SELECTED FORMULÆ.

Magic Cloth and Glove Cleaner.—This is intended for silk or dress goods, gloves, ribbons, etc. It will not stain nor discolor.

Gasoline	1 gal.
Chloroform	1 oz.
Bisulphide of carbon	1 "
Essential oil of almonds	5 drops.
Oil of bergamot	1 drachm
Oil of cloves	5 drops.

Mix them. To be applied with a sponge or soft cloth. Gloves are best cleaned on the hand. This preparation should not be made or used at night or in a room where there is a fire, as it is very inflammable.—The Formulary.

Sheep Dip.

1. Creolin-Pearson	1 lb.
Water	14 gal.
2. Soft soap	1½ "
Water	15 "
Crude carbolic acid	1 pint.

Dissolve the soap in the water with the aid of gentle heat (140° F.), and incorporate the carbolic acid; then cool down to 110° F. and dip the sheep. For the sheep scab mites the temperature should be 120° F., and the scabs should be completely broken up by means of a corn cob.

3. Arsenious acid	1 lb.
Zinc sulphate	10 "
Water	25 gal.

Dissolve.

4. Arsenious acid (powder)	6 oz.
Potassium carbonate	6 "
Soft soap	6 "
Sulphur	4 "
Hillsboro root (bruised)	2 "
Water	14 gal.

Boil the ingredients in a portion of the water for half an hour, or until the arsenious acid is dissolved; then add the remainder of the water and strain through a coarse sieve.—Merck's Market Report.

CARBOLIC ACID DIP.

Soap	1 pound.
Crude carbolic acid	1 pint.
Water	50 gallons.

Dissolve soap in one gallon or more of boiling water; add acid; stir thoroughly, and add to remainder of the water. Keep the mixture well thinned and do not allow it to get into the mouth, nostrils or eyes of the sheep. Hold each sheep in the bath not less than half a minute.

LOW'S SHEEP DIP.

Tobacco	16 pounds.
Oil of tar	3 pints.
Soda ash	20 pounds.
Soft soap	4 "
Water	50 gallons.

Steep the tobacco in three successive portions of water, expressing each time; then add other ingredients to the liquid.

To Disguise the Taste of Castor Oil.—Hostelly strongly recommends the following formula:

Arom. fl. ext. yerba santa	½ fl. oz.
Fl. ext. licorice	1½ fl. oz.
Oil cloves	18 min.
Oil wintergreen	½ fl. dr.
Oil cinnamon	½ fl. dr.
Syrup	12 fl. oz.
Magnesium carbonate	2 dr.
Alcohol	1 fl. oz.
Simple elixir, to make	1 pint.

—Druggists' Circular.

To Clean Dirty Belts.—A correspondent of the Centralblatt für die Textil-Industrie who complains that several belts are dirty from drop oil and dust and desires to know how to clean them is told to first wash the belts with warm water and soap, using a sharp, stiff brush, and while still moist, to rub them with a solution of sal ammoniac, which saponifies the oil in them. Immediately thereafter the belts must be rinsed well with lukewarm water and then dried with sufficient tension. While they are still moist the belts are to be rubbed well on the inside, and less on the outside with the following unguent: 1 kilog. (2 lb. ¼ oz.) India rubber heated to 122° F. and mixed with 1 kilog. rectified turpentine oil. After the solution is complete, 780 grammes (27 oz.) bright resin are added, and when it is dissolved, 750 grammes (26½ oz.) yellow wax are added. This mixture, by diligent stirring, is mixed with 3 kilog. (6 lb. 10 oz.) fish oil and 1¼ kilog. (2 lb. 12 oz.) tallow previously dissolved in the former. In the further treatment of the belt, rub the inside only and the outside only the first time as stated. This unguent also replaces the tannin extracted from the leather, prevents the dragging of the belt and imparts elasticity to it.—Industrial Record.

Fertilizers.**FERTILIZER FOR GARDENS.**

Ammonium sulphate	10 parts.
Sodium nitrate	15 "
Ammonium phosphate	30 "
Potassium nitrate	45 "

FERTILIZER FOR LAWNS.

Potassium nitrate	30 parts.
Sodium nitrate	30 "
Calcium sulphate	30 "
Calcium superphosphate	30 "

FERTILIZER FOR FRUIT TREES.

Potassium chloride	100 parts.
Potassium nitrate	500 "
Potassium phosphate	570 "

This total amount of 1,170 grammes to be used for one tree.—Rev. Chem. Ind.

