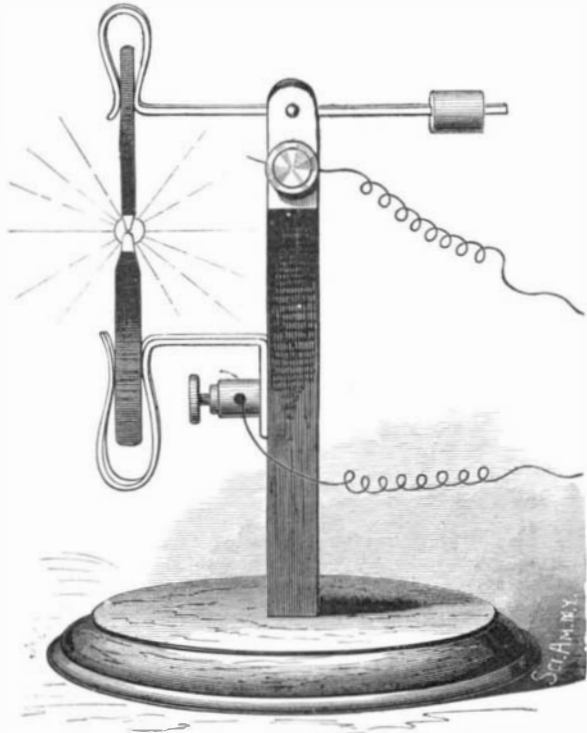


SIMPLE ELECTRIC LIGHT APPARATUS.

BY GEO. M. HOPKINS.

The engraving represents, full size, a very simple and easily constructed apparatus for producing an electric light on a small scale. To the center of the wooden base is attached a vulcanite standard, to one side of which a spring carbon holder is secured by the binding post, which screws into the standard. Two brass ears, having apertures for receiving the pivots of the upper carbon holder, are secured to the upper end of the vulcanite standard.

By placing in the U-shaped loop at the end of each holder a small pencil of battery carbon, and adjusting the holders so that the points of the carbons touch, and connecting the instrument with a battery of 4 or 6 Bunsen cells, a small but very brilliant light will be produced.



SIMPLE ELECTRIC LIGHT APPARATUS.

As the points burn away the upper carbon moves downward of its own gravity. The contact of the points, which should be light, is regulated by a movable weight on the straight end of the pivoted holder.

Town Sewage Changed into Hydraulic Cement.

In May, 1872, General Scott read a paper before the Society descriptive of a method of dealing with sewage precipitates, and then described how, by means of fire, the sludge deposited, after precipitation by lime, could be converted into strong and salable cement. That purification by lime will produce a clear effluent, and one which, thrown into a river of sufficient volume, will insure a satisfactory result, is admitted by Royal Commissions and leading chemical authorities, but the great difficulty remaining has ever been how to deal with the vast accumulation of sludge that necessarily takes place. In some cases, as at Birmingham for instance, it costs the town £14 per acre to dig it into the land, which the corporation has secured in connection with its sewage works, while at Leeds and other places it has been a source of great trouble to get rid of at any price. General Scott, however, discovered that the sludge, when dried, contains in it sufficient combustible material to act as a fuel for burning it; and he thus, at a moderate expense, converts the sludge into a powerful and useful cement of the character of Portland or Roman, according to the constituents of the sewage from whence it was derived. Repeated experiments on a more or less extended scale showed the practicability of the process. A few days since a large party, consisting of the Mayors of Burnley and the neighboring towns, with the chairmen and members of sanitary authorities in Lancashire and Yorkshire, met together, by invitation of Scott's Sewage Company, to inspect the works lately erected by the Corporation of Burnley, Eng., for carrying out this process on an extended scale for dealing with the sewage of Burnley.

The Corporation of Burnley was prohibited by injunction from allowing the effluent from their sewers to flow into and pollute the River Calder. The Corporation and Scott's Company entered into a contract whereby Scott's Company engaged to produce and have produced a clear effluent. The injunction has been got rid of, and the Corporation has recorded its satisfaction at the results which the company has attained. The works at Duckpits, a short distance from Burnley, have been erected by the Corporation, after the designs of Mr. W. B. Bryan, C.E., which exemplify the latest scientific views on the subject, in order to deal with all the sewage of the town and district except in time of floods. The Corporation deliver the sewage into the tanks, and then Scott's Company purifies it by lime precipitation, to be supplemented eventually by filtration, through coke if required. The clear effluent passes into the Pendle water which joins the River Calder. The stream into which Colne and Barrowford, Nelson and Brierfield pour their raw sewage is at present unpurified. The Calder below Duckpits also receives a considerable amount of sewage before it joins the Ribble. Duckpits thus placed, as it were, between two sources of impurity, presents a case of some difficulty.

