RECENT INVENTIONS.

Mr. Eugene Wessells, of Peekskill, N. Y., has patented an improved automatic mechanism for feeding animals. It is designed to be operated by a heavy weight, and its movements are controlled by a clock.

An improved chamber vessel has been patented by Mr. Arthur Bird, of Jeffersonville, N. Y. The object of the improvement is to provide means for tightly sealing vessels used in sickrooms, hospitals, and other places, so as to prevent escape of gases and odors. The invention consists in swinging covers fitted for being opened and closed by hand or by movement of the seat.

Mr. Henry Eitenmüller, of Butler, Pa., has patented an improved beehive of handsome appearance, which affords ready means for the inspection of its interior, and an easy and convenient removal of the upper comb boxes and the improved comb racks in the brood chambers, means being also provided whereby the honey made in the hive shall be made more secure against marauding bees.

Mr. Samuel B Knapp, of Osceola, Iowa, has patented a device for attracting insects, which drop into a poisoned liquid in the apparatus, and are thus destroyed.

An improved billiard table on which a game can be played with two or more balls, has been patented by Mr. Edmond J. Sause, of Brooklyn, N. Y. The invention consists in a billiard table provided with the ordinary cushioned end rails, and with a central cushion attached to a stud projecting from the table.

PHOSPHORESCENT SUBSTANCES.

Phosphorescence, or the emission of light without flame or sensible elevation of temperature, is a phenomenon exhibited in a greater or lesser degree by many substances—mineral, animal, and vegetable—and is developed under a variety of conditions. In a few substances the light is developed by chemical change or a process of slow combustion, as in the case of phosphorus, from which the name phosphorescence has been derived. In others the substance suffers no appreciable change, only requiring exposure to a strong light to shine themselves when taken into the dark. The diamond and many mineral substances develop light in this way, and it is supposed that these substances have the property of absorbing light in the same way they do heat, and of slowly parting with it when taken into the dark much in the same way that hot bodies part with their heat when removed from the source of heat.

With some of these substances the application of heat causes the development of a brighter light (though for a shorter time than would be otherwise required to exhaust the supply); and again, there are some substances, such as fluorspar, that absorb light, but do not give it out until heated.

Many substances also become phosphorescent while crystallizing.

The color of the light developed by many of these substances varies with their nature and the degrees of heat to which they have been exposed. A certain scale of light and color may, therefore, be produced by grouping together different substances or samples of the same substances previously heated at different temperatures.

The following are methods for preparing some of these pyrophors:

BARIUM SULPHIDE.

Finely powdered barium sulphate, free from iron, is formed into balls with gum tragacanth; the balls are dried at a moderate temperature, then placed in a crucible with a luted cover and kept at a red heat for an hour. They are then allowed to cool slowly, and while still warm are transferred to glass stoppered bottles.

A better light is developed from the following charge:

Barium sulphate (C P.)	32 parts.
Magnesium carbonate (C. P)	1 part.
Sulphur (C. P.)	1 "
Gum tragacanth	q. s.

This is heated in the crucible as before described.

STRONTIUM SULPHIDE.

Strontium sulphate (C. P.)	22 parts.
Sulphur (C. P.)	1 part.
Gum tragacanth	q. s.

Proceed as before.

CALCIUM SULPHIDE.—(CANTON'S PHOSPHORUS.)

Calcine clean oyster shells to whiteness in a crucible, separate the clearer portions, reduce these to a fine powder, and place in layers with intermediate layers of flowers of sulphur in a crucible, cover, and heat to dull redness for about half an hour. Cover the crucible tightly and let it cool slowly in the crucible.

Another method of preparing this phosphorescent sulphide is to heat bisulphide of lime—obtained by boiling lime in a little water with twice its weight of sulphur—in a covered crucible at a low red heat for one hour.

CALCIUM AND ANTIMONY SULPHIDES.

Calcined oyster shells	3 parts.
Flowers of sulphur	10 "
Antimonic acid	1 part.

Mix intimately, in fine powder, and heat for half an hour in a covered crucible at low redness.

CHLORIDE OF CALCIUM.

Fuse chloride of calcium in a crucible and pour it out on a clean iron plate. As soon as it becomes cold enough break it into pieces and transfer to well stoppered bottles.

CALCIUM NITRATE.

Dissolve chalk or marble dust in nitric acid, evaporate to dryness, and fuse in a porcelain crucible.