CHEMICAL GUANO, GRANDEAU.

Calcium nitrate	100 parts.
Potassium nitrate	25 "
Potassium phosphate	25 "
Magnesium sulphate	25 "

Dissolve from 4 to 10 grammes of this powder in 1

liter of water, and water each pot plant with this once or twice a month. The plants must be in full vegetation.—Rev. Horticult.

Chloride of Bromine as a Solvent for Gold.—One of the most notable processes of its kind, says the Boston Journal of Commerce, is that recently brought forward by a New Zealand inventor, Dr. Gaze, for the use of chloride of bromine as a solvent for gold, the employment of caustic soda to recover the chlorine and bromine for use, and the recovery of the gold from the solution by electrolysis instead of by chemical precipitants. The most important feature is said to be the method adopted for making the solvent used in gold extracting by means of a containing vessel of about three feet diameter and two feet deep. In this vessel are placed a number of porous cells filled with plain water, each porous cell having a number of carbon rods placed in it, and the containing vessel itself filled with a strong solution of chloride and bromide of sodium, and more carbon rods are immersed in the solution; the whole is fitted with a lid, one set of carbons being connected with one pole of a powerful dynamo machine and the other set with the other pole. On passing a strong current of electricity through the electrodes, the salts are separated, the chlorine and bromine uniting, and the chloride of bromine thus formed is forced into a vessel overhead.

Gold for Decorating Porcelain.—Dissolve in a tared capsule any convenient quantity of pure gold in nitrohydrochloric acid and add to the solution sufficient uranium oxide to impart a rich brown color. Evaporate the liquid to dryness on a sand bath, cool the capsule, and weigh. Then to the residue so ascertained and counted as one part, add:

Sulphur	1 part.
Dammar resin	2 "
Turpentine oil	6 "

With due precautions against the mixture igniting, heat it over a quick fire, with constant agitation, until it becomes homogeneous and acquires a fine reddish brown color. Add while still hot sufficient rosemary oil to give it the consistency of a thick sirup. Finally, for every 100 parts of the gold originally used, add 35 parts of bismuth flux (bismuth trioxide, or bismuthous oxide, obtained by gently igniting basic bismuth nitrate), and let cool.—Bulletin of Pharmacy.

Sea Foam without Ammonia for Barber's Use.—To get a profuse lather in using a shampoo, soap should be present in the liquid or powder, or preferably soap bark. Grease will not be as readily removed as by alkali alone, but that will make no practical difference in most cases.

Potassium carbonate	4 drachms.
White soap	2 ounces.
Tinct. quillaja	2 "
Oil lavender	20 minims.
Alcohol	8 ounces.
Water	8 "

Tanning Sheepskins.—Wash the hide in warm water and remove all the fleshy matter from the inner surface and loose dirt from the woolly side. Now wash in strong, rather warm soapuds. The old fashioned soft soap made from wood ashes is best. Either rub by hand or gently on a washboard. As soon as thoroughly cleansed and rinsed, press as much of the water out as possible. Add the following mixture to the flesh side; Common salt and ground alum, one-fourth ounce each, and one-half ounce of borax, dissolved in one quart of hot water. When sufficiently cool to work with the hand, add enough rye meal to make a thick paste. Spread the mixture on the flesh side; fold and let remain in a shady, airy place for two weeks; remove the paste and wash. (They may now be dyed with any color used on woolen cloths, if so desired, being careful not to have the dye hot enough to cook the skin.) When nearly dry, scrape the flesh side thoroughly with a dull knife, rub with the hands until the skin is soft and pliable. Comb the wool when dry. A speedier and perhaps as reliable a method is: For one sheepskin, one pound of salt, half pound of alum, two tablespoonfuls of saltpeter. Spread the hide out smoothly as soon as taken from the sheep. Rub the mixture well in, on the flesh side, turn the head to the tail, leaving the woolly side out, roll smoothly and closely, tie with a string and let remain five days. Spread and tack it, woolly side in, against the side of an outhouse. Scrape all the flesh and grease off with a dull knife, wash with warm water and soap, using as much suds as required to remove all fatty and oily matter. While drying, rub sufficiently to keep it soft.—Country Gentleman.

Kerosene Emulsion for Insects on Animals.

Fresh skimmed milk	1 gallon.
Kerosene	2 "

Churn together until emulsified. Use one gallon of this emulsion to ten of water and apply.

Egg Phosphate.