How it is met on the Pendle water is shown by the pure effluent discharged into it. The sludge, always an offensive difficulty, is entirely cleared away by its conversion into cement (Portland and other hydraulic and Roman cements). All that has hitherto been made has been sold or used in the works. The cement is sold with a guarantee as to the strength and quality. The company is open to make contracts with any other sanitary authority. The nature of the contract and the cost of working the process depend on local circumstances.

The sewage from the town passes into four settling tanks, after receiving the proper dose of lime cream previous to entering them. After settlement, the time for which varies from a few days to a fortnight, according to circumstances, the sludge is pumped into draining and drying "backs," from whence it is dug out and carried to a heated drying floor. When sufficiently dry it is packed into kilns and burnt, the only fuel used beyond that which it contains being a small amount of coal and shavings to set it alight. At the end of a few hours the kiln is drawn, and the "cement clinkers," as they are termed, are ground into a coarse powder, which forms the cement. The cement is readily salable as Portland or other hydraulic cement, according to the character and treatment of the sludge. It is understood that these are the first works on a commercial scale for carrying out the process. The Corporation are satisfied with the effluent, and the company feel assured that the results of working up to the present time are a money success.

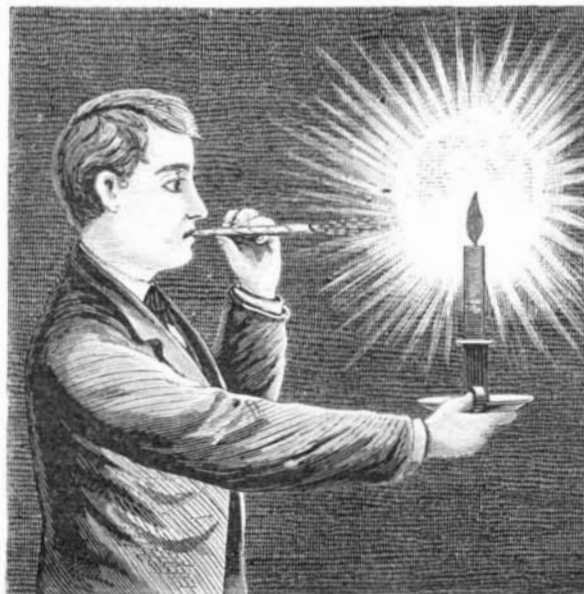
Eau de Cologne as a Peace Maker.

The Rev. H. C. McCook has given to the Academy of Natural Sciences in Philadelphia an account of some experiments he has made to determine the mode of recognition among ants. The pavement ants (*Tetramorium cespitum*), for example, are very quarrelsome, and fight like human savages whenever members of different colonies meet. They challenge all comers. If friends, they pass on; if foes, they interlock antennæ, and "have it out" on the spot. Mr. McCook thinks that they recognize friends and foes (as some savages do) by the sense of smell; and he has made the curious discovery that when fighting factions of these ants are enveloped in an atmosphere of eau de Cologne, they instantly become friendly; a truce is declared, and these natural enemies go on together for several days amicably feeding, burrowing, and building. We infer that the truce holds so long as the peace compelling atmosphere is maintained. Carpenter ants, on the contrary, are not amenable to this treatment, but go on snipping off each other's heads without regard to their fragrant surroundings.

Philanthropists may possibly find a pregnant hint in these observations. Who knows but it may be possible to discover eau de Cologne adapted to allay human passions; so deftly compounded that a bottle or two broken over the heads of rival factions (say on the 12th of July, or in a Bulgarian village) would insure instant amity?

INTERESTING EXPERIMENTS WITH LYCOPODIUM SEEDS.

The seeds of the *Lycopodium clavatum*, or club moss, are so fine that they appear as a yellow powder, and repel water so powerfully that a person may thrust his hand below the surface of water that has been well sprinkled with it without wetting his hand. This property renders it useful as a preventive of chafing in infants, and as a coating for pills to prevent their sticking to each other.



