

landscape painters and to staff officers who desire to obtain the general contour of a piece of ground.

The apparatus is the invention of Mr. Marius Mallen, and is constructed by the well known optician, Mr. F. L. Chevalier, of Paris.—*La Nature*.

THE JOHNSON FILTER.

THE filter represented herewith is extensively used in England, and obtained one of the principal prizes at the last Hygienic Exhibition in London.

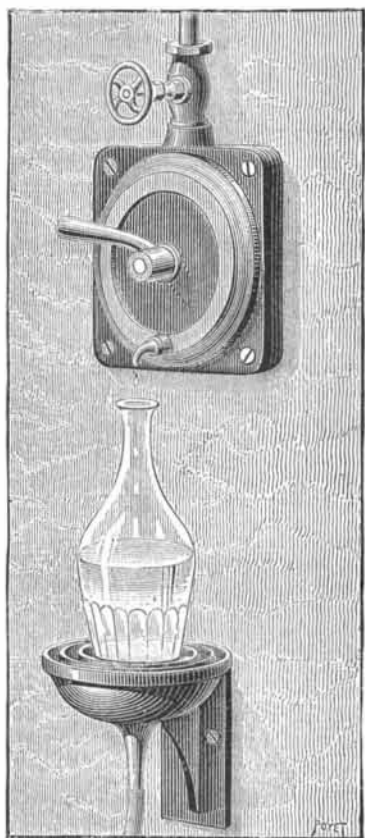


FIG. 1.—THE JOHNSON FILTER.

This filter is both a mechanical and a chemical one, and it is applicable to both domestic and industrial uses. Fig. 1 shows the domestic style, and Fig. 2 gives the internal arrangement of it. The water enters through the pipe shown at the upper part of the engraving, traverses a disk of prepared carbonized paper, B, and reaches a metallic plate, D, from whence it flows off at E. This plate, D, is put in place by means of a screw, F. The disk of filtering paper may be changed with the utmost ease, and the operation may be performed by the most inexperienced domestic. As the entire apparatus is of iron, there is no danger of breakage. The domestic style shown herewith is the smallest size one. It is constructed in two other styles in which the filtering disks are superposed, so that several of them operate at one and the same time, and thus give a much larger quantity of filtered water within the same period. By thus superposing the filtering parts, Mr. Johnson, the inventor, has been enabled to construct a large industrial model that is much used in breweries, and that is capable of furnishing more than 130,000 gallons of filtered water per day.

In the small apparatus the filtering material is a special paper composed solely of purified cotton fibers, and boneblack freed from all phosphates. In the large

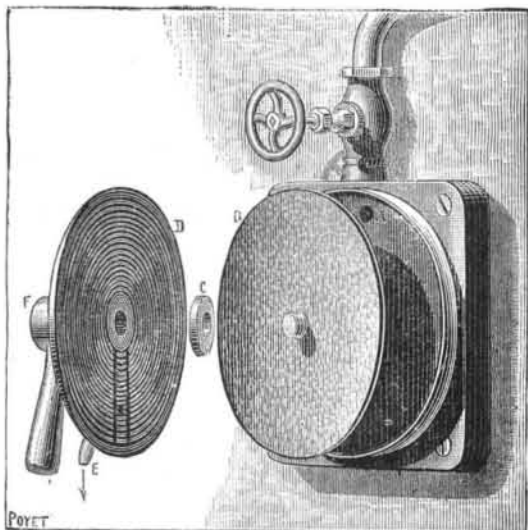


FIG. 2.—DETAILS OF THE FILTER.

filters, which resemble barm presses and are managed in the same way, paper is used in conjunction with specially prepared cloth.—*La Nature*.

A ROCKING APPARATUS FOR USE IN DEVELOPING DRY PLATES.

