Crystoleum Painting.

Photographs and other pictures may be colored from the back as follows:

Take a smooth piece of glass rather larger than the print to be colored, and, after having cleaned it thoroughly, dust it over with powdered French chalk; rub it well into the glass, and then wipe it off with a piece of clean linen.

Next coat the plate with plain collodion, and allow to set, but not dry, otherwise the film will probably leave the glass. When the collodion is set, it in turn receives a coating of gelatine solution—one part by weight of gelatine to eight parts of water. This is then placed on a level surface, care having been taken that the gelatine solution has flowed well to the edges of the plate. It must then be left to dry. The print should also receive a coating of gelatine similar to that on the plate. This is best done with a soft brush or a piece of clean sponge, by which means there will be no danger from air bubbles. The picture must then be dried. Next wet the film on the glass plate by passing a wet sponge over the surface; and at the same time wet the print by immersing it in cold water for a few seconds. Now lay the print face downward on the glass plate, bringing them in contact by means of a squeegee or roller, taking care, while doing so, not to disturb their position, as it may wrinkle the film beneath. It must then be allowed to dry. Next rub the paper away from the back of the print with fine glass paper, working gently in a circular direction, the object being to get it as thin as possible. Care, however, must be taken not to rub away all the paper.

The next operation is to render the print transparent. There are several substances for rendering the print transparent, but I have found ordinary paraffine wax melted at low temperature answer as well as anything. Place the print in this, keeping it in a molten condition, and when transparent the picture should be removed. If the temperature be raised too high, it is liable to turn the print yellow.

When cold wipe off all excess, and then proceed with the painting. This only requires a little ordinary care. It is best to begin with the eyes and lips, and all small places which require different colors to the main color. When these are dry, the color of the flesh and dress may be laid on with a large brush. When the paint is thoroughly dry, a sharp knife is passed round its margin. The print is then raised from the glass, which it leaves freely, and a delicately painted photograph is the result. It may then be mounted on card in the ordinary way. This process seems to lend itself to oil paints; but if the operator wish to employ water colors he must use some medium, such as shellac dissolved in borax, for mixing the colors.—*E. E. Cadett, in Br. Jour. of Photography.*

Nitrogen Selenide.

Verneuil has recently sent to the *Bulletin Soc. Chimie* a report of his experiments on the preparation of the selenide of nitrogen which was discovered by the late Professor Wohler in 1859. The Gottingen professor prepared it by saturating selenium perchloride with ammonia gas; but Verneuil finds that the method more recently proposed by Fordos and Gelis for the preparation of nitrogen sulphite yields better results, and he takes 10 grammes of the perchloride and mixes it into a paste with a few drops of carbon disulphide, and the paste is then suspended in a liter of carbon disulphide, in which it is almost insoluble. Into this liquid a current of dry ammonia gas is passed. Flocks of ammonium chloride are precipitated, and the liquid passes from a rose tint to a dark cochineal red color. Finally, the red color disappears and brown flocks are thrown down. The current of gas is continued until the flocks become of a clear orange tint. The liquid is filtered, and the flocks washed with carbon disulphide and dried. On removing the ammonium chloride with water, washing again with carbon disulphide, and drying, the nitrogen selenide is obtained pure in amount equal to 80 per cent of the theoretical yield. It forms an amorphous powder, insoluble in all solvents, having the formula Se_2N_2. When dry it detonates instantly by a shock, being as easily exploded as mercury fulminate, less easily than nitrogen iodide. Potassium hydrate and hydrogen chloride decompose it, producing selenite of potassium and ammonia.

Laying Turf in Summer.

Mr. Henderson says: "I find that turf can be successfully laid down, if necessary, in dry and hot summer weather, by simply covering it when finished, before it gets too dry, with about a quarter of an inch of light soil put through a half inch sieve. The grass begins to grow through the soil in a very few days."

THE ARGUS PHEASANT.