These substances, when properly prepared and exposed to any strong light for a short time, exhibit phosphorescence for some time after removing to a dark place. A calcium sulphide has been prepared that, after a short exposure to sunlight, will continue to give out light for ten hours in the dark. When, by keeping in the dark, one of these substances has ceased to give out light, it may be made to give a series of fresh exhibitions by heating it first with the hand, then over a water bath, and finally on a hot stone plate.

A remarkable phosphorescence is developed in quinia and some of its salts by heat. Spread quinia or its sulphate on a sheet of paper, and spread the paper on a plate of hot metal in a dark room—a strong phosphorescent light develops at the edges and spreads to the center. A similar display is observed in sprinkling finely powdered fluorspar (calcium fluoride) over a plate of hot metal in the dark.

Boracic acid fused and allowed to cool breaks into small pieces, and along the cracks a phosphorescent light appears, which is sometimes strong enough to be visible even in daylight. Potassium sulphate fused with cream-of-tartar shows the same phenomenon.

PHOSPHORUS.

Phosphureted oil is the best means of exhibiting the luminous properties of phosphorus. A small piece of dry phosphorus, about the size of a pea, is placed in a test tube with a little pure olive oil. The test tube is held in the waterbath until the oil becomes heated and the phosphorus liquefies; it is then shaken until the oil will take up no more phosphorus, and, after allowing the oil to become clear, it is poured off into a small glass vial provided with a glass stopper. Only a small quantity of this oil in the bottom of the vial is necessary. When it is shaken about so as to coat the sides of the vessel, and the stopper is removed so as to let the air get in, the oil-coated sides of the glass become at once luminous, and continue so as long as the stopper remains out. Characters written on paper with oil thus prepared (freshly), appear in the dark very brightly.

Phosphureted ether is prepared by digesting phosphorus in ether for some days in a tightly stoppered bottle. A piece of sugar dipped into this ethereal solution and then thrown into water makes the surface of the latter appear quite luminous in the dark.

Young experimenters must remember that phosphorus is very dangerous to handle when out of water, and often inflames spontaneously when exposed dry in the air.

The Storage of Electric Energy.

Sir William Thomson, in a recent note to *Nature*, confirms the favorable results of his previous experiments with the Faure battery. He says: "I am continuing my experiments on the Faure accumulator with every-day increasing interest. I find M. Reynier's statement, that a Faure accumulator, weighing 75 kilogrammes (165 pounds), can store and give out again energy to the extent of an hour's work of one horse power (2,000,000 foot pounds), amply confirmed. I have not yet succeeded in making the complete measurements necessary to say exactly what proportion of the energy used in the charging is lost in the process of charging and discharging. If the processes are pushed on too fast there is necessarily a great loss of energy, just as there is in driving a small steam engine so fast that energy is wasted by 'wire drawing' of the steam through the steam pipes and ports. If the processes are carried on too slowly there is inevitably some loss through local action, the spongy lead becoming oxidized, and the peroxide losing some of its oxygen viciously, that is to say, without doing the proper proportion of electric work in the circuit. I have seen enough, however, to make me feel very confident that in any mode of working the accumulator not uselessly slow, the loss from local action will be very small. I think it most probable that at rates of working which would be perfectly convenient for the ordinary use of fixed accumulators in connection with electric lighting and electric transmission of power for driving machinery, large and small, the loss of energy in charging the accumulator and taking out the charge again for use will be less than 10 per cent of the whole that is spent in charging the accumulator; but to realize such dynamical economy as this prime cost in lead must not be stinted. I have quite ascertained that accumulators amounting in weight to three-quarters of a ton will suffice to work for six hours from one charge, doing work during the six hours at the uniform rate of one horse power, and with very high economy. I think it probable that the economy will be so high that as much as 90 per cent of the energy spent in the charge will be given out in the circuit external to the accumulator. When, as in the proposed application to driving tramcars, economy of weight is very important, much less perfect economy of energy must be looked for. Thus, though an eighth of a ton of accumulators would work very economically for six hours at one-sixth of a horse power, it would work much less economically for one hour at one horse power; but not so uneconomically as to be practically fatal to the proposed use. It seems indeed very probable that a tramcar arranged to take in, say, 7½ cwt. of freshly charged accumulators, on leaving headquarters for an hour's run, may be driven more economically by the electric energy operating through a dynamo-electric machine than by horses. The question of economy between accumulators carried in the tramcar, as in M. Faure's proposal, and electricity transmitted by an insulated conductor, as in the electric railway at present being tried at Berlin by the Messrs. Siemens, is one that can only be practically settled by experience. In circumstances in which the insulated conductor can be laid, Messrs. Siemens' plan will undoubtedly be the most economical, as it will save the carriage of the weight of the accumulators. But there are many cases in which the insulated conductor is impracticable, and in which M. Faure's plan may prove useful. Whether it be the electric railway or the lead-driven tramcar, there is one feature of peculiar scientific interest belonging to electro-dynamic propulsion of road carriages. Whatever work is done by gravity on the carriage going down hill will be laid up in store ready to assist afterward in drawing the carriage up the hill, provided electric accumulators be used, whether at a fixed driving station or in the carriage itself."

