The Circulation of Underground Waters.

In the course of the proceedings in the Geological Section of the British Association, at the recent Southampton meeting, Mr. C. E. De Rance read the report of the committee appointed for the purpose of investigating "The Circulation of the Underground Waters in the Permeable Formations of England, and the Quality and Quantity of the Water supplied to Various Towns and Districts from these Formations." There was added to the report an appendix, written by Mr. Edward Wethered, on the density and porosity of rocks in relation to the water supply.

The author of the appendix commenced by averring that a knowledge of the porosity of rocks was important as regards the water supply, the suitability of stone for building purposes, and in accounting for some of the lithological changes often observed in the earth's strata. Though the matter had not escaped investigation, the vast volume of water stored in the rocks had not been fully realized. The density of the old red sandstone was 2·61, the volume of water absorbed by a cubic foot being more than 0·707 gallon; and by a square mile, 3 feet thick, 59,000,000 gallons. The conglomerate beds of the same formation were still more absorbent; being capable of taking in 0·805 gallon per cubic foot, or 67,000,000 gallons per square mile, 3 feet thick. The millstone grit, which lay at the base of the coal measures, varied much in different localities; that found in the Forest of Dean being the most porous, absorbing 66,000,000 gallons per square mile, 3 feet thick. Some of the coal measure grits also stored large volumes of water. The Pennant rock, about 900 feet thick, in the Bristol coalfield, and extensively developed in Somersetshire, as also around Swansea, was capable of absorbing 12,000,000 gallons per square mile, 3 feet thick; and specimens of magnesian limestone taken from the neighborhood of Bristol, showed a porosity of 86,000,000 gallons. The carboniferous limestone, however, was quite the reverse, and only absorbed 3,500,000 gallons. Oolites held vast stores of water, and the rock was much used for building.

Mr. Wethered then referred to the relation of specific gravity to porosity; and proceeded to say that shallow well-water had been classed by the Rivers Pollution Commissioners as dangerous, and the deep as wholesome, and there must, therefore, be a purifying process going on during the percolation into the earth. From an analysis of rocks, it was clear that nothing in the chemical composition of the rock could purify the water; and in order to get rid of organic contamination there must be oxidation, and they must, therefore, look to another source for the oxidizing agent. This, he thought, existed in the air absorbed by the water, and in the air contained in the interstices of the rock.

Poisonous Colors.

The German Government has just laid before the Reichstag the following decree, bearing date May 1, 1882, concerning the prohibition of poisonous colors for the coloring of certain alimentary substances and articles of food:

1. The use of poisonous colors for the manufacture of food-products or articles of food intended for sale is prohibited. Those which contain the following materials or compositions are considered as poisonous colors within the meaniug of this enactment: antimony (oxide of antimony), arsenic, barium (except sulphate of baryta), lead, chromium (except pure chromic oxide), cadmium, copper, mercury (excepting cinnabar), zinc, tin, gamboge, picric acid. 2. The preserving and packing of food stuffs or food products intended for sale in wrappers colored with the above-cited poisonous colors, or in barrels in which the poisonous color is so employed that the poisonous coloring matter can pass into the contents of the barrel, is prohibited. 3. The employment of the poisonous colors enumerated in Art. 1 is prohibited for the manufacture of playthings, with the exception of varnish and oil paints made of zinc-white and chrome-yellow (chromate of lead). 4. The use of colors prepared with arsenic for the manufacture of paper hangings, as well as that of pigments containing copper prepared with arsenic, and of matters containing similar colors for the manufacture of materials of dress, is prohibited. 5. The putting on sale, and the sale, wholesale or retail, of food stuffs and food products preserved or packed contrary to the regulations of Articles 1 and 2, as well as playthings, paper hangings, and dress materials manufactured in contravention of the directions in Articles 3 and 4, are prohibited. 6. This law will come into operation on April 1, 1883.—*Br. Med. Journ.*

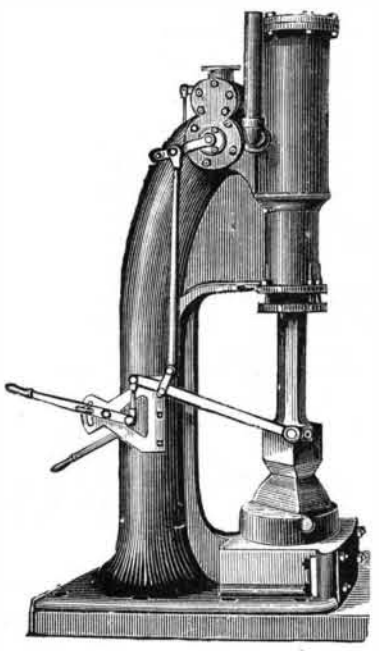
An Incubator for Infants.