In the year 1780, the first skin of a magnificent bird, called the Argus pheasant, was sent to Europe. It excited universal admiration. A little later, in 1785, Marsden gave the following account of its manner of living:

"The famous Argus pheasant, or 'kuau,' is a bird of unusual beauty, perhaps the most beautiful of all birds. It is a very difficult matter, after it has been captured, to keep it alive for any length of time. It hates the light. When it is in a dark place it appears quite lively, and its voice may perhaps be heard. Its tones are more pitiful but not quite so shrill and clear as the peacock. In bright sunlight it sits motionless. Its flesh tastes exactly like the flesh of other pheasants."

Raffles says: "This bird, which plays an important part in Malayan poetry, lives in the deepest wilds of Sumatra, and is commonly found by pairs. Solomon Müller asserts that he heard the strong voice of this bird for the first time, when near Southern Borneo, sixty meters over the sea. The young, as with the peacock, obtain their beautiful plumage after repeated moulting."

The natives catch these birds in snares, because it is not only remarkably shy and cunning, but it conceals itself in the thick undergrowth of the forests, so as to escape even the sharp eyes of the natives. An old Malay, whom Wallace challenged to shoot one of these birds, whose voice was continually heard in the forests of Malacca, asserted that during twenty years of his life as a hunter he had never killed one of these pheasants, or even seen one in the open forests. From Padang, on the western coast of Sumatra, Rosenberg writes: "The natives often bring me living birds, receiving from one and a half to two guldens in payment for each one. They are also numerous in the mountain forests of this island. In the midst of the deepest wilds the traveler or hunter sometimes comes upon a bare place, cleared carefully of branches and leaves, from which paths run into the forest in all directions. Here, sometimes at midday, the Argus pheasant may be found resting, playing, or fighting; they may be seen like hens lying on the ground, which is warmed through by the sun's says, and 'bathing' themselves in the sand. The hunters place their snares in these paths. The hen lays from seven to ten white eggs, a little smaller than goose eggs. The nest is concealed in the thickest undergrowth. In freedom the bird subsists on insects, snails, worms, leaf buds, and seeds of various kinds. The flesh is very palatable."

Until recent times, Marsden's opinion that these birds could not endure captivity was thought to be true. But now the Argus pheasant may be found in several zoological gardens. It is really incorrect to call this bird a pheasant, for, as Rosenberg asserts, in gait, behavior, and disposition it is a peacock; possesses its loud voice, and even its expression of countenance.

When sitting it holds itself in an almost horizontal position, carries itself in a lazy manner. It walks with long strides, and nods its head with every step. Its head is drawn in between its shoulders, and is only thrown forward in walking; it runs dexterously along the branches; springs without help from its wings over long distances; is not a good flier.

The Argus pheasant (Argus giganteus) differs from all known birds in the extraordinary development of the secondary feathers of the wings. "While walking or sitting on a bough this is not so noticeable, but when the bird spreads its wings they come out in all their beauty. When the bird chooses, it can raise the tail so that it stands in the air between the wings, and is partially spread."

The bill is elongated and slightly curved at the point; the foot is long, but has no spurs. The eye is naked; the head and back of the neck are covered with short feathers. The short crown feathers are a velvety black. The hair-like feathers of the back part of the head are yellow striped with black. The feathers on the neck are a warm chestnut brown, striped with light yellow. The middle of the back is a yellowish gray ground, marked with round dark brown spots. The longest tail feathers are black, with white spots surrounded with a black ring.

The secondaries of the wings are wonderful examples of plumage; they have a beautiful dark reddish brown ground color, with bright reddish gray stripes, and are covered with rows of spots, surrounded by a dark ring. Wood says that in one feather in his possession there were seventeen large "eyes" on the outer web, each being surrounded by a ring of jetty black, then with a dash of chocolate within the ring, then olive with a tinge of purple, lastly a spot of pure white near the tip, fading imperceptibly into the olive on one side and the chocolate on the other; between these spots are some leopard-like mottlings. The inner web is pale fawn, covered with black spots surrounded with buff, and the tip of the whole feather is deep brown, spotted profusely with white.