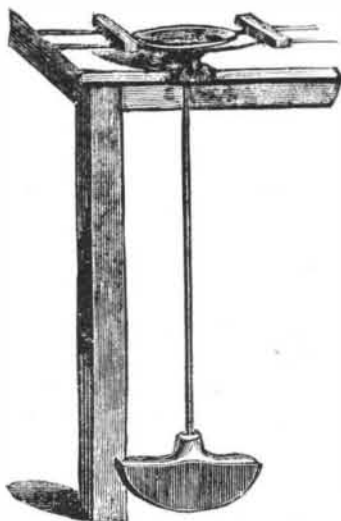
By Dr. J. M. EDER.

In developing gelatine-bromide plates, the vessel containing the developer should be kept in motion, particularly when the amount of developer is small.

Automatic rocking apparatus make the temporary absence of the operator practicable, and hence may be of value, not only in large establishments, but also for amateurs.

I have therefore no hesitation in calling attention to an arrangement made by Herr Braun, of Berlin, and

which was much appreciated by the visitors to the Frankfort Exhibition; and as Herr Braun was good enough to send one to Vienna, I had an opportunity of exhibiting it at the general meeting of the Photographic Society in this city. The apparatus is, as the figure indicates, screwed upon a table, and it consists of an iron plate having two V-pieces, in which work the knife-edges of the pendulum. Over these knife-edges is a small round platform, upon which the dish stands, and there are steadying pieces, which slide on iron rods, as shown in the figure. When once the



heavy iron pendulum is set in motion, it remains swinging for a long time.—*Photo. News*.

OXALATE OF POTASH DEVELOPER.

THE following oxalate developer is said to keep well, and was proposed by Mr. Archer Clarke at a recent meeting of the London and Provincial Photographic Association:

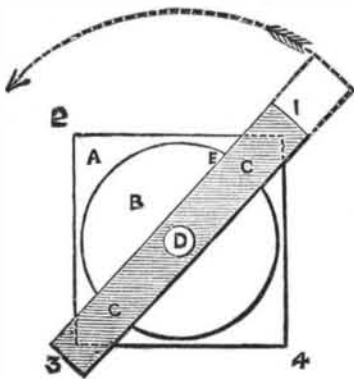
No. 1.		
Citric acid.....	1	ounce.
Citrate of ammonium.....	1	"
Chloride of ammonium.....	1	drachm.
Bromide of ammonium.....	1½	drachms.
Oxalate of potash.....	10	ounces.
Water.....	50	"

No. 2.		
Protosulphate of iron. . . .	3 oz. and 160 grs.	
Citric acid.....	1 ounce.	
Water.....	50 ounces.	

Mix in equal proportions.

NEW TOURIST CAMERA.

M. BALAGNY exhibited a new tourist camera manufactured by M. Ruckert. This camera is constructed more like an English one, having a square bellows, which is very rarely to be seen in France; but it is on the front of the camera that a new dodge has been tried. A large turntable has been inserted into the front board, upon this a sliding lid holding the lens. The idea of the inventor can easily be guessed by this dodge; he has a multiplying camera, that is to say, if his camera is for a whole plate, he can make four C. D. V. or quarter-plate views; if he leaves the lens in the center, he can take a whole-plate landscape. If he desires to employ four quarter-plates, the operator fixes two sheets of zinc in the front of the camera, next to the dark-slide, so that the first corner only remains open; he then pulls up the lens to position. When the exposure is finished, the sliding board holding the lens is pulled around, and the lens is then found at corner 2, the exposure is given, and the lens is then brought around to corner 3, and from thence to corner 4. Naturally the operator is supposed to have changed the strips of zinc in the front; if so, he has four pictures upon his plate. The operator can also have two half plates, either horizontal or upright, by bringing the



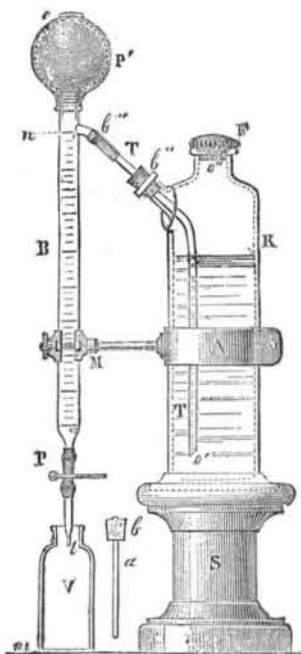
lens to the top, bottom, right, or left of the camera, and changing the zinc bands to coincide with what is required.—*Br. Jour.*

BILLET'S IMPROVED BURETTE.