M. Tarnier, the surgeon of the Maternity Hospital in Paris, struck by the great mortality among infants prematurely born, and those which are very sickly after birth, has conceived the ingenious idea of constructing a box which is almost exactly similar to the incubators used for poultry. This box is divided into two compartments—the lower one being used as a reservoir for hot water, while the infant is placed in the upper one, which is well stuffed at the sides and fitted with a sliding glass cover. The temperature is maintained at 86° Fahr., and M. Tarnier has found that by keeping infants in the incubator for a period varying from two days to six weeks, their vitality is enormously improved. He has made experiments upon five six-months children, six seven-months, and thirteen eight-months children, and he has only lost two of them, whereas, according to his statement, three-fourths of them would have died but for this adventitious aid to vitality.—*Lancet.*

STEAM HAMMERS.

The steam hammer, itself a modern novelty, has become a general adjunct to mechanical labor in all operations of hammering requiring graduated weight, quietly repeated blows, and precision. They are now to be found in smiths' shops as well as in large forges and rolling mills, but with smiths' shops the cost and complicated arrangements of those that have been constructed, requiring special skill for management, have interfered with their wider use.

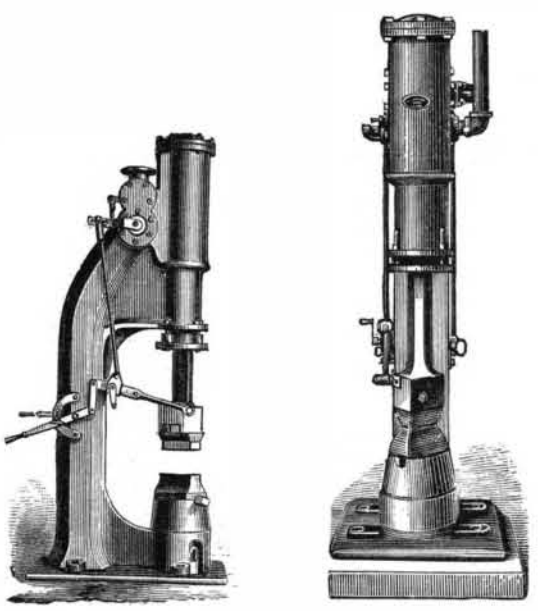
Mr. David Bell, the eminent builder of iron ships and yachts, engines and boilers, of Buffalo, N. Y., noting the cause of this restriction in the use of the steam hammer, where it would be serviceable in finishing by machinery and in vise work, etc., applied himself to construct one that



BELL'S STEAM HAMMER.

would meet every requirement of the smith's shop, aiming especially at simplicity of construction, combined with strength and automatic movement, and that could be worked as occasion offered, manually or otherwise. That he has succeeded in this is evident from a view of the steam hammer of his invention and construction, of which we present three designs.

Bell's patent steam hammer has a single column standard which, with the cylinder and bed plate, is cast in one piece; the die block being cast separately, it is strong, self-acting and takes steam at both ends of cylinder. The cylinder diameter is 10 inches; the stroke or lift 22 inches, and it will strike a blow of 6,000 pounds. The average diameter of shaft, which it will easily beat out at a single heat, is 7 inches.



BELL'S STEAM HAMMER.

Two smaller sizes of steam hammers are made, having respectively 16 and 20 inches lift, and delivering a blow of 2,000 and 4,000 pounds. This hammer is economical in use, and its value in this respect and ready efficiency is testified to, as shown by numerous testimonials, from foremen, blacksmiths of leading establishments, and eminent engineering firms throughout the country.

Mr. Bell has completely suited the steam hammer to the ordinary smith's work, saving wages, time, fuel, and material, and securing improved execution. Wherever used it appears to have done valuable service, and has been classed not only as a useful but first class hammer. The Buffalo Car Works, Buffalo, N. Y., state that No. 3, which they use, presses into shape, without striking a blow, the bars and other iron work required for freight and passenger cars, and that they find it invaluable for the purpose.

