of ice which is solid and often transparent, and this suffices to prevent all reactions; second, the superficial combination which is sometimes produced also limits the reaction. This second effect, which is produced for instance when sodium is acted upon, is all the more important, as we know scarcely anything about the solubility of simple or compound bodies in liquefied gases. In order to prove that chemical affinity still holds good at very low temperatures, the authors undertake the study of fluorine on different bodies by substituting liquid fluorine for the gaseous form.

To realize these experiments the body to be studied was placed in a glass tube of small diameter, carefully dried. This tube, 6 or 8 inches long, was sealed up at the ordinary temperature to avoid the absorption of moisture; it was then placed in liquid air at -190°C . On the other hand, the fluorine was liquefied in a tube whose diameter was much greater than that of the tubes containing the samples. At the moment of making the experiment, the end of the sample-tube was cut off and it was inverted quickly into the liquid fluorine. By lifting it up, the body to be observed is allowed to fall into the liquid. A great variety of simple and compound bodies were studied in this way, and many of them gave very interesting reactions at this low temperature. Iodine, however, which takes fire in fluorine gas and forms a pentafluoride of iodine, has no reaction in liquid fluorine. Pure liquefied oxygen has also no reaction on liquid fluorine at -187°C . On allowing the temperature to rise, each of the two simple bodies separates at its boiling point. When a piece of dry sulphur is let fall in liquid fluorine an intense flame of a livid blue color is immediately produced, which soon fills the whole apparatus. The glass tube is broken on account of the heat, and when the excess of fluorine is volatilized, the glass is seen to be covered with a crystalline layer of hexafluoride of sulphur, which soon takes the gaseous form. With selenium the reaction is still more violent at -187°C . When the selenium comes in contact with the fluorine a flame is produced, accompanied by a detonation which is strong enough to break the tubes and the double-walled vessel filled with liquid air within which the experiments are made. After the explosion the glass is found to be covered with a layer of red selenium. When red phosphorus, quite dry, is let fall in the liquid, it combines at once and forms a flame, giving pentafluoride of phosphorus, which is rapidly solidified and afterward takes the gaseous state when all the fluorine is volatilized by reheating the tube. Arsenic also acts with great violence, and a fine blue flame is produced; after the fluorine is volatilized there remains a solid fluoride of arsenic. Nitrogen has no reaction either at the ordinary temperatures or when both gases are liquefied. Antimony falls to the bottom of the liquid fluorine and is not attacked, still preserving its brilliant appearance.

The different varieties of carbon, also crystallized silicon and amorphous boron, have no action upon liquid fluorine at its boiling point. When a small fragment of wood charcoal or a flake of lampblack is let fall into the tube containing the liquid fluorine, the carbon becomes incandescent when it traverses the gas but is put out on reaching the liquid. Sodium when in contact with the liquid remains brilliant but is covered with a thin transparent layer of fluoride of sodium. Potassium does not react at first, but after 20 seconds or more a combination is produced with a violent explosion which shatters the tube. Some of the reactions given by composite bodies are very energetic at low temperatures; thus if a few fragments of dry iodide of potassium are let fall in liquid fluorine which is kept at a few degrees below its boiling point, no reaction is produced, but when the temperature is raised to the boiling point there is a rapid decomposition. The iodine is displaced from its compound and owing to the elevation of temperature it burns in the fluorine. Iodide of mercury does not react in liquid fluorine, but takes a yellow tint owing to the extreme cooling. Silicon and boric anhydride fall to the bottom and show no effect, but on the contrary lime is violently attacked. It is raised to incandescence and the tube is broken from the intensity of the reaction. Carbide of calcium gives no effect. Among the organic bodies, anthracene when crystallized and quite dry, placed in contact with liquid fluorine at -187°C , gives a violent reaction with disengagement of heat, explosion and deposit of carbon. Iodoform, however, shows no effect, nor sugar, morphine, etc.