The ring around the eye is reddish brown, the bill ivory white, the eye bright ash-blue, the foot bright carmine.

The total length of the bird is more than five feet, the plumage is so developed.

The hen is much smaller and plainer in form and the marking of the plumage. —*From Brehm's Animal Life.*

THE ARGUS PHEASANT.

A Diffusion Engine.

A curiosity in physics was exhibited by Mr. Woodward, lately, at the Physical Society, London, in the shape of what is veritably a diffusion engine, that is to say, a machine in which work is done by the diffusion of gases. The action of the engine is based on an experiment of the late Professor Graham, the well known chemist. This experiment consists in taking a red clay porous cylinder containing air, and covering it with an inverted bell jar full of hydrogen. The hydrogen diffuses into the cylinder more quickly than the air diffuses out, as is shown by means of a glass tube projecting from the bottom of the cylinder into a vessel of colored water. When the gaseous pressure inside the cylinder is increased by the influx of hydrogen, the mixed gases descend this tube and bubble out of the water. On removing the bell jar, the action ceases and a reaction, due to fall of pressure, causes the water to rise in the tube. By suspending the gaseous cylinder of porous clay from a balance beam, and directing a jet of hydrogen gas against its side, the beam begins to oscillate and keeps plainly oscillating for a length of time; the action being sustained, as Professor W. G. Adams, F.R.S., pointed out, by the alternations of gaseous pressure in the cylinder.

Copper and Lead in Food.

A. Gautier shows that copper is little calculated to produce mortal results. The solubility of most of its salts, their marked color, nauseating taste, and emetic action give at once warning. The salts of lead, on the contrary, have no pronounced taste, or are even sweetish. They are in general colorless. If introduced into the system, there is no alarming effect until the nervous centers, the liver, and the blood have become interpenetrated with the poison. All foods sold in tins, especially if of a fatty nature, public water supplies, wines, beers, effervescing drinks, the glaze of earthenware, enamels, and especially culinary utensils lined with tin, may introduce lead into the system.

Recent Progress in the Manufacture of Soap and Candles.

BY G. HARTL, OF VIENNA.

There have been no recent improvements in the manufacture of stearine candles beyond perfecting the saponification with sulphuric acid, and obtaining good results on a large scale without distilling. The candles are no better than they were, except that they are harder, and there is a certain disadvantage in this, for unless they are carefully lighted the stearic acid will run off in places, forming points and dents that surround and injure the light. The artificial butter and oleomargarine manufacture has withdrawn the more easily fusible compounds from the market, leaving the solid stearine for candle making. This has necessarily raised the melting point of the pure stearic acid, hence the candles unavoidably run off, because a part of the small flame formed by the burning wick is unable to draw up the melted stearic acid. It is therefore necessary to hold the candle horizontally while lighting it, and turn it slowly around until the stearic acid is partially melted, to avoid the evil just mentioned.

Many candle manufacturers add paraffine to prevent this, as it renders the candle more fusible, but if there are many candles burning in one room they produce a disagreeable odor, that is particularly unpleasant when they are extinguished.

Saponification with sulphuric acid was discovered by the French chemist Fremy, a short time after the discovery of stearic acid, and was made use of in the distillation of the fatty acids. As much as 37 per cent of concentrated sulphuric acid was employed to separate the fatty acids in the fat, and of course as a result enormous quantities of the fatty acids were destroyed and converted into tar; 100 lb. of tallow would yield 83 or 84 lb. of fatty acids, while the same quantity of palm oil produced 80 to 81 lb. Sulphuric acid saponification combined with distillation is now in use in most countries.