MANY styles of burettes have been made, but the one that we figure herewith is of particular interest to chemists and analysts. It is of Mr. F. Billet's invention, and is manufactured by Mr. E. Dueret. Referring to the figure, R is a reservoir containing the liquid to be titrated; S is a support for the reservoir; B is a burette divided into ½ cubic centimeters; A is a ring with clamp, M, for holding the burette; P is a Mohr pinch-cock, which may be replaced by a glass cock terminating the burette; P' is a rubber bulb, with aperture, a; T is a glass tube connecting the reservoir and burette; F is the stopper of the reservoir, with aperture, o; and

V is a glass vessel, with stirring rod, ab, for receiving the liquid which flows from the burette.

The apparatus is used as follows: The liquid to be titrated is put into the reservoir, R, and the bulb, P, is squeezed and then allowed to expand while a finger is held over the aperture, o. The liquid is thus sucked through the tube, T, into the burette, and the excess above the level, n—the zero of the burette's graduation—immediately flows out through T. The burette is thus filled and brought to zero quickly and automatically. It is always ready to operate without any de-



BILLET'S BURETTE.

canting of the titrated liquid. On opening the cock at P, the liquid from B flows into V, which is afterward closed with the stopper and rod, ab.—*La Nature*.

MINUTE-GLASS WITH ALARM.

A MINUTE-GLASS is often used for measuring a certain length of time, especially in boiling eggs, etc.; but in employing this apparatus it is necessary to keep constant watch of the sand, in order to know the instant when its flow ceases. The accompanying engraving illustrates an ingenious device, which we have noticed in the bazaars, and which does away with the inconvenience of watching the sand. When the latter has entirely run out, a counterpoise causes the glass to tilt, while a hammer fixed at the extremity of a metallic rod tilts at the same time and strikes a small bell at



MINUTE GLASS WITH ALARM.

the upper part of the support. The sound produced warns the operator, who in the interim has been enabled to busy himself with something else.—*La Nature*.

SEPARATING ZINC.

By Prof. W. HAMPE.

As a convenient means for the separation of zinc from iron, nickel, cobalt, manganese, and aluminum, the author recommends the conversion of these metals into formates, and the treatment of the solution with sulphureted hydrogen. As far as his experiments extend, the zinc is always completely precipitated. The precipitate is always free from manganese and aluminum, and also from nickel, cobalt, and iron, if the solution contains a sufficiency of free formic acid (at least 15 to 20 c. c. of acid of spec. grav. 1.2 in 250 to 500 c. c. of liquid), and those metals are not present in too great excess. In other cases traces of foreign sulphides are sometimes mixed with the zinc hydrosulphide, and give it a reddish-brown tint. Iron is most easily thus carried down, nickel and cobalt less readily. These impurities are in quantity very trifling. For their entire removal the precipitate, after filtering and washing, is redissolved in nitric acid, supersaturated with ammonia, then with formic acid, and once more precipitated with sulphureted hydrogen. Such a repetition—certainly not always needed—of the separation would deprive this method of its essential advantages if we had not a means for making zinc sulphide capable of easy and rapid filtration. To this end sulphureted hydrogen is passed into the hot solution. The zinc sulphide falls as a granular precipitate which filters and washes quickly and clearly. For washing sulphureted hydrogen water is used to which a little ammonium formate and formic acid have been added.

On passing sulphureted hydrogen into the hot solution, a little zinc sulphide (about 1 milligramme) is deposited on the sides of the glass so firmly that it can-

not be rubbed off. This film, after rinsing the glass, is dissolved off in a little nitric acid, and the solution is added to that of the main precipitate if the precipitation has to be repeated. If this is not necessary, or if the second precipitation is already in process, the nitric solution of the film is mixed with ammonia and ammonium sulphide, then with formic acid until the reaction is acid, and the whole is poured upon the filter to the precipitate, which is already washed.