These experiments show, therefore, that the affinity of fluorine at a temperature of -187°C . is still strong enough to ignite sulphur, selenium, phosphorus and arsenic, and to give a violent reaction with incandescence in the case of oxide of calcium, also to form an explosive mixture with anthracene. It is thus demonstrated that chemical affinity still holds good at these low temperatures, when energetic reactions are employed such as those of fluorine with simple or compound bodies.

THE DEATH OF DR. J. V. LABORDE.

DR. JEAN BAPTISTE VINCENT LABORDE, died recently at the age of seventy-two. He was born at Buzet (Lot et Garonne), and received a good education at the Lycée of Cahors, after spending some time in a boarding-school at Casteljaloux. He went to Paris, without any resources, to study medicine. He obtained the gold medal of the hospitals, the Corvisart prize, and another prize from the Société Médicale des Hospitiaux, and lastly, in the very year in which he got his doctor's degree, the Godard prize, awarded by the Société Anatomique de Paris.

In 1872 Laborde gave up pure medicine to devote himself to scientific works, particularly to physiology. He studied the acid of the gastric juice, trying to show that it never existed uncombined (1874-77), the rhythmical function of the heart and its development in the embryo (1876), and more especially the function of the central nervous system, and of the bulb in particular (1877-1880). He clearly explained the two possible causes of death, either a stop of the respiratory movements with persistence of the beating of the heart or *vice versa*. He showed also the functional association of the eyes in the binocular vision, owing to the narrow connections between their motor nerves.

His special study was experimental physiology applied to therapeutics and toxicology; he published works on the properties of many substances, such as the narceine (1866), which he considered as the best sedative of the nervous system; the bromides, the soothing influence of which he investigated (1867-1869), the eserine or alkaloid of the Calabar bean (1869); propylamine (1873); aconitine, the advantages of which he showed as a sedative of sensibility (1875); colchicine, sparteine, boldo, salts of strontium, etc.; lastly, in 1877, he published a study on the alkaloids of cinchona, which he named in the following order, according to their poisonous qualities: Cinchonine, cinchonidine, quinidine. In fact, he made a special study of poisons in general, animal as well as mineral, natural as well as artificial.

In concluding this cursory view of Laborde's works, we cannot do better than mention his ingenious method of the rhythmical tractions of the tongue, which was sufficient to make the name of its inventor known throughout all the world. There is no need to expatiate on his most simple and efficient process of setting the respiratory reflex to work. It is known and used everywhere, and it has called back to life numbers of apparently drowned or suffocated people.

CENTENNIAL CELEBRATION OF THE BIRTHDAY OF JUSTUS VON LIEBIG.

By DURAND WOODMAN.

By invitation of the Verein Deutscher Chemiker, New York Section, the members of the American Chemical Society, the Society of Chemical Industry, the Electro-Chemical Society and the Chemists' Club, participated, recently, in a celebration in memory of the illustrious investigator and chemist, Justus von Liebig, who was born on May 12, 1803.

The societies met in the Assembly Hall of the Chemists' Club and listened to addresses by Dr. Ira Remsen, president of Johns Hopkins University; Prof. William H. Brewer, of Yale; Dr. Carl Duisberg, vice-president of the Verein Deutscher Chemiker and managing director of the Farbenfabriken, of Elberfeld, Germany.

The exercises were opened by Dr. H. Schweitzer, chairman, who welcomed the assembly and foreign guests, and introduced the speakers.

Dr. Remsen outlined the early life of Liebig, mentioning his unpromising inaptitude for study at school, which resulted in giving it up and devoting himself to chemistry; his first interest in which was aroused by the study of colors and dyes. Later, while at a country fair, he saw an exhibition of Pharaoh's serpents, accompanied by some chemical operation connected with their preparation which led eventually to his study and investigation, while attending the lectures of Gay Lussac at Paris, of the cyanides, cyanates and fulminates. This work resulted in his introduction to Gay Lussac, who admitted him to his private laboratory. He was appointed a professor at the University of Giessen, in his twenty-first year, 1824, where his laboratory was of the crudest character, not much better than a barn without flooring; but from this modest beginning, with only six or seven students, his work grew and his reputation spread; a new laboratory was built and students came to it from all quarters.