The most important step taken in advance by soap makers is that they are beginning in various places to utilize the glycerine which has always been permitted to run off with the waste lyes. The separation of the glycerine from soap boilers' lyes will always involve considerable difficulty, for the various salts in the lye will give rise to unpleasant complications in purifying the glycerine. For this reason it is more profitable to separate the glycerine from the fats and oils before using them for soap.

There have also been very great improvements in trying out tallow and suet, and it may be said that this operation has now reached the highest degree of perfection. The intelligent soap boiler can try out the tallow that comes to his shop in such a manner that the neighborhood does not suffer the slightly inconvenience; no unpleasant odors are produced, for they can be melted at 130° to 140° Fahr. For this we are indebted to a newly invented chopping device, as that alone makes it possible to melt out the raw tallow at a low temperature. The French chopping machines are very good, but those made by Von Lohr are still better, for they grind up the tallow to a kind of magma, so that all the fat comes out at 130° or 140°. Any residue left is melted by steam in closed vessels, or it can be converted into soap by boiling with lye.

In the stearine candle factories the slightest residues can be melted with the otherwise useless dilute sulphuric acid. This new method of trying tallow, as already mentioned, is the acme of perfection. The melted tallow is very nice and tasteless, so that it can be used for food after being rendered odorless, as well as tasteless, by proper treatment.

The machines made now require a four-horse power engine to run them; it would be very desirable to make such machines as could be used in small establishments that are unable to put in a steam engine.—*Translated from the Neueste Erfindungen.*

Freight Train Speed.

In experiments made with a heavy freight train on a Western road several years ago by Mr. P. H. Dudley with his dynograph car, it was found that a speed of 18 miles an hour required less power and was more economical of fuel than a slower rate of speed, say 10 or 12 miles an hour. This was the result for the entire trip, including all the elements of resistance, frictional, atmospheric, grades, curves, etc. The track was in good condition and was laid with steel rails. The reduction in the amount of fuel consumed was very marked, owing to the fact that the engine developed its power at the higher speed much more economically than at a slower rate. It was also evident that journal and flange friction, within the limits of freight train speed, decreased with the speed, and that with proper curve elevation the resistance of such trains decreases in most cases as the speed increases. It was found, however, that when trains were run at a rate much above 18 miles an hour, the atmospheric or wind resistance increased faster than the other elements of resistance decreased. These results, it is to be presumed, were realized upon tracks with moderate grades and curves. Upon long and heavy grades, in connection with sharp and frequent curves, the conditions would, of course, be very greatly changed.

Without going into an analysis of the various mechanical causes which combine to impede the movement of trains—an exceedingly difficult thing to do with any degree of precision—the fact seems to have been established by Mr. Dudley that an average speed of 18 miles an hour for heavy freight trains, upon roads as straight and level as the New York Central and its immediate Western connections, is more economical as respects consumption of fuel and tax upon motive power than a slower speed. But whether this limit can be exceeded with like results is not so clear. There seems to be a point at which the atmospheric resistance is increased to such an extent as to neutralize the decrease of frictional resistance due to increased speed. If this point could be definitely ascertained as respects freight trains, it would go far toward settling the question as to whether these trains can be run to advantage at a speed of 25 or even 30 miles an hour. The old theory that train resistance increases as the square of the speed has been a good deal shattered by recent experiments with the dynograph. In regard to passenger trains, Mr. Dudley found, if our memory is not at fault, that the draught of a certain train at starting was 12,000 pounds, while at a speed of fifty miles an hour it was only 3,000 pounds. And yet, if reliance is to be placed on some other authorities, the atmospheric resistance to passenger trains moving at high speeds increases in a ratio much greater than the square of the velocity, however it may be with journal and flange friction, curves, and grades. That the maximum speed of passenger trains has not increased within the past thirty years, notwithstanding the efforts that have been made in the way of fast running, is an evidence that with them the practical limit has been reached, under existing conditions at all events.