Lemon or orange sirup	1-1½ ounces.
Compound phosphate solution	1-2 fluid drachms.
Shaven ice	2 ounces.
Egg	1

Into the tumbler put the articles in the above order; add ice water two ounces; shake vigorously or pour it from one tumbler to another several times; pour through a strainer and fill up the glass with carbonated water.

Paste for Attaching Paper to Glass.

Flour	2 tablespoonfuls.
Water	4 ounces.
Potassium bichromate	5 grains.

The flour must be rubbed to a smooth paste with the water, then placed in a saucepan over the fire, and kept stirred until it boils. Add the bichromate slowly, stirring all the time; then stand to cool. The paste must be kept in the dark, and used as soon as possible. Soak the paper in it, and attach to the glass, then place in direct sunlight for a day. This sets up a chemical change in the bichromate, and renders the paste insoluble.

A CAMERA SWINGBACK INDICATOR AND HOW TO MAKE IT.

By Rev. F. C. LAMBERT, M.A.

SOME years ago I tried various forms of plumb indicators, circular, oblong and other shaped spirit levels, but very soon came back to a simple home made article which the experience of time has firmly established in my affections. Like many useful things, it is characterized by extreme simplicity, and can be made and fitted to any ordinary stand camera by any who can use his hands with a modicum of deftness. We need, for a whole plate camera, for example, one moderately stout, straight, steel knitting needle (generally sold in sets of four for one penny or so, at any draper's or fancy shop), a couple of moderately stout pins, a pair of round nosed pliers, and a pair of square-end cutting pliers and a candle or gas flame. The round nosed pliers are not a necessity, but a convenience.

Proceed as follows: Select a perfectly straight knitting needle. (Its straightness can be tested by laying on a sheet of glass, old negative, etc., and rolling back and forward by laying the finger on it about the middle of the needle.)

Slowly heat one end of the needle in the candle, spirit lamp, or gas flame or fire, until red hot, then seizing this end with the pliers, give it a loop end, such as is shown in Fig. 1. Heat it again at the neck, and bend the neck slightly back to come into the form shown in Fig. 2. Now take one of your fairly long but not very stout pins. Cut off the head quite close, and in a slanting direction, so as to give its thick end somewhat of a point, a, then bend it (cold) into the form shown in Fig. 3; the loop, b, is purposely exaggerated in its distance from the pointed arm, c, but a very slight distance between b and c is only really needful.

The second pin is decapitated, pointed and then bent into the form of a square staple, as shown in Fig. 4.

Now, to fix the apparatus. The camera is opened out, and the side opposite to that where the slides go in and out selected.

As the contrivance is intended to show when the swingback is vertical, it must be fixed to the part which swings, but not to the reversing part. With the aid of a stout needle held by the pliers, small holes are made to receive the points or ends of the staple, 3.

The knitting needle loop is passed into the loop, b, and the staple then gently driven home until the curved part only projects, as shown in Fig. 5. It will now be seen that the use and object of the curved part of the pin is just, and only just, to prevent the hanging long needle touching the wood. If the staple were square, as in 4, this would be the case, and it would not swing freely. The square staple, 4, is used about a quarter of an inch above the straight end of the needle to confine the swing to reasonable limits. The final arrangement of parts is shown in Fig. 6, which I hope is sufficiently self-explanatory. The dot below the end of the needle, marked p, is the point which shows where the end of the needle ought to be when the swingback is quite vertical. A small white pin is selected, and the head part cut off to within about a quarter of an inch, using the cutting pliers aslant, so as to leave somewhat of a point. This is then gently driven into the wood, so as to leave the head quite flush with the wood surface when the vertical point is ascertained.

In this way this needle serves a twofold purpose, and it shows when the swingback is vertical, and also shows when the top of the camera is horizontal. For if we glance at it sideways, having the view of things as shown in Fig. 5, we can see that the needle is hanging clear, i. e., not touching the wood on the one side, and not the bottom staple on the other.

One or two words of caution are perhaps needed:

(1) If the point of the needle projects below the

bottom staple more than a quarter of an inch, the focusing cloth is liable to get caught in it, and the camera may be upset.

(2) The needle must be quite straight or it will not swing freely.

(3) The longer it is, the more sensitive and delicate its indications. It need not, however, exceed about seven or eight inches in any case, but for a quarter-plate camera it should be as long as is convenient.

(4) It should be rubbed now and again with vaseline to prevent rust. If the least bit of rust gets in the loop, it is apt to stick. In all cases, therefore, touch it lightly with the finger to see that it is in healthy working order.