During the twenty-eight years at Giessen the activity of Liebig and the work he accomplished were enormous, and he can be truly considered the greatest chemist of that time. His publications in scientific journals amounted to more than two hundred papers, in addition to his works on agriculture, organic chemistry and analysis; besides acting as editor of several scientific journals.

Coming to personal reminiscences of the time when he attended the lectures of Liebig at Munich, Dr. Remsen described the difficulty he experienced as a student in attempting to harmonize the old system as taught by Liebig, with the new as taught by his assistant, Volhard. Speaking of his methods he said that all Liebig's lectures were profusely illustrated by experiments, many of them so elaborate as to be unthought of in the present day lecture room—metallurgical experiments requiring wind furnace, and many others which the speaker said he would now hardly believe could have been done on the lecture table if he had not preserved his note book filled with rude drawings of all the apparatus used.

Liebig was fond of a little dramatic effect, and took some care to bring his lectures to a climax with the most effective experiment, whether with a big flash of flame or an explosion or otherwise; and while the present method is more severe and straight laced, the speaker said he was not certain that the impressions made and the train of thought aroused by Liebig's method were not very effective.

It was extremely difficult to get admission to Liebig's laboratory as a student; in fact, it was one of his conditions on accepting the professorship at Munich, that he should not give his time or attention to students. In appearance, Liebig was large of stature and of fine bearing; one of nature's noblemen, but very emphatic in berating his assistants when the experiments went wrong, his language on such occasions being more remarkable for condensed energy than for rhetorical elegance.

Prof. Brewer, who is the oldest living pupil of Liebig in this country, and who has been his devoted follower in the line of agricultural chemistry, told of his enthusiastic desire to study under him, aroused by reading a translation of his work on agriculture in 1846. A few years later he went abroad, and with letters of introduction went to Munich. Here he found Ogden Rood, afterward professor of physics at Columbia University, who offered at once to introduce him to Liebig, and assist in every way toward the desired end. But Rood advised him not to use his letters of introduction; not to call Liebig "Professor," but "Herr Baron," to have plenty of assurance, and not to spare flattery. With this preparation, the introduction was brought about and Brewer stated his mission. Liebig assured him that he would do better to go somewhere else. He said: "I will give you no attention; no attention." This assurance met every advance until finally the speaker said: "I told him I had come

three thousand miles to sit at the feet of the greatest teacher of chemistry in Europe and I am going to remain here." "Well," said Liebig, "see Mr. Meyer."

He saw "Mr. Meyer" and a place was set apart in the laboratory for the new student, who remained there a year, but actually received practically "no attention," except when he showed some organic crystals to him which had the appearance of potassium nitrate, and were so pronounced by Liebig on sight. The effort to convince him that they were organic was followed by a sound berating for "contradicting," which was later followed by demonstrating to the great professor that no contradiction had been intended, and that the crystals were in fact "very peculiar." Prof. Brewer's address was full of personal interest, and was followed with the closest attention.

Dr. Carl Duisberg read a paper describing the influence of Liebig on chemical industry, his teachings resulting in that knowledge of the importance of scientific method which has so largely displaced the "rule of thumb" man by trained chemists in all the great chemical industries of Germany, and more or less in other countries. Liebig's influence was exerted chiefly on the organic chemical industries, and much of their progress is due to his activity and energy while at Giessen.

"A staff of his pupils making their way to all quarters of the globe disseminated his ideas in assisting agriculture and the chemical industries, and as the first systematic teacher of laboratory methods, the credit is justly due him for an influence which can hardly be measured or described."

THE CANALS OF MARS.

By EDMUND LEDGER.