It is highly desirable, however, that freight trains should move faster, so that a larger annual tonnage can be transported in a given number of cars. That they ought to move faster, with improved locomotives, steel rails, and better ballasted tracks, seems obvious. That their speed will be increased in the future about in proportion as grades are reduced and curves straightened on all our roads, there can be no doubt; but whether the average rate of speed will be 18 or a much greater number of miles per hour, cannot at present be determined.—*Car-Builder.*

A Balloon for Service under the Sea.

According to the London *Daily News*, the International Exhibition of Nice is reserving some wonders for the foreigners who may propose to pass a portion of the winter of 1883-84 upon the borders of the Mediterranean. One of these wonders is a balloon which its inventor, M. Toselli, calls "the observatory under the sea." It is made of steel and bronze, to enable it to resist the pressure which the water produces at a depth of 120 meters. This "observatory under the sea" has a height of 8 meters, and is divided into three compartments. The upper apartment is reserved for the commander, to enable him to direct and to watch the working of the observatory, and to give to the passengers the explanations necessary as to the depth of the descent, and what they will see in the depths of the sea. The second apartment, in the center of the machine, is comfortably furnished for passengers to the number of eight, who are placed so that they can see a long distance from the machine.

They have under their feet a glass which enables them to examine at their ease the bottom of the sea, with its fishes, its plants, and its rocks. The obscurity being almost complete at 70 meters of depth, the observatory will be provided with a powerful electric sun, which sheds light to a great distance in lighting these depths. The passengers have at their disposal a telephone, which allows them to converse with their friends who have stopped on the steamboat which transports the voyagers to such places as are known as the most curious in the neighborhood. They have also handy a telegraph machine. Beneath the passengers an apartment is reserved for the machine, which is constructed on natural principles, that is to say, as the *vessie* of a fish, becoming heavier or lighter at command, so as to enable the machine to sink or rise at the wish of the operator.

Improved Mode of Charging the Holtz Electrical Machine.

To secure the efficient working of a Holtz induction machine, Mr. Karl Antolik recommends keeping the revolving disk as close as possible between the fixed disk and the metal points of the collecting combs, and particularly that the fixed disk should be kept warmer by at least 10 deg. Centigrade than the surrounding air. The machine should, however, not be placed in front of a fire, or otherwise heated direct, as then cracks begin to form in the shellac; but it ought to be effected by dark rays only.

For this purpose Mr. Antolik constructed a special lamp, consisting of a flat circular copper vessel, 7 inches in diameter, with its outer surface rough, and covered with lampblack. The hot air supplied by a Bunsen burner enters at the back of the vessel, which, in a vertical position, is brought to within a foot of one of the paper armatures. When this armature has become warm, the lamp is removed to the other armature, and may, during the experiment, be brought near them alternately, unless two lamps are employed.

The revolving disk should not be varnished, as the well-known metallic and conducting rings which form on the disk opposite the points of the combs are difficult to remove. These rings will, of course, settle on unvarnished glass as well, but may then easily be rubbed off with a little tallow. Mr. Antolik says that with this preparation it is only necessary gently to rub one of the warm armatures with a piece of felt to start the machine even in an unfavorable atmosphere, and it will then continue to work without any disturbing change of polarity.

Beer, Wine, and Liquor.

In a recent publication—"The Brewer, Distiller, and Wine Manufacturer"—Prof. Gardner gives some interesting facts regarding artificial drinks. Although he writes from an English point of view, it is not unlikely that his statements will have an adaptation otherwheres. Of beer, he says that until recently malt, hops, and water were the only ingredients that entered into the composition of beer, but sugar and raw grain are also now used largely in place of malt, and occasionally other bitter flavoring materials are substituted for hops. The present proper definition of beer may be as follows: "A saccharine fluid flavored with hops, or other aromatic bitters, which has been rendered alcoholic by fermentation." Aloes is now largely used to take the place of hops. It may leave the beer a lighter and more amber-like color, but it is a very inferior substitute for hops. Its presence is readily detected by the taste.