When dry, the zinc sulphide is not horny and brittle like that thrown down from an acetic solution, but pulverulent, and it can be readily removed from the filter without loss.—*Chemiker Zeitung*.

GLYCERINE AND ITS USES.

By F. H. ALCOCK.

GLYCERINE is perhaps well known to be a useful addition to the sulphur type of lotion for the hair, as the sulphide of lead which is supposed to be formed renders the hair almost as stiff as a board without some such addition.

A very recent hair dye, and one which is said to be good, may be made by dissolving freshly prepared ammonio-tartrate of bismuth, or the ordinary scale citrate of bismuth and ammonia, in weak glycerine, and mixing this with a solution of hyposulphite of sodium in glycerine and water, and finely diluting with more water.

Teeth lotions have also come much into use, and of the many formulae published the following is a type: Tincture of quillaia, eau de Cologne, water, borax, glycerine, with coloring. Such a combination is as excellent for its purpose as it is elegant in appearance.

Almost all cosmetic solutions are greatly improved by the addition of a little glycerine. Of these we may name freckle lotions, zinc oxide, and rose water lotions, calamine lotions, etc.

Liquid starch glosses and finishes have glycerine in them as a *sine qua non*. Here is an example from the *Popular Science News*: Spermaceti, 1 oz.; gum arabic, 1; borax, 1; glycerine, 2½; water, 14½; perfume, q. s. Three spoonfuls to be added to about 4 oz. of boiling water.

Lime juice and glycerine inseparable may easily be made by the subjoined formula, but I cannot say how much will be the percentage of glycerine. A saturated solution of borax should first be prepared. Here is a note I made a long time ago: "One drachm of powdered borax to be dissolved in 21½ drachms distilled water, and during solution warmed slightly to keep the temperature just a few degrees above that of a summer's day, and to insure accuracy it is perhaps better to weigh the materials into a large size 3-oz. bottle. The oily material consisted of 14 parts of oil of almond and two parts of castor oil, thoroughly mixed. To this quantity of mixed oil was added, all at once, four parts of the solution of borax as named (each being accurately measured). On being well shaken, a very white uniform emulsion which did not separate resulted. I believe soap is sometimes added to this preparation to increase its white appearance and to prevent separation, but I do not know that it is a desirable addition, or that it is effectual in preventing separation." I have, up to this period, had no fault to find with my note.

Glycerine Jelly.—This combination may be made opaque or transparent. For the former, soap, glycerine, almond oil, and perfume are used; for the latter, isinglass, gelatine, or transparent soap, 1 oz., dissolved in glycerine and a little added water, this usually being a perfumed water.

I hope, by the introduction of a few brief notes under this head, that we shall not be doing any serious injustice to the medical profession.

Glycerine is reputed to be a safe and very effectual emetic for infants. As a substitute for cod liver oil, iodized glycerine with iodide of potassium forms a good tonic, etc., for phthisical patients whose stomachs are unable to bear this oil.

A combination of a fluid extract of *Cascara sagrada*, glycerine, and a little tincture of nux vomica is highly praised as a tonic laxative. Ferric chloride and its preparations are very astringent, and hence, when taken internally for some time as a tonic, are liable to do harm. This astringent effect is greatly counterbalanced by the addition by glycerine, with which this chalybeate is perfectly compatible.

An excellent simple remedy, in place of the old-fashioned rum and figs, for tightness of the chest and the cough of old people, is a mixture of 40 fluid drachms of glycerine, 10 of rum, with 1 minim of oil of anise or peppermint.

The combination, as an aperient, in doses of 1 drachm, of glycerine and castor oil in equal parts, is now so old that it has almost sunk into oblivion, but it is undoubtedly, when prepared *secundum artem* and with a little flavoring agent, a valuable and highly efficacious elegant preparation. The activity of the oil is said to be increased.