(5) The very stout needles are not so good as the moderate sizes, as the former are generally much thicker with the needle than toward the ends, and therefore rub against the wood and do not swing so freely.

ACETYLENE FOR DOMESTIC LIGHTING.

THERE is a phenomenon about to occur, the importance of which it is well to emphasize, since it marks an abrupt halt, almost a reaction, in the social evolu-

SECTION OF AN ACETYLENE GENERATOR.

A, water reservoir; D, rod carrying the carburet of calcium basket; B, tube through which the acetylene makes its exit.

tion of recent years. In fact, centralization is now everywhere triumphing. Large cities are absorbing the inhabitants of the rural districts and forming a void in villages; large stores are prospering at the expense of humbler establishments; and transportation is in the hands of large companies. And yet the reign of the large gas and electric light companies is about over, for the possibility of producing at will all the light that one has need of at home, and with a compact and cheap apparatus, will shortly be realized. The agent of this economic revolution is a gas, a carburet of hydrogen—acetylene.

It was the great chemist Berthelot who first studied acetylene. This was in 1862. He made known the remarkable properties of this gas, and especially its intense illuminating power, and succeeded in effecting the synthesis of it by combining the two elements carbon and hydrogen, under the action of the electric arc. This memorable experiment was the

forerunner of all the discoveries that have been made by the chemists of the entire world for the last thirty years. But acetylene remained a laboratory gas for a long time, since it was possible to obtain but small quantities of it, and that only by costly processes. It belonged to Mr. Moissan, another French scientist, to discover a method of manufacturing it industrially.

It had been found that upon putting carburet of calcium in contact with water, there immediately occurred a tumultuous disengagement of various gases, among which acetylene predominated. As the carburet of calcium was impure, the acetylene was likewise charged with impurities. The method of obtaining pure carburet of calcium was pointed out by Mr. Moissan. In the month of March, 1894, he submitted to the Academy of Sciences some specimens of crystallized carburet of calcium obtained in the simplest manner in the same electric furnace by means of which he had manufactured diamonds. It suffices to place in this furnace, in the presence of two carbon electrodes, between which circulates an electric current of great intensity capable of developing a temperature of 3,000°, a mixture of carbon and lime in order to cause the calcium to immediately combine

brilliance is because, in consequence of incomplete combustion, carbon set at liberty and rendered incandescent exists in their flame. The pale flame of hydrogen will become very brilliant if some such solid body as quicklime, magnesium or platinum be introduced into it. The Auer burner owes its remarkable luster to the introduction of a cylinder covered with zircon, thorine and other infusible oxides, raised to incandescence, into the but slightly illuminating but very hot flame of the burner. Now, of all the carburets of hydrogen, acetylene is the richest in carbon. Its chemical formula is C^2H^2 , while that of methane, which is predominant in illuminating gas obtained by the distillation of coal, is CH^4 . One volume of acetylene therefore contains twice more carbon and twice less hydrogen than an equal volume of methane, and, it may be said, than an equal volume of illuminating gas. Consequently as the flame of acetylene contains a large number of particles of incandescent carbon, it has an intense illuminating power.

Mr. Bullier, preparator to Mr. Moissan, appreciating the industrial value of the discovery made by his chief, has installed in Buffon Street a small laboratory where he is producing acetylene by means of carburet of calcium manufactured in an establishment of the Est and collected in gasometers.

If we endeavor to burn acetylene at the ordinary pressure, the flame produced will be fuliginous, owing to the fact that, since the gas is very rich in carbon, a portion of the latter escapes during combustion. In order to increase the surface of contact with the oxygen of the surrounding air, Mr. Bullier dilutes the acetylene with an inert gas (nitrogen, for example). The gas that reaches the burners is a mixture of 85 per cent. acetylene and 15 per cent. nitrogen. Such dilution presents a second advantage, that of preventing the re-entrance of air into the gasometer or conduits, and consequently prevents the production of the detonating mixtures that the air forms with acetylene, as it does, moreover, with ordinary illuminating gas. The net cost of the nitrogen is insignificant.

The apparatus for producing acetylene is installed in a corner of the laboratory. We give a general view and a section of the generator. The apparatus consists of a cylindrical reservoir two-thirds full of water and capable of withstanding a pressure of from 10 to 12 atmospheres. In the upper part there slides by friction a rod that supports a perforated basket capable of holding 11 pounds of carburet of calcium. Upon lowering the rod, the carburet comes into contact with the water, and acetylene is disengaged and develops sufficient pressure to force it directly into the gasometer. The pressure is indicated by a manometer.

