Scientific Items.

PROGRESS IN SCIENCE AND THE ARTS.

Balmain's luminous paint is attracting considerable attention, in consequence of the reading of an excellent description of its capabilities by Mr. C. W. Heaton, F.C.S., before a recent meeting of the London Society of Arts. This novelty, which seems to be susceptible of many valuable uses, consists substantially of the sulphide of calcium, prepared according to a patented process. The inventor, who has devoted considerable time and study to the subject, from all accounts has succeeded in producing a luminous paint which far excels anything of a similar kind hitherto manufactured. Its applications, however, are what specially interest us. Mr. Heaton, in his paper, divided them roughly into the ornamental and useful. He exhibited pieces of statuary and busts and ornamental tiles, covered with the paint, which gave striking and beautiful effects in the dark. He also showed clock-faces so prepared as to show the time all night, and watch-boxes, which enabled the wearer to do as much for his watch. Lucifer match-boxes painted in the same manner, obviated the difficulty of hunting for matches in the dark in an emergency. He suggested other more important applications; for example, painting the roofs of railway carriages, the names of streets, direction of post-offices, sign-posts and advertisements, and notices of infinite variety.

A special field of utility for this new product is its application for various marine purposes; as, for example, for mooring and signal buoys, which are often of the greatest service, and which would be visible, if painted with the luminous paint, throughout the darkest night for a considerable distance. Equally important will be its use for life-buoys; when an ordinary life-buoy is thrown out to a man overboard at night will be of no use save by the most fortuitous combination of circumstances, the luminous buoy will not only show him where to swim to, but will serve a rescuing party as well by giving them the proper direction. For diving and other submarine apparatus, the paint will prove equally useful. The diver's dress can be painted all over with the luminous paint, and by carrying his own light with him, will assist his labors very materially. The experiment was actually made at Southampton, and with very satisfactory results. On the whole, the invention will doubtless find a wide field of application.

A New Substitute for Ivory, coral, leather, caoutchouc, etc., lately patented in England under the name of *Vegetaline*, is prepared as follows; Cellulose (woody fiber) from any source whatever, is treated with sulphuric acid of 58° B. (=sp. grav. 1·676) at 15° C. (=59° Fahr.) then washed with water to remove excess of acid, dried and converted into a fine powder. This is mixed with resin-soap, in a mortar, and the soda of the soap is removed by treatment with sulphate of aluminium. The mass is now collected, dried again, and pressed into cakes by hydraulic pressure. These cakes are again cut into thin plates, which are shaped by again subjecting them to pressure. By adding castor-oil or glycerine to the mass before pressure, the product may be made transparent. Colors may be imparted by the use of vegetable coloring agents. Facts respecting the strength and elasticity of this product are wanting.

THE ELECTRIC LIGHT IN FACTORIES.

Although the electric light has not yet come into use for domestic purposes, its success for lighting large spaces, such as depots and factories seem assured beyond question. The Riverside worsted mills, at Providence, R. I., have used the light for over a year, with an estimated economy of $14,000 over gaslight. Five dynamo-electric machines with 80 lamps are employed lighting all the principle rooms. An extract from the report of the Treasurer of the company is as follows:

They could not have a severer test than we give them, as our mills runs night and day the year through, and we have not had a moment's delay from, or a dollar's worth of repairs on, any of the machines or lamps. The light is all we expected. It is strong and steady, clear and white. It is universally liked by both overseers and helps—so much so that we doubt if we could get along now with the helps if we were to return to the old gas-lighting. Certainly we should not get so good work, nor so much of it. We use porcelain globes prettty generally throug out the mill, and we have less complaint of trouble to the eye than we used to have with gas. The air of the room, too, shows a marked difference. In our weaving-room with its 250 gas-lights, the air became almost unbearable after midnight in summer, and the faded appearance of the men showed how they felt it. With the electric light there is no such trouble, as the air at night is as good as in the day time, and noticeable cooler. The 80 electric lamps takes the place of 578 gas burners and effect a saving in cost of $4.73 an hour, or $15,000 a year, as stated above.

A New Diving System.—We alluded some time ago, in this department, to a remarkable improvement, invented by Mr. H. A. Fleuss, which had been attracting much attention in London, by which a diver is enabled to remain under water for several hours together without receiving his air supply from above, as has hitherto been necessary. In other words, the diver by some ingenious method succeeded in taking some portable form, thus making himself practically independent of the air-supply from the surface, the only connection required being the signal-rope. Our chemical readers, will, no doubt, have struck upon the general features of the new invention; but the details are so ingeniously worked out that a brief account of them will be of interest, especially as the new system bids fair to greatly extend the utility of sub-marine work, and is even claimed to be applicable, with decided advantage over existing methods, to life-saving purposes, in fiery mines, and the like.

In this new apparatus, the helmet, which is outwardly no larger than the ordinary diver's head-gear, is provided with a tight compartment, having about ¼ of a cubic foot capacity, in which is stored (from previously-provided cylinders containing it under the needful pressure) a quantity of oxygen gas, under a pressure of say 240 lbs. per square inch. This quantity represents about 4 cubic feet of oxygen at normal pressure, and has been found ample to afford air-food for the diver sufficient for five hours' consumption.

The metallic yoke (or collar) to which the helmet is attached, and which serves to fasten the outer rubber suit of the diver to its place, is provided with two curved shields, one in front and the other at the back of the wearer. In the space included in these shields are two vulcanite receptacles filled with masses of spongy rubber, saturated with strong caustic soda solution. The object of this provision is to effect the immediate absorption of the carbonic acid exhaled by the diver, by filtering the expired breath through the receptacles of soda.

The mouth and nose of the divers are fitted with an inhaler not unlike that used by dentists. A valve on each side is so arranged that it opens during inspiration, and closes tightly during expiration. The expired air is passed, by suitably attached tubes, to the bottom of the receptacles containing the soda, through which it is filtered, and finally finds its way, purified of its carbonic acid, and containing therefore chiefly nitrogen, to the inner helmet, where it receives a fresh complement of oxygen in place of that which was lost by consumption, and is once more breathed into the lungs. It should be added by way of explanation, that the air in the wearers' lungs and about his capacious garments, when he first dons the diving costume, contains sufficient nitrogen for indefinite use; for, as it is not absorbed by the soda, it is breathed again and again, serving the necessary purpose of diluting the oxygen which is constantly supplied from the store compressed in the helmet.

This apparatus is much less cumbersome than that commonly used, and less expensive in operation, as only one attendant to the signal-cord is required, in place of three required in the old system. The air is supplied through the valves at normal pressure, so that at whatever depth the wearer may be working, he breathes easily and naturally, without being subjected to the distressing pressure which limits the usefulness of the old system. It is claimed that with this apparatus divers will be able to descend to, and work safely in, greater depths than have hitherto been possible. It will be possible, too, for one provided with it to penetrate with impunity into fiery mines to the rescue of unfortunates; to enter burning buildings and smoke-filled apartments. It has even been suggested that aëronauts might avail themselves of it to ascend to far greater heights than it has hitherto been possible to attain.

A large immigration of Scandinavians to the Canadian Northwest is expected this season, and arrangements are being made by the Government for the transportation overland from Thunder Bay of such of them as may wish to work upon the Pacific Railway. It is thus hoped to evade the wiles of Minnesota and Dakota land agents, who, according to one section of the Manitoba newspapers, have, so far, managed to divert a large number of the immigrants expected to reach that province.