An excellent application for scalds and burns is composed of equal parts of glycerine and oil of peppermint. Glycerine, as an external application, is said not to be absorbed by the skin, hence it is of especial value as a basis when such agents as mercuric chloride, iodoform, etc., have to be superficially applied in cases of certain skin diseases, as scabies, etc. One and a half drachms, dissolved in 3 fl. oz. of glycerine, is reported to possess valuable powers in the treatment of scabies, etc.

Iodized glycerine prevents the pitting which may result after an attack of small pox. As a liniment, in combination with chloral hydrate, camphor, etc., it receives the commendation of sufferers from rheumatism.

When vaporized in a suitable apparatus, and its fumes inhaled, glycerine is a simple expedient in cases of bronchial affections and distressing coughs; and here we may remark that many eminent vocalists are fully alive to the value of this substance as a voice strengthener and throat invigorator.

Salicylate of sodium, dissolved in glycerine, has its medicinal effects greatly enhanced. A good remedy for dyspepsia consists of pepsine, sherry, glycerine, and tartaric acid.

Naphthaline, recommended as an antiseptic agent with a view to checking diarrhoea, and said to be efficacious in cases of intestinal catarrh even when chronic, may be administered in glycerine, in which it is soluble when the solvent is slightly warmed. Indirectly connected with glycerine is the use of nitro-glycerine, as a

1 per-cent solution in diluted alcohol, for neuralgia, etc.

Mercuric iodide, with glycerine, is a good paint for corns.

An excellent simple febrifuge drink is thus made: Glycerine, 3 j; citric acid, 3 ss; water, 3 vj. Dose, 1 to 2 tablespoonfuls every hour for an adult.

Glycerine is very largely used in the manufacture of printing, stamping, and letterpress inks, as also in the preparation of inks for the numerous forms of "graphs." The following is an example of an indelible stamp ink taken from the *Pharmaceutical Record*: Sodium bicarbonate, 22; glycerine, 85; gum arabic, 20; nitrate silver, 11; solution of ammonia, 20; Venice turpentine, 10; mix according to art. For ribbon ink: Concentrated glycerine and alcohol, of each 15; aniline, ½ oz. Blackening of excellent quality can be made by means of a judicious combination of soot, glycerine, oils, etc.

A good "graph" is readily made from Russian glue, 2; water, 1½; glycerine (1:260), 5 parts by weight. As these sometimes get mouldy, we may mention a wrinkle which will prevent the proneness of gelatine to this trouble. It is simply to dissolve a few grains of boric acid in the glycerine before incorporating with the other materials.

In the process of vulcanizing India rubber glycerine is found to be of service. It appears that the India rubber acquires properties which protect it from oils and fats without interfering with its other properties.

For silvering and gilding glass we find our subject again in request by reason of its reducing action on the salts of silver and gold, and also because the deposit thus produced is of a brilliant metallic luster. An ammoniacal solution of nitrate of silver is first prepared, and in it is poured a little solution of caustic potash, and then a few drops of glycerine. It is then ready for immediate use, since reduction begins at once, which process is accelerated if a little ether or alcohol be also added to the mixture. The result is said to be most brilliant when a moderate heat is used, and darkness is said to favor the adhesion of the deposit to the mirror.

A polish for leather is thus made: Shellac, 200; spirit, 1,000; Marseilles soap, 25; spirit, 25 per cent. to dissolve soap, 375; glycerine 40; to which is finally added 5 nigrosin in 125 spirit.

Mineral water manufacturers are now availing themselves of the advantages to be derived from the use of glycerine in the preparation of the liquors and flavors, etc., which are much in request as beverages.

Gloves use large quantities of yolks of eggs in certain processes involved in the manufacture of kid gloves. An addition of a few percents of glycerine is said to be a decided advantage. Glycerine preserves the yolks for a long time.

In the preservation of anatomical and other specimens its value is well established, but a little point will perhaps be useful to bear in mind. About six years ago a friend presented me with a nice specimen of the ripe fruit and fresh leaf, with tendrils, of the *Bryonia dioica*, which I placed in a bottle with some glycerine and water, but now, although in good condition as far as preservation goes, I find the berries have become wrinkled and some have collapsed, which, I believe, is probably due to a process of osmosis, the liquid within the fruit being of a different gravity from the preservative fluid. If I had first ascertained the gravity of the juice, and made my glycerine solution of a similar gravity, if such had been possible, I think the shape of the fruit would have been retained.