If it be proposed to admit the actual objective existence upon Mars of these very numerous formations, many difficulties immediately arise. All who have seen them have been puzzled by their number; the complexity of their interlacing and triangulation; their visibility when the disk of the planet is of very small size; their straightness; their immense length, which in some cases reaches to 3,000 to 4,000 miles (nearly equal to a whole diameter of the planet); and their uniform and great breadth, in different instances estimated at 30, 40, or even 60 miles. This breadth has naturally suggested that it must at any rate be a mistake to imagine them to be lines of water, but that it is more likely that they may be lines of vegetation extending along a canal of water which is itself too narrow to be seen. It is to be noted that the very narrowest line which it is considered that a telescope can possibly reveal upon Mars must be at least 18 miles in width. As to the distance between the two lines of the doubled canals, the observations indicate that it varies from about 30 to as much as 360 miles.

The visibility of the canals is observed to be greater some times than at others. Now, it is probable that the climate of Mars is very dry, its atmosphere of small density, its clouds rare, and its land mainly desert. Nevertheless, white spots are seen around its poles, which are generally termed the polar snows. These wax and wane with the alternation of the summer and winter of the two hemispheres, and are most likely not of great thickness, as they almost, and sometimes altogether, disappear in the height of the summer. Mr. Lowell has consequently strongly maintained that the melting of such a polar snowcap forms a sea of water around its boundary, from which a supply gradually finds its way into the canal system, causing vegetation to spring up, as on the earth along the Egyptian Nile. The circular spots observed at the intersection of two or more canals might, in that case, be fertile oases in the midst of surrounding desert.

As numerous almost as the writers who have discussed the canals are the varied hypotheses promulgated for their explanation. Some have suggested that they may be tracks drawn by meteorites as they have rushed along the surface; or by minor planets, which became close satellites of Mars in the earlier stages of its formation, and presently in grazing contact ran round and round it. Others have supposed that they may be fissures, generally following the course of great circles, and in some parts radiating from central points. These, it is said, might be caused by the cracking of an unsupported crust left behind by a contracting interior; or, on the other hand, by the resistance of the interior to the contraction of a more rapidly cooling crust. It has even been suggested that vapors continuously rising out of such fissures may perform a part in producing the single, or doubled, appearance of the various canals. The space at my disposal forbids the mention of other theories, or the discussion of such as I have named. They are all, I believe, unsatisfactory. They all alike involve great improbabilities, and fail to satisfy the necessary conditions.

The general appearance, as well as the exceedingly complicated interlacing and arrangement of these numerous so-called canals, is therefore of so puzzling and enigmatical a character that I think it may well suggest the question: Are they really there?

It is, I think, probable, that the so-called canals (with the exception perhaps of a few of the darkest and most prominent seen with low telescopic power) may not really exist upon Mars; and also that the apparent doubling, seen in many of them, may be still more delusive. I think that what is seen may for the most part be an appearance produced by the observer's eye, when affected by the strain of long and earnest gazing through the telescope. I consider that this conclusion is supported by experiments, and by the physiology of accommodation, astigmatism, and diplopia in the human eye. And I believe that there is also a subtle influence which is often conjointly effective upon the brain and nerves of an observer.

When much has been seen, more is wished for, and the more is seen. Those who once begin to see canals generally go on to see an increasing number; and others may presently see what they have recorded. Even Antoniadi wrote, in 1898, that "had it not been for Prof. Schiaparelli's wonderful discoveries, and the foreknowledge that the canals are there, he would have missed at least three-fourths of those seen now." Many of the drawings of portions of the surface by

Schiaparelli, which have been very often reproduced, easily impress themselves on the memory. They may, therefore, be the more likely to form imaginary cerebral images. It is certain that individual observers have occasionally drawn some features as they had previously been depicted in Schiaparelli's charts, when many other observers have testified that they could not be seen at that particular time.—Nineteenth Century.

THE RAPID ANALYSIS OF WATER.