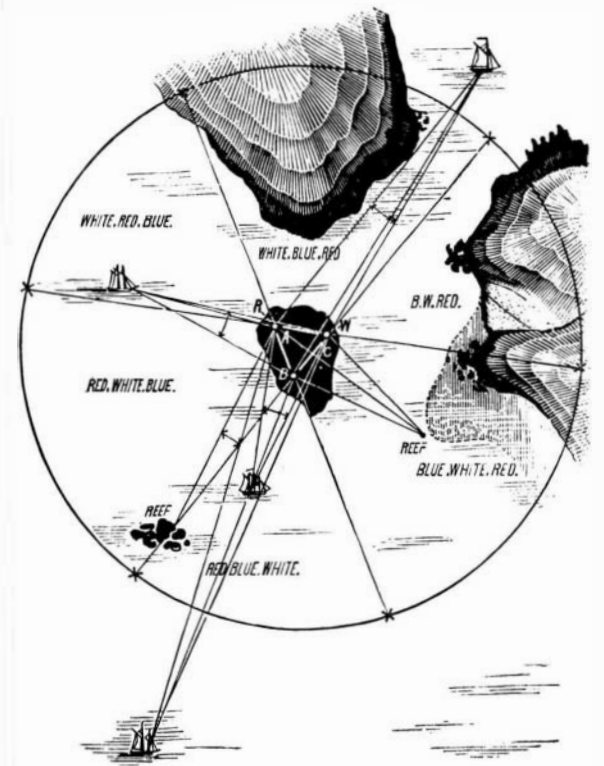
It has another curious property: if a teaspoonful of it be placed in a saucer, the flame of a common match will not light it; it appears to be as incombustible as table salt; but if a small quantity of it be placed in a short paper tube and blown over the flame of a candle in a cloud, as shown in the engraving, it will burn with a flash like gunpowder, affording a good illustration of the dangerous explosive that is formed when carbonaceous dust is mingled with a certain proportion of air; and shows the necessity of reliable means for the removal of such dust from flour mills, and other manufactories where it is liable to accumulate.

There seems to be good ground for supposing the recent terrible explosion and burning of the flour mills at Minneapolis, Minn., were due to the presence of mill dust.

METHOD OF DETERMINING THE POSITION OF VESSELS.

Mr. P. A. de la Nux, of Haulei Kauai, Sandwich Islands, sends us the following very ingenious method of determining the position and distance of vessels as they approach the coast.

The lighthouses can at present only be used for the position of vessels by an inspection of the compass, while the distance is obtained by the height above the horizon. Frequently, however, the compass is not reliable, and especially near the coast, and also at night the horizon is distinguished only with difficulty. It cannot be observed at all if an island or other piece of land is between it and the vessel. The lighthouses lose, therefore, in utility the nearer a vessel approaches the land.



METHOD OF DETERMINING THE POSITION OF VESSELS.

The following method may be employed to fix positively the position and distance of a vessel:

A B C are three lights of different colors, which are preferably double lights, so as not to be confounded with stars. They are placed on the angles of a triangle at the entrance of a harbor or passage in such a manner that their rays extend over as large a circular space as possible.

It is evident, by reference to the illustration, that no two positions of a vessel can give the same angles. The position of the vessel is then readily determined by the order in which the colors of the light are seen, as thereby the sector is given in which the vessel is situated. The distance of the light indicates in what part of this sector the vessel is, while finally the size of the angles formed by lines drawn to the lights furnishes the exact distance of the vessel therefrom. The shape and size of the triangle can, of course, be changed and adapted to the nature of the locality. Three lights are sufficient, but more, arranged in quadrangle, etc., may be used.

Tables can be calculated for each place, according to the size, shape, and position of the lights, by which, on taking the angle of the vessel to the lights, its position and distance may be instantly determined.

The Preservation of the Teeth.

Dr. J. W. Clowes, of this city, is one of our oldest and most esteemed practitioners of dentistry. He is accustomed, on dismissing a patient, after putting the teeth in good order, to present him with a copy of a neatly printed little tract, full of excellent hints, as follows:

DIRECTORY, EXPLANATORY, AND VALEDICTORY.—When the teeth of a patient have been under professional treatment, to the extent of a thorough overhauling or placing in order, he is advised as follows, for his personal observance and benefit.

Saving a set of teeth is one of the most positive and undoubted processes in the world, providing the dentist does his work well and the patient does likewise. This statement is made in all candor, that the patient may comprehend his position; for, if he would retain his teeth, he must "make an effort"—he must, indeed, be a co-worker. When both the dentist and patient are faithful, there can be no result but success. Therefore, O reader! peruse, ponder, and practice these

DIRECTIONS.

In the morning, before breakfast, always brush your teeth—first with water only, then with powder. Powder should be used at least once a day. Without powder teeth cannot be kept clean. Using a brush with tooth soap, just before retiring at night, is a commendable practice. To brush effectually, place the upper and lower rows of teeth parallel to each other, the points of the fronts touching; then use your brush up and down the teeth between the gums, being not unmindful nor fearful to brush as well the gums as the teeth—thereby toughening the one and cleansing the other. Your back teeth need more brushing than your front ones. Wisdom in this respect will be displayed,