For the preservation of cider, glycerine of salicylic acid is admirable, a very small quantity keeping it good for over twelve months.

A solution of alum, arsenic, and niter in glycerine is said to be an admirable preparation for "curing" animals' skins. I have a cat's skin which has been successfully prepared with this combination.

To render corks impervious, soak them several hours in a solution composed of ½ oz. glue or gelatine, ¾ oz. glycerine, and a pint of water heated to 50° C. After such a treatment they are nearly proof against many corrosive liquids, but are more completely so if they are first well dried and then dipped in a mixture of four parts of paraffine and one of petrolatum, or simply ordinary petroleum oil.

The easiest and safest method of preparing this explosive is that which was first introduced by Messrs. Boutmy and Foucher, and which as a new and safe method obtained the prize of 2,500 f. offered by the French Academy of Sciences. First by converting the glycerine into sulpho-glyceric acid, and in this form bringing it into contact with the nitric acid, to which an equal weight of sulphuric acid has been previously added.

The details of the process are as follows:

One part by weight of pure glycerine (1:260) is thoroughly mixed with 3 parts of strong sulphuric acid (1:842); there is at once a considerable evolution of heat, and the glycerine is slightly discolored. In a separate vessel a mixture of 3 parts (also by weight) of sulphuric acid and 3 parts of nitric acid (1:4) is made, and both mixtures are then allowed to cool down to about 15° C. The next step is to transfer the two cooled liquids to a tall cylinder, and well stir them together, when a slight rise in temperature (to about 20° or 25° takes place, followed, after the lapse of half an hour or so, by a cloudiness of the acids, due to the separation of minute drops of nitro-glycerine. After standing for about twenty hours the formation of the oil is complete, the whole of it having risen to the surface of the acid mixture; it may then be siphoned off, dissolved in an equal volume of ether, to facilitate its separation, shaken up with successive portions of water until the washings fail to reddens blue litmus, and, finally heated on a water-bath until its weight remains constant. The nitro-glycerine will now be light brown in color, and should have a specific gravity of 1.6, and should detonate readily and powerfully when fired by percussion, or by means of a fulminating charge. This substance may be easily recognized by the violent but transitory headache which is experienced on placing an exceedingly small quantity (1-1,000th of a grain or thereabout) on the tongue.

In the old processes the nitro-glycerine separates almost instantaneously and rises in part to the surface, thus rendering washing difficult. In the process above described its formation is gradual, and extends over a long period of time.

The barometric records made for the *Times* newspaper are from a glycerine barometer. In place of the column

of mercury of about 30 inches length, a tube about 27 feet long is used, containing ¾ of a gallon of glycerine colored red with aniline. The great advantage of this fluid is that readings can be taken more accurately, for, when subjected to the weight of the atmosphere, while mercury would move 1-10 inch, the height of the glycerine column would be moved through a space of 1 inch. One objection has to be provided against, *i. e.*, the hygroscopic nature of glycerine, its power of absorbing water from the air being very great. This is remedied, however, by putting a layer of heavy petroleum oil in the cistern of the barometer. There is a glycerine barometer at the Kew Observatory, which also required for its construction ¾ of a gallon of glycerine, and, in order to obtain the correct height, the tube passes through two rooms, the cistern being in one and the column read off in the one above.

This fluid, on account of its high boiling point and low freezing point, is of constant use in scientific experiments.

Carbolic acid is said to be an adulterant of ordinary or wood-tar creosote. The former is well known to be soluble in glycerine (glycerinum acidi carbolici), and on the addition of water forms a clear solution. Creosote forms a nearly clear solution with this liquid when of sp. gr. 1.260, but on dilution with water it separates out again.

When gallic acid is warmed for a long time with glycerine, even at a low temperature, pyrogallol results, and this process is taken advantage of by photographers, who use a combination of glycerine and pyrogallol or pyrogallol acid in some of their operations.