THE potability of water constitutes at present one of the most important questions of hygiene, since the use of this liquid as an exclusive drink is becoming more and more widespread in all classes of society, either by preference or as a medical necessity. Such use of water presents numerous advantages, but may, nevertheless, sometimes offer serious inconveniences. We know, in fact, that a number of diseases of the most dangerous character owe their origin to water. Aside from cholera, typhoid fever, and dysentery, there are a number of gastric or intestinal troubles that have no other cause. There is, then, a genuine and serious danger in the use of water in the hard state as a drink, when we are not certain of its purity. The public authorities well understand the importance of this question, and, in order to supply a city with wholesome water, take thousands of precautions, which, however, often prove inadequate, since accidental contaminations are continually to be apprehended. The danger is still greater in the rural districts, where the water is submitted to no surveillance, and where the causes of accidental contamination are often more frequent. It is therefore almost absolutely necessary for the inhabitants of a city or the country, as well as for travelers, explorers, and simple tourists, to be able easily to ascertain the quality of the water that they are obliged to drink. There are certain signs characteristic of the contamination of water, but these can be put in evidence only by chemical or bacteriological analyses, both of which constitute lengthy, delicate, and troublesome operations that can be performed only in a laboratory and by experienced hands.

To simplify bacteriological analysis is impossible; but we can always rely upon chemical analysis as being quite sufficient. In fact, as Prof. Chantemesse says, "although bacteriological analysis plays an important part in the diagnosis of the qualities of a potable water, it does not play an exclusive one," since the chemical composition of the liquid has a very great influence upon the existence, nature, and viru-

absence and in the second the presence of nitrites is revealed. The rapid appearance of the blue color and its intensity indicate, upon reference to rules established by us, the proportion of the nitrites contained in the water.

If, in operating under the above conditions, it is found that the water remains colorless, add a zinc tablet in order to test for nitrates. As before, one of two cases may present itself: either the water will remain colorless, even after five minutes have elapsed, or else it will take on a blue color. Here again the rapidity and intensity of the coloration serve to show the proportion of the salt contained in the water.

From the view point of the contamination of water, the test that we have just described is of prime importance, since potable water should not contain nitrites, which are a sign of the presence of organic matters in process of a transformation caused by microbes. The nitrates, without having the same importance, nevertheless indicate a certain degree of pollution, when the quantity thereof exceeds a determined limit. With the process under consideration, it is possible to effect these two analyses in ten minutes and to ascertain the quality of the water in the dining room of a modern hotel as well as at the source of supply of a village tavern.

Example II.—Determination of the presence of chlorides. Put a chromium tablet into 100 cubic centimeters of water, and the latter will assume a yellow color. Then add tablets of nitrate of silver successively until the liquid becomes red. Since each tablet corresponds to 10 milligrammes of chromium, the water contains as many times 10 milligrammes of chromium per liter as the number of tablets added.

Example III.—Determination of the hydrometric degree, that is to say, the richness of the water in calcareous or magnesian salts. Put 40 cubic centimeters of water into a 100 gramme bottle, dissolve therein a soap tablet and shake well. If no persistent lather is produced, add tablets until it is. Each tablet corresponds to 4 hydrometric degrees. These two operations are very important from an industrial standpoint. No one, in fact, is ignorant of the rôle of the chemical composition of water in its industrial applications. The engineer and manufacturer will find in this process an easy and quick method of ascertaining the quality of the water that they employ.

THE GREAT MANUFACTURING STATES.

It is a somewhat curious fact, says the Chicago Tribune, that the seven States which stood first in

APPARATUS FOR THE QUICK ANALYSIS OF WATER.

lence of microbes. Moreover, bacteriological analysis has not always given decisive results, and M. Duclaux, manager of the Pasteur Institute, on the one hand, and M. A. Gautier, on the other, have shown by researches made in different countries in which epidemics of typhoid fever and dysentery had prevailed that a chemical analysis, even a summary one, would have sufficed to reveal the suspicious character of certain waters.

We have, therefore, say MM. Pignet and Hue, in La Nature, finally given preference to this form of analysis, and, taking as a basis a pharmaceutical preparation called "compressed tablets," have succeeded in creating a simple, quick, and practical process of analysis that permits of the examination of water by anybody, under all circumstances, and without any special knowledge. These tablets, which are accurately proportioned and may be preserved indefinitely, replace the titrated liquids and solutions and complicated apparatus in ordinary use.

