bulge. By gently shaking the flask the liquid slaps against the top (bottom) and sides, thus dislodging completely all adhering particles. A slight revolving motion is then given, and the heavy solid particles go quickly down through the neck of the flask into the dish. After all the substance has been removed, the flask is gradually tilted and the liquid allowed to run out. This operation also requires a little skill. If a bent glass tube be introduced into the flask, a quick exit of the contained liquid is effected. Care must be taken that the dish holds easily the additional amount of liquid contained in the flask, and that the liquid in the dish is warm.

2. The liquid in the flask is cold.—The flask is inverted in the manner described. A bent tube is introduced into the flask and the air partly drawn out. The operation is then conducted as in the other case.*

After this treatment it will be found that the flask is completely free from adhering particles.

CRYSTALLIZATION BY GRADUAL DILUTION.

It became necessary for me, not long since, to obtain some perfect crystals of a substance with which I was working, and I experienced considerable difficulty in obtaining solvents which would yield me the desired results.

The fact of argol being deposited by the gradual dilution of alcohol, wherein it is insoluble, struck me as affording a clue to the right manner of crystallizing in general, and of this case in particular.

I dissolved the substance (dinitro-brom-benzol) in boiling glacial acetic acid, allowed the solution to cool to about 70°, and then added an equal volume of absolute alcohol, at a temperature of about 50°, stirring all the time. If the substance showed signs of separating prematurely, a little more acetic acid was added. The mixture was then allowed to stand in a warm place. The crystallization soon began. The formation of acetic ether† keeps pace with the separation of the crystals, so that, as the substance is withdrawn from the solution, the water resulting from the formation of the ether dilutes the solution, thus keeping up a continuous separation. The ether may be allowed to evaporate, so that finally a very dilute acetic acid solution, containing but little of the substance, is left behind. I have tried this method with various substances and have been rewarded by beautifully formed crystals. I have noticed that many of the crystals obtained in this manner were remarkably transparent. The only requisites are naturally that the substance to be crystallized must be soluble in acetic acid, alcohol, and acetic ether, and insoluble in water.

It is often necessary to allow solutions to cool off very slowly. For this purpose I find the cork box, to which attention has so often been drawn, to be most admirable. The cork should be about an inch in thickness and covered with the pads of felt previously mentioned. If the liquid is to be kept from the air or from moths, or other nuclei forming specks of matter, it should be boiled in a beaker, or glass vessel, having a ground rim, and while boiling quickly covered with a ground-glass plate. A brush dipped in a solution of pure rubber in chloroform is run around the line of jointure of the two surfaces. This forms a connecting film impervious to both air and moisture.

POLYGONOSCOPE.

A NEW optical instrument has been invented by Mr. Ezra Hutton, of Manchester, England, ornamental metal worker, for producing and displaying an infinite number of designs and patterns, which can be copied or photographed, and may be used for art manufactures, for amusement, or for other purposes. The instrument consists of two mirrors of