A delicate test for glycerine is to take 2 drops of carbolic acid with 3,000 to 5,000 drops of water, and add 1 drop of solution of ferric chloride; in the absence of glycerine a blue color results, but if it be present the color does not form. If coloring matters or sugar is present in the suspected liquid, they must first be removed. To do this calcic hydrate is added to the liquid to be tested, with some powdered marble, and evaporated, and the mass then exhausted with a mixture of alcohol and ether; the alcoholic solution evaporated to remove ether and alcohol, and the residue mixed with water, and the test applied, first neutralizing any alkali, should any be present. This may be available as a qualitative test for the presence of glycerine in beers, wines, beverages, etc.

The value of glycerine jelly for mounting microscopic objects needs only a passing comment; its manipulation is very easy, and well suited to the tyro embarking in the study of histology of animals and plants.

The fact that glycerine when present in a solution often greatly interferes with the usual chemical reactions should always be borne in mind. Thus ferric bromide mixed with glycerine, and then sulphocyanide of potassium added, gives the usual red color, but either does not remove that color and impart it to itself. Again, if ferric bromide be added to sulphocyanide of potassium, and then ether added, we get all that we expect, but on the addition of glycerine the ether becomes colorless again. Glycerine also removes auric chloride and uranium nitrate from their ethereal solutions; so, too, an ethereal solution of mercuric chloride, when agitated with glycerine, is found to hand over the greater part of its solvent to the latter solvent.

Glycerine has very recently been used in a process for the preparation of chemically pure metallic bismuth. Ordinary commercial bismuth is dissolved in dilute nitric acid, and the solution mixed with water until turbidity begins to appear; then a sufficient quantity of fixed alkali is added in solution to precipitate the bismuth and render the solution alkaline; twice the volume of the alkaline solution is now added, and glycerine in sufficient quantity stirred in to redissolve the precipitate; filter if necessary. The filtrate is now mixed with a solution of pure glucose (1:6 or 8), and laid aside for some time in the dark; filter again. The filtrate is now boiled and well stirred, when finely divided bismuth is deposited, which must be filtered away, washed, and dried as rapidly as possible.—*Chemist and Druggist*.

A NEW PROCESS FOR EFFECTING THE LIQUEFACTION OF OXYGEN.

By L. CAILLETET.

LIQUID ethylene when boiling in the free air gives a degree of cold such that oxygen, if compressed and cooled to this temperature, presents, on diminishing the pressure, a tumultuous ebullition which lasts for an appreciable time.

On quickening the evaporation of the ethylene by means of the pneumatic machine, as Faraday did for nitrogen monoxide and carbon dioxide, the temperature is lowered so far as to bring the oxygen to a liquid state. The author has endeavored to avoid the inconvenience and the complication resulting from the necessity of operating in a vacuum. For this purpose he has already proposed the use of liquid formene, which enables us to obtain at once the liquefaction of oxygen and nitrogen. In spite of these advantages, ethylene, which is so easy to prepare and to manage, is preferable to formene, and he has sought to obtain by means of ethylene boiling in open vessels a reduction of temperature sufficient for the complete liquefaction of oxygen. The process employed is exceedingly simple; it consists in intensifying the evaporation of the ethylene by forcing into it a current of air or of hydrogen cooled to an exceedingly low temperature.

In the apparatus employed, the steel receiver which contains the ethylene is fixed to a vertical stand, with its aperture turned downward. To this aperture is adapted a copper worm of three to four millimeters in diameter, and closed at its lower end by a screw-cock. On cooling the worm to -70 degrees by means of methyl chloride the ethylene which accumulates there has at this temperature a very feeble pressure only, and flows out without sensible loss on opening the exit-cock. This new arrangement, which has been adopted both for ethylene and formene, enables these condensed gases to be cooled, as if the entire reservoir containing them was refrigerated to the temperature of the worm.

The ethylene is received in cylinders of thin glass placed in a glass vessel containing dry air; it is then merely necessary to intensify the evaporation of the ethylene by means of a rapid current of refrigerated air or hydrogen to permit the oxygen condensed in a