SCIENTIFIC AND PRACTICAL INFORMATION.

NEW PROCESSES OF WATERPROOFING.

The desirability of rendering cloth waterproof without interfering with its permeability by air has attracted a great deal of attention; and a somewhat elaborate process for the purpose has just been published. The mixture is prepared as follows: Place, in a metal vessel of about six gallons capacity, 20 lbs. sulphate of alumina cut in thin slices; and, in a similar receptacle, 8 lbs. of oleic acid, and six quarts of alcohol. Thoroughly dissolve the latter compound, and stir it with a wooden stick for twenty minutes, gradually adding the sulphate of alumina. Leave the whole for about twenty-five hours to settle. The oleic acid and the spirit will then be at the surface, and can be decanted; the remaining deposit should be filtered through flannel, and pressed into a cake. This can be dried by heat, and ground to a powder. For use on silken or linen clothes, one pound and a half to 20 gallons of water will be ample; wool will not require more than one pound. It is as well to strain these solutions, and the fabrics require only to be thoroughly saturated and dried in the air.

Another mode of applying the sulphate of alumina is as follows: Thirty grammes of acetate of lead is dissolved in a pint of water, and a similar solution is made of twenty-four grammes of sulphate of alumina. The two solutions are blended, and the fabric, after being soaked in the compound for twenty minutes, is dried by the atmosphere.

DYEING WOOL.

An eminent French authority recently gave the following directions, in a paper read before the Association of Commerce at Roubaix:

Good dyeing is not possible, unless the wool has previously been thoroughly purified from all fatty matters, and from animal moisture. Bleaching—that is to say, this thorough cleansing and purification—therefore, constitutes an integral part of dyeing, and it is of the utmost importance that it should be most efficiently carried out; in fact, the dyer should watch this part of the process constantly. The next point to be attended to is mordanting. Nearly all the colors used in dyeing require, in order to form a stable dye, that they should have for their base some metallic substance, the bodies used for this purpose being the mordants. Now, if the compounds formed between the coloring matters and the dyes are insoluble, the compounds formed between the mordants and many of the impurities in the wool—the soap in badly washed wool, for instance—are not less fixed and insoluble. If the mordant be a salt of iron, for example, it forms an insoluble iron soap, which effectually prevents the wool from taking a good pure tone of color. In order to get a good result under such conditions, dyers are constantly in the habit of evading the obstacle, and dyeing without any mordant whatever; so that mismanaged cleansing gives rise to fraudulent dyeing, colors thus put on being merely superficial and valueless.

THE COMMUNICATION OF DISEASE.

A further contribution to our knowledge of this subject has recently been made by M. Chauveau, a member of the French Academy. He states that contagion depends, not on virulent humors in a state of solution, but on solid matters held in suspension by gases; and he cites, as evidence of the truth of this theory, the facts that the inoculation with dissolved substances remains without result, and that with corpuscles is followed by the appearance of disease. He also proves, by experiment, that miasms in the air are not disengaged gases, but solid corpuscles. A person may be inoculated, with a fluid formed by the condensation of the vapor of evaporation of a virulent liquid, without danger, while the primitive liquid contains all its contagious properties. These results were observed in experimenting with the virus of small pox, epizoötic typhus, and other diseases.

DISCOVERY OF GOLD IN SIBERIA.

Accounts from the river Amour, which divides eastern Siberia from the northeastern provinces of Chinese Tartary, report the discovery of large and rich gold deposits in that region of country. Washers and diggers are at work in the tributary streams of the Amour, and gold to large amounts has already been extracted. The Olakonta and Sega, two of the small streams, appear to flow through valleys of surpassing wealth in this metal, a gang of men having obtained as much as 170 pounds of gold in a day from the banks of the latter river. A company has been originated, at St. Petersburgh, for carrying on extensive mining operations, as well as for the ulterior object of opening up trade with China and Japan, and with Western North America. A large influx of Chinese population into Siberia may be predicted.

SOUND PRODUCED BY THE MOLECULAR MOTION OF MAGNETIZATION.

Professor Tyndall, in a recent lecture, made the following statement:

"The effect I wish to make manifest was discovered by Mr. Joule, and was subsequently examined by MM. De la Rive, Wertheim, Marian, Matteucci, and Wartmann. It is this:—At the moment when the current passes through the coil surrounding the electromagnet, a clink is heard emanating from the body of the iron; and, at the moment the current ceases, a clink is also heard. In fact, the acts of magnetization and demagnetization so stir the particles of the magnetized body that they, in their turn, can stir the air and send sonorous impulses to our auditory nerves. The sounds occur at the moment of magnetization, and at the moment when magnetization ceases; hence, if a means be devised of making and breaking, in quick succession, the circuit through which the current flows, we shall obtain an equally quick succession of sounds. I do this by means of a contact breaker which belongs to a Rhumkorff's induction coil. A thin bar of iron stretches from one of the bridges of this monochord to the other. This bar is placed in a glass tube, which is surrounded by copper wire; the contact breaker is placed in a distant room, so that you cannot hear its noise. The current is now active, and every individual in this large assembly hears something between a dry crackle and a musical sound issuing from the bar, in consequence of its successive magnetization and demagnetization."