Electrotype of the Brain.

A brain, preserved and metallized by the galvanoplastic method, was lately presented to the French Academy of Medicine, on behalf of Dr. Oré, of Bordeaux. Dr. Oré's method (which preserves the brain entire) is briefly as follows: The brain having been so arranged that circumvolutions are well separate, by introducing cotton wicks into the fissures, and so that the preserving liquid may penetrate the ventricles, is kept about a month in alcohol at 90°, so as to acquire good consistency; the wicks are then taken out. The brain is now plunged for ten minutes in an alcoholic solution of nitrate of silver (100 gr. per liter of alcohol), and carefully drained in air. Next, it is transferred to a case in which sulphureted hydrogen is liberated, and it takes a dark hue owing to formation of a surface deposit of sulphide of silver. In about twenty minutes it is taken out, and after exposure a quarter of an hour in air, it is put in the galvanoplastic cell, where it soon assumes a fine metallic aspect.

A Boiler Water Safety Valve.

According to the *Revue Industrielle*, M. Barbe has successfully introduced a guard safety valve for steam boilers, to be brought into action only on emergencies. This valve is placed in a suitable position underneath the boiler shell, and is essentially an ordinary weighted lever safety valve turned upside down. When the valve is opened, therefore, water is blown off instead of steam. M. Barbe argues that, useful as ordinary safety valves undoubtedly are, there are occasions when a sudden and explosive evolution of steam takes place, and at such times these valves are of little service, since the steam cannot escape with speed equal to that at which it is formed, and the pressure consequently rises to the bursting point. In all such cases, in addition to what must be reckoned a possible failure of the ordinary valve for other reasons, M. Barbe's valve would be a complete safeguard, as it would instantly discharge a large quantity of water. It is known that a cubic inch of water increases in volume about 1,700 times when transformed into steam, and therefore the escape of the water would naturally be more efficacious in reducing the danger of explosion than the discharge of an equal bulk of steam. The idea, of course, is not new, but M. Barbe's apparatus for effecting the desired object is very simple and compact, although some objection might be urged against the awkward situation of the valve and the practical impossibility of examining it or keeping it in order during ordinary working; and all experience shows that fittings intended for use solely on emergencies are seldom in working condition when the event for which they are intended arrives. It is, however, stated that experiments have been made with the guard safety valve, under conditions similar to those of actual but dangerous working, and it has answered so well that many have been fixed in French factories.

Lemon Juice in Diphtheria.

Dr. J. R. Page, of Baltimore, in the New York *Medical Record*, May 7, 1881, invites the attention of the profession to the topical use of fresh lemon juice as a most efficient means for the removal of membrane from the throat, tonsils, etc., in diphtheria. In his hands (and he has heard several of his professional brethren say the same) it has proved by far the best agent he has yet tried for the purpose. He applies the juice of the lemon, by means of a camel's hair probang, to the affected parts, every two or three hours, and in eighteen cases on which he has used it the effect has been all he could wish.

Tartaric Acid in Diphtheria.

The topical use of tartaric acid in diphtheria has been successfully resorted to by M. Vidal, who, in one of the foreign medical journals, remarks upon the necessity of thus making use of topical agents against the false membrane, as it has a great tendency to spread by a sort of auto-inoculation, comparable to what occurs in certain cutaneous affections. His formula is ten parts, by weight, of tartaric acid, fifteen of glycerine, and twenty-five of mint water. The acid acts upon the false membrane, converting it into a gelatinous mass, and favors its expulsion.

The Lady Franklin Bay Expedition.

The Arctic expedition for meteorological and geographical exploration left St. Johns, Newfoundland, at noon, July 4, for the station selected for it near Lady Franklin Bay. The party will call at Disco or Upernavik, Greenland, for Esquimau hunters, dogs, clothing, etc., and then hurry on to the end of their journey. The steamer will at once return to Newfoundland. The expeditionary force is commanded by Lieut. A. W. Greely, Fifth Cavalry.