Preserving Ripe Fruit.

That fruit can be preserved for a long time in a frozen state, and even in a non-frozen state, so long as the temperature does not exceed 32°, is a well known fact. But it is equally well known that articles so preserved lose flavor every day after they are so stored, and that when exposed afterward to an ordinary temperature they perish almost immediately. This happens to fruit when merely set on ice and not actually frozen; but it is certain that the freezing does not improve its chance of keeping, and very much depends on how the frozen mass is thawed, sudden thawing being mostly destructive to the tissues of either fruits or vegetables. For many years we have been in the habit of storing both fruit and vegetables in the ice house, but they are deteriorated by the treatment, and must be used immediately they come off the ice. In tin boxes we have kept peaches sound, though dead ripe when gathered, for a month, and nectarines for six weeks, in a perfectly spotless condition; but they lost flavor greatly toward the end of the time, and grew discolored almost before dessert was over, although only brought out of the ice house in time to be dished up for the table. By the following morning they had become quite black and useless.

Melons that would not keep more than a few days in the fruit room will keep a long while on ice, and retain their flavor longer than peaches. They, besides, are long in cooling, although the condensed moisture on their surface in the warm dining room would, to an experienced person, betray the quarter they came from, and they are much more refreshing than when warm out of the melon house or even the fruit room. In placing fruit on ice, the main thing to observe is not to pack it in any way or to wrap it in anything. It should be placed on a tray or in a tin box with a lid to keep off drip, but each fruit should be set out singly by itself and not come in contact with its neighbors, and great care should be used to prevent bruising, as that will greatly hasten decay when the fruit is taken out. It is not needful to bury the boxes quite in the ice; but they may be set in it with the lid of the box above the surface, so that any of the fruit can be got without trouble. Peaches, nectarines, melons, pineapples, figs, and other soft fruits that do not keep long, succeed best preserved in this manner.—*The Garden (London).*

A New Photo-Electric Battery.

A new battery, which gives a current on exposure to the action of light, has been devised by M. Saur. It consists of a square glass vessel, containing a solution of 15 parts common salt and 7 parts sulphate of copper in 106 of water. A porous vessel of mercury is placed in the solution. An electrode of platinum is in the mercury, and another of sulphuret of silver in the saline solution. The electrodes are connected by means of a galvanometer, and the battery is fixed in a box sheltered from light. The closing of the circuit displaces the needle of the galvanometer, and it is seen that the sulphuret of silver is the negative pole. When the needle has come to rest, if the battery is exposed to the light of the sun the deviation increases. If the light is suppressed the needle returns to its original position; if a cloud passes before the sun while the battery is exposed to the light the variations of the needle indicate the fluctuations of the electric current. The effect of the battery is due to the action on the mercury of the bichloride of copper formed by the mixture of common salt and sulphate of copper. The protochloride of copper which is formed reduces the sulphuret of silver; but this reduction requires the intervention of the solar light, which determines the production of the photo electric current.—*Les Mondes.*

Electricity in a Brewery.

A curious case of electrical generation by friction was recently brought before the German Electro-Technical Union by Dr. Werner Siemens, of Berlin. It was observed in a brewery in that city, and caused considerable alarm among the workmen. The brewery building is constructed of stone and iron, and the floor is laid with asphalt. In the upper story is a malt cleaner, from which the malt passes by an iron chute to the floor below, where it is received in wagons for distribution throughout the works. When the cleaner remained in action for some time the friction of the malt on the iron chute generated electricity, which produced a continuous stream of sparks. The malt itself crackled, and sparks flew from it to the hands of the workmen. When Dr. Siemens was called in to investigate the phenomenon, he showed how the asphalt floor insulated the malt room from the rest of the building, so that it became a large Leyden jar charged by the electricity generated by the friction of the malt rubbing on the iron chute and on itself.

Asbestos as an Insulator.

M. H. Geoffroy has brought before the French Academy of Sciences a specimen of electric lighting wire which appears to answer the purpose of preventing fires. It consists of copper wire insulated with asbestos and threaded through a lead pipe. According to experiments made at Paris by M. Henri Lippmann, engineer to the Faure Electric Accumulator Company, a specimen of the conductor of this wire was entirely volatilized by powerful currents without the leaden pipe being affected. The volatilization takes place in a mere fraction of a second, and the lead does not begin to fuse. Moreover, the asbestos acts as a good insulator for ordinary currents.