THE CRYSTALLIZATION OF IRON AND STEEL.

The various qualities of iron and steel may be compared by observing the forms of their crystals through a microscope. Cast steel of fine quality exhibits fine crystals of a needle-like shape, parallel to each other; and the axes of these crystals are in the direction of the hammering to which the metal has been subjected. The surface of iron exhibits crystals of the shape of a double pyramid, the proportions varying with the quality of the metal. The pyramids more nearly approach a cubical form as the carbon in the metal is increased in quantity.

VACCINATION.

There are three methods of inserting the vaccine lymph in the human body. One is effected by drawing the skin tight, and making four or five punctures quite through it with the proper lancet, taking care to penetrate to the *cutis vera* or true skin, the innermost of the several integuments of which the covering of our bodies is composed. The lancet should have a groove, down which the lymph can flow, running to the point, and should be held in the wound for two or three minutes to give the lymph a certainty of being absorbed. In the second manner, the ordinary phlebotomy lancet is used, and two or three scratches, parallel to each other, are made, care being taken that the abrasion is only just sufficient to allow the slightest exudation of blood. The third process is by vesication; three small blisters are raised raised a few hours previous to the vaccination, and the lymph is inserted under the skin after the serum of the blisters has been pressed out. Dr. Richard Wilson, of London, gives most emphatic testimony to the superiority of the second method, but deprecates its use on persons advanced in years or of an unhealthy condition of body. The results in such cases are frequently large swellings and considerable inflammation of the parts; and frequently sloughing sores follow, which are to be healed only by the slow process of granulation.

EDITORIAL SUMMARY.

HYDROSULPHURIC ACID.—When sulphur acts upon paraffin, at a temperature a little above the melting point of the sulphur, this gas is evolved in large quantities, and this method may be advantageously used for its generation in the laboratory. A flask, holding about a pound of the material, is fitted with a tube, bent at right angles, about one half inch bore and 12 to 18 inches long, containing cotton wool, and to this is attached the small tube for precipitation. The production of gas may be stopped by removing the heat. Heavy paraffin oil, stearic acid, or suet may be used as a substitute for paraffin.—*John Galletly.*

A NOVEL ADDITION TO THE DINNER TABLE.—The *Brewers' Gazette* says, and it ought to know, that we are to have a revolution, it appears, in wine glasses. London porter requires pewter, and hock a green glass, and it has now been discovered that sherry is not sherry unless drunk out of wood, so that we shall shortly have our dining tables laid out with tiny carved cups, instead of the orthodox wine glass with which we have long been familiar. At present the idea is only in its infancy, awaiting the artists who have under consideration the design of the new sherry cups. We may, however, mention that they will be larger than the present wine glass, more like the old port glasses which our grandfathers used.

CAMELS IN NEVADA.—The Virginia city (Nevada) *Enterprise* says that a train of over a dozen camels recently arrived in that city, having journeyed from the Carson River valley, below Dayton. These "ships of the desert" were loaded with hay, in bales, for Adam's hay yard on North D street. The huge, ungainly beasts presented quite a picturesque appearance as they filed into town with their cumbrous freight. Upon arriving at the hay yard, at the word of command they all knelt down to be relieved of their loads. These animals appear to thrive quite as well in this country as in the wilds of Sahara. There is an abundance of deserts here, if they are necessary to the comfort of the beasts.

PRUSSIAN TORPEDO BOATS.—These boats are cigar-shaped and shot-proof against the rifle and mitrailleuse. In the bow is the rudder, and in the stern, an observatory, with a peep hole about the size of a thaler; the funnel is hardly three feet above water and of very small diameter. The whole boat is about forty feet long, and the only parts above water are the funnel and observatory. The bridge is on a level with the water and protected by a double shield. It is of a gray color and very fast. It will carry torpedoes whose construction is unknown, dash into an enemy's fleet, especially at night, blow up the ship and make away again. Should it prove a good sea-going boat, and England ever dared to thwart Germany, the prediction in the "Battle of Dorking," will probably be realized. Three are already finished and in the port of Dantzic; three unfinished, destined for Kiel, and a number more under construction.