For a complete analysis, nine tablets and two small bottles of liquid reagents are all that is necessary. The apparatus, which is very simple, consists of a few test tubes, test glasses, etc., the whole contained in an easily transportable box 35 centimeters in length, 20 in width and 15 in height. The operations are seven in number: quantitative analysis (1) of the nitrites, (2) of the nitrates, (3) of the free and albuminoid ammonia, (4) of the chlorides, (5) of the organic matters, (6) determination of the hydrometric degree, and (7) examination for iron, copper, zinc, etc.

In order to give an idea of the simplicity of the process we cannot do better than give a brief description of the method employed in some of our researches.

Example I.—Determination of the presence and proportion of the nitrites and nitrates. Dissolve an iodide tablet in 100 cubic centimeters of water contained in a test glass and afterward add to it an acid tablet. After the two tablets are dissolved, one of two cases may present itself: either the liquid will remain colorless, even after five minutes have elapsed, or else a blue color will develop more or less rapidly during the same space of time. In the first case, the

1890 in the value of manufactured products stand first again in 1900, and in exactly the same order: First of all comes New York; second, Pennsylvania; third, Illinois; fourth, Massachusetts; fifth, Ohio; sixth, New Jersey, and seventh, Missouri. Illinois is third in population, as in manufactured product. In that respect it occupies a normal position. Its output per unit of population is \$261, compared with New York's \$299, Pennsylvania's \$291, and New Jersey's \$324. The output per unit is affected by the character of the business carried on. New Jersey is the home of the silk manufacturing industry of the United States. It is partly owing to the manufacture of this expensive product that New Jersey, in one respect, outranks Illinois.

RUSSIAN BANKING METHODS IN CHINA.

THE Novoe Vremya gives a by no means flattering account of the methods pursued by the Russo-Chinese Bank in the Far East. It appears that there are ten different nationalities represented among the sixteen employees in the bank there, and there is only one Russian on the staff. The official organ complains that the "directors" of the bank look far more like schoolboys than serious business men, and that neither the practical British merchants, nor the French, nor even the Russians care to avail themselves of the facilities afforded by the bank.

The following is an instance of the bank's procedure. The cost of a ticket from Japan or China to St. Petersburg by the German Lloyd Line has to be paid in marks. The traveler asks the Russo-Chinese Bank to change for him the necessary sum out of, say, £100. The bank converts the English pounds into Chinese taels or Japanese yen and charges brokerage; then the taels or yen are converted into German marks, and commission is again charged; then from this result the sum required for the passage money is deducted, and the remainder is converted into taels or dollars, commission being charged for the third time, and, finally, the fourth operation consists in converting the taels or dollars into English pounds, commission being charged for the fourth time.—The London Globe.

TRADE NOTES AND RECIPES.

Gold Printing on Oilcloth and Imitation Leather.—Oilcloth can very easily be gilt if the right degree of heat is observed. After the engraving has been put in the press, the latter is heated slightly, so that it is still possible to lay the palm of the hand on the heated brass plate without burning it, or better, without even any unpleasant sensation. Go over the oilcloth with a rag in which a drop of olive oil has been rubbed up, by which treatment it acquires a thin, greasy film. No priming with white of egg or any other priming agent should be done, since the gold leaf would stick. By sprinkling on gilding powder, a lustrous gilding cannot be obtained. The gold leaf is applied direct on the oilcloth, which has been slightly oiled; then shove into the lukewarm press, squeezing it down with a quick jerky motion and opening it at once. If the warm plate remains too long on the oilcloth, the surface covering of the latter will soften under the radiating heat and the gold leaf will stick. When the impression is done, the gold leaf is not swept off at once, but the oilcloth is first allowed to cool completely for several minutes, since there is a possibility that it has become slightly softened, especially at the borders of the pressed figures, under the influence of the heat, and the gold would stick there if swept off immediately. When the work is manipulated as per directions, the printing must be sharp and neat and the gold be glossy. The whole operation, besides, is so simple that it requires less time than the popular bronze printing so much in use upon oilcloth. For the latter a preliminary treatment of printing with varnish ground has to be given, and the bronze is dusted on this varnish. Naturally this is not so durable as gold printing, nor does it look as pretty and neat, since it lacks the luster which distinguishes gold-leaf printing.