The water used in the brewing of beer is known to have a marked influence on its quality. Any organic contamination in the water spoils the product. Hard water is preferred to soft water; the sulphates and salts of calcium and magnesium in the water tending to self-fining of the beer. The ales of Burton, England, get much of their celebrity from the water used in their brewing, which comes from wells sunk in the beds of red sandstone and gypsum that abound in the neighborhood, and not from the river Trent, as popularly supposed.

Wines derive their distinctive peculiarities less from the original stock of the grape and from method of manufacture than from the climate and soil where the vines are grown. Wines so opposite in character as those of Burgundy, the Cape, and Spain are all made from the same stock of Burgundian grapes. To prevent viscidity or ropiness in wines while fermenting, grape stalks are added to the must, or tannic acid, oak bark, gall nuts, wood shavings, gypsum, or alum. When wine becomes bitter, isinglass, carbonate of lime, or slaked lime is added. To prevent acetous fermentation the wine must be fortified by alcohol.

The best whisky is made from malt. Inferior qualities are made from raw grain spirit prepared from barley, oats, rye, or rice, and the peculiar flavor admired by habitual users comes from the artificial addition of fusel oil, which is a narcotic poison.

The best brandy is distilled from white wines, but it loses strength with age, and with its strength goes its peculiar aroma. A sugar sirup with essence of cayenne and burnt sugar are used sometimes to "improve" weak brandy. Malt brandy is a spirit made from malt, potatoes, beets, or carrots.

Gin is ordinary grain spirit flavored with oil of juniper, juniper berries, oil of turpentine, creosote, lemons, cardamoms, garlic, horseradish, caustic potash, or sulphate of zinc.

Absinthe is an extract of wormwood mixed with sulphuric acid and colored with spinach.

Health Alphabet.

The Ladies' Sanitary Association, of London, gives the following simple rules for keeping health, which we find copied in the *Sanitarian*:

A—s soon as you are up shake blanket and sheet;
B—etter be without shoes than sit with wet feet;
C—hildren, if healthy, are active, not still;
D—amp beds and damp clothes will both make you ill;
E—at slowly and always chew your food well;
F—reshen the air in the house where you dwell;
G—arments must never be made too tight;
H—omes should be healthy, airy, and light;
I—f you wish to be well, as you do I've no doubt,
J—ust open the windows before you go out;
K—eep the rooms always tidy and clean;
L—et dust on the furniture never be seen;
M—uch illness is caused by the want of pure air,
N—ow, to open the windows be ever your care;
O—ld rags and old rubbish should never be kept;
P—eople should see that their floors are well swept;
Q—uick movements in children are healthy and right;
R—emember the young cannot thrive without light;
S—ee that the cistern is clean to the brim;
T—ake care that your dress is all tidy and trim;
U—se your nose to find if there be a bad drain;
V—ery sad are the fevers that come in its train;
W—alk as much as you can without feeling fatigue;
X—erxes could walk full many a league.
Y—our health is your wealth, which your wisdom must keep;
Z—eal will help a good cause, and the good you will reap.

Gigantic Fossil Remains.

Workmen in a gravel pit near Syracuse, N. Y., unearthed on July 17 a tusk and tooth of what is believed to have been a mammoth. The relics were discovered at a depth of about thirteen feet from the surface. They were examined by Professor Brown, of Syracuse University, and Professor John F. Boynton, of Syracuse, both well-known scientists, and pronounced a great discovery. By calculation from the parts already discovered, Professor Brown regards it as the largest mammoth ever exhumed in this country. The tooth is twelve inches in length and weighs about twenty-five pounds. The surface of the tooth is divided into wedge-shaped transverse ridges, the summit of each of which constitute smaller cones. The enamel of the specimen is polished and perfectly preserved. The portion of tusk found is about five feet long and weighs 150 pounds. The entire tusk was probably ten or eleven feet long, and the animal when living is supposed to have stood at least fourteen feet high.