DETECTION OF ARSENIC IN PAPER HANGINGS, DYED AND PRINTED FABRICS AND IN COLORS.—The arsenical copper colors may best be detected by Bettendorf's process. The sample is covered with pure hydrochloric acid containing 25 per cent of real acid, in such quantity that after it has been digested for 15 or 30 minutes, 20 drops of the clear liquid can be poured off. If the liquid is dark or turbid some more hydrochloric acid must be added, and the solution filtered. About 20 drops are poured into a test tube in which a knife-point full of chloride of sodium and the same quantity of protochloride of tin (stannous chloride) have been placed. When these salts have become a thin paste, pure concentrated sulphuric acid is quickly but carefully added to about double the volume, so that the mixture grows hot, and fumes of hydrochloric acid gas escape. After the first violent reaction is over, more pure hydrochloric acid is added. Arsenic, if present, separates in the metallic state, rendering the liquid a dark grey brown or brown and turbid, and is readily deposited in diluting the liquid.

BOSTON FIREMEN.—The dormitories of the Boston firemen are model apartments, as are all the engine houses. They are carpeted and furnished with the best of furniture. The firemen have a parlor or sitting room, and here the stranger is surprised. There are Brussels carpets, black walnut furniture, ornamental book cases well stocked with useful volumes, facilities for writing, a piano, and the walls are ornamented with choice paintings backed by handsome paper. The department supplies all necessary comforts; but so great is the rivalry between the respective companies to show up the most inviting quarters that the firemen themselves make heavy outlays, and respective friends aid them in their work of refinement with liberal hands. Among the many good regulations of the department is the strict observance of the Sabbath and prohibition of intoxication and profanity, discharge following the breaking of the rule.

F LUDWIG had just published, in the *Wiener Anzeiger*, p. 220, 1871, an account of some researches on the action of chromic acid on certain common gases, namely, carbonic oxide, hydrogen, marsh gas, and olefiant gas. Even at ordinary temperatures, and in contact with dilute as well as with concentrated solutions, carbonic oxide is transformed into carbonic acid. Hydrogen gas, on the other hand, is oxidised with tolerable rapidity by concentrated solutions, but either not at all or very slowly by dilute solutions. At common temperatures, marsh gas is unattacked. Olefiant gas is oxidised to formic and possibly to acetic acid, as well as to carbonic acid and water at ordinary temperature. Operating at higher temperatures, Chapman and Thorp found only carbonic acid and water.

MR. J. W. BAUGHMAN, of Baltimore, Md., writes to inform us that a lady recently ran a needle into her flesh, about three inches above the knee, breaking it off under the skin. She preferred to risk the consequences rather than to have it extracted by a doctor. Mr. Baughman thought of using a magnet, and applied one of the horse shoe shape, 8 inches in length. She wore it for two days, more or less, and then found the point end of the needle protruding from the skin, one inch from where it entered. The needle was easily removed. Our correspondent is curious to know how the needle could come to the surface point upward, having thus turned round in a space less than its own length, which was $1\frac{1}{16}$ inches, and he suggests that the muscles may have turned it about.

HEATING WINES.—To destroy the germs in the wine which may produce deterioration of its quality, M. Tellier proposes to pass steam into a double copper helix which is introduced through the bung hole of the cask containing the wine. This steam, condensing, is forced up in the form of water through the interior tube by the pressure of the fresh steam boiler, and thus gotten rid of. The wine may by this means be heated to a temperature sufficiently high to destroy any germs in it, and at the same time its volatile constituents preserved.

BROWN TINT FOR IRON AND STEEL.—Dissolve in four parts of water, two parts of crystallized chloride of iron, two parts of chloride of antimony and one part of gallic acid, and apply the solution with a sponge or cloth to the article, and dry it in the air. Repeat this any number of times, according to the depth of color which it is desired to produce. Wash with water and dry, and finally rub the articles over with boiled linseed oil. The metal thus receives a brown tint and resists moisture. The chloride of antimony should be as little acid as possible.

A DRESSING for goods, according to Finckh, may be made by boiling two parts of caustic soda, with four to five parts of palm oil to a soap, which is then dissolved in more water and mixed with thirty parts glycerin of 30° Beck. The mixture should then be cooled, and eight parts of wheat starch stirred in, and water added to bring the weight of the whole up to 1,000 parts. The addition of a little carbolic acid will protect this from fermentation. Of this mixture, add 6 to 8 pounds to every 100 pounds of potato starch used.

SPECTROSCOPIC REFLECTOR.—A slightly convex mirror is fastened on a stand, in such a way as to receive the rays from a Bunsen burner near the operator, and reflect them to the prism or slit of the spectroscope. The introduction of any substance into the flame may be easily accomplished by this arrangement, and the lines are said to appear much brighter than in the ordinary instrument. Prof. Fleck tested, with this apparatus, lime which he had obtained in five different quantities by partial precipitation, and states that different lines appear in different portions; this may be owing to the presence of different elements in the precipitates.