If it becomes too strong, the rod that carries the basket is raised, and the disengagement of the gas ceases as soon as the carburet is no longer in contact with the water. The apparatus is completed by a worm in which the acetylene is cooled, and by two driers containing mineral wool for absorbing the water carried along by the gas. When the carburet is exhausted, the lime that has deposited in the basket is removed, as is also that which has fallen to the bottom of the reservoir; and the supply is renewed.

Every one will be able to have an apparatus analogous to this in his own house. As one pound of carburet of calcium gives about four and one-half cubic feet of acetylene, each charge of the basket will produce 49 cubic feet of illuminating gas. Now, accurate photometric measurements establish the fact that 427 cubic inches of acetylene suffice to give one carcel hour, that is to say, to produce the light of a type carcel lamp or of a butterfly gas burner, for one hour. It requires 4 cubic feet of coal gas to obtain one carcel hour. Acetylene is therefore fifteen times more luminous than ordinary gas. A single charge of the acetylene generating apparatus will furnish more than 214 carcel-hours, or in other words, a light of 21 carcel for 10 hours.

Acetylene appears to afford a practical solution of domestic lighting. Small portable acetylene lamps will soon be offered to the public. We have had one of these placed at our disposal and have been able to assure ourselves that it operates very well. This lamp, of which a section is shown in one of our figures, consists essentially of two communicating tubes, the narrower one of which is connected with a reservoir containing water, and the wider one incloses a perforated cylinder containing the carburet of calcium. If the cock of the small tube be opened, the water of the reservoir will descend, and by virtue of the principle of communicating vessels will enter the large tube through the bottom in lifting a small rubber ball. As soon as the water comes into contact with the carburet, acetylene is disengaged, the pressure forces back the water, and the little rubber ball forms a valve. When the burner being opened and lighted, the gas is burning, the pressure diminishes, the water ascends in the large tube, and a new disengagement of gas takes place in consequence of the contact of the water with the carburet. The lime deposits in the cylinder or falls into the foot of the lamp. In this small sized lamp there may be placed 4 ounces of carburet, sufficient to produce about one cubic foot of acetylene, and give a light of one carcel for four hours. The spent carburet is easily replaced.

The railway companies (the Paris-Lyons-Mediterranean line, the first) have acetylene under trial for the lighting of their cars. During the last presidential trip, two cars of the special train were thus lighted. The acetylene was stored in reservoirs placed under the frame of the cars. These reservoirs contained 125 cubic feet under a pressure of 15 pounds. The burners employed were of feeble discharge and gave an illuminating power of one carcel and a half with a consumption of but 670 cubic inches an hour. The light obtained was truly dazzling, and of absolute whiteness and steadiness. How different from that wan and flickering light that our travelers, even of the first class, are to-day condemned to suffer!

Acetylene is therefore the light of the future, and of a very near future. The net cost of the gas depends upon that of the carburet of calcium. Such cost is still high—say \$90 a ton. This, at the rate of about $4\frac{1}{4}$ cubic feet of gas to the pound of carburet, puts the price of a cubic foot of acetylene at about a cent. As a cubic foot of coal gas, although costing five times less, gives fifteen times less light, it follows that it is now possible for the same price to obtain three times better light with acetylene than with coal gas. We must an-

SECTION OF A PORTABLE LAMP.

A, water reservoir; T, tube for entrance of the water; B, large tube containing the carburet cylinder; C, F, rubber ball valve.

with the carbon in giving rise to pure carburet of calcium, while at the same time the oxygen of the lime unites with a part of the carbon and forms carbonic oxide. The carburet of calcium liquefies under the action of the intense heat developed in the electric furnace, and, in cooling, solidifies into a compact mass of a slightly reddish brown gray, with a sharp crystalline fracture.

If this pure carburet of calcium be put in contact with water, the latter will be immediately decomposed, the hydrogen of the water will form pure acetylene with the carbon of the carburet, and the oxygen of the water, in going over to the carburet of calcium, will recompose the primitive lime, which will become hydrated in contact with the excess of water.

It is easy to understand the illuminating power of acetylene. The brilliancy of a flame depends upon the quantity of solid matter that it contains. The reason that a candle and illuminating gas burn with

CHARGING OF A GASOMETER.