The leather paper (imitation leather) now so much in vogue is generally treated in the same manner. The tough paper substance is made to imitate leather perfectly as regards color and pressing, especially the various sorts of calf, but the treatment in press gilding differs entirely from that of genuine leather. The stuff does not possess the porous, spongy nature of leather, but on the contrary is very hard, and in the course of manufacture in stained-paper factories is given an almost waterproof coating of color and varnish. Hence the applied ground of white of egg penetrates but slightly into this substance, and a thin layer of white of egg remains on the surface. The consequence is that in gilding the leaf gold is prone to become attached, the ground of albumen being quickly dissolved under the action of the heat and put in a soft sticky state even in places where there is no engraving. In order to avoid this the ground is either printed only lukewarm, or this imitation leather is not primed at all, but the gold is applied immediately upon going over the surface with the oily rag. Print with a rather hot press, with about the same amount of heat as is employed for printing shagreen and title paper. A quick jerky printing, avoiding a long pressure of the plate, is also necessary in this case.—Der Stein der Weisen.

Silvering Glass Globes.—Workshop Receipts, an English formulary, is authority for the following:

(1) Take 1-3 ounce of clean lead, and melt it with an equal weight of pure tin; then immediately add ½ ounce of bismuth, and carefully skim off the dross; remove the alloy from the fire, and before it grows cold add five ounces of mercury, and stir the whole well together; then put the fluid amalgam into a clean glass, and it is fit for use. When this amalgam is used for silvering, let it be first strained through a linen rag; then gently pour some ounces thereof into the globe intended to be silvered; the alloy should be poured into the globe by means of a paper or glass funnel reaching almost to the bottom of the globe, to prevent it splashing the sides; the globe should be turned every way very slowly, to fasten the silvering.

(2) Make an alloy of 3 ounces of lead, 2 ounces of tin and 5 ounces of bismuth; put a portion of this alloy into the globe, and expose it to a gentle heat until the compound is melted; it melts at 197 degrees F.; then by turning the globe slowly round an equal coating may be laid on, which, when cold, hardens and firmly adheres. This is one of the cheapest and most durable methods of silvering glass globes internally.

(3) Nitrate of silver, 1 ounce; distilled water, 1 pint; strong liquid ammonia, sufficient quantity, added very gradually, to first precipitate and then redissolve the silver; then add honey, ¼ ounce. Put sufficient quantity of this solution in the globe, and then place the globe in a saucepan of water; boil it for 10 to 30 minutes, occasionally removing it to see the effect.

Manufacture of Aluminium Bronzes.—According to a French authority an alloy of the following composition gives the best results:

Copper, 89 to 98 per cent, aluminium and nickel, 1 to 2 per cent. Aluminium and nickel change in the opposite way, that is to say, in increasing the percentage of nickel the amount of aluminium is decreased by the equal quantity. It should be borne in mind that the best ratio is aluminium, 9.5 per cent, nickel, 1 to 1.5 per cent at most.

In preparing the alloy a deoxidizing agent is added, viz., phosphorus to 0.5 per cent, magnesium to 1.5 per cent. The phosphorus should always be added in the form of phosphorus-copper or phosphorus-aluminium of exactly determined percentage. It is first added to the copper, then the aluminium and the nickel and finally the magnesium, the last named at the moment of liquidity, are admixed.—Neueste Erfindungen und Erfahrungen.

Composition for Cleaning Painted or Varnished Surfaces.—The specifications of a recent English patent call for lemons, or other acid fruit, 2 pounds, hydrochloric acid, 1 pound, and water, 4 pounds. These are mixed, boiled to a thick paste and incorporated with oxalic acid, 2 pounds, and black treacle, 3 pounds. When cold, butyric acid, 1 fl. ounce, or other grease-dissolving acid is stirred in, and the whole made up to 1 gallon with water. The composition is applied to the painted, varnished, or polished surface, left for a sufficient time, and then washed off.—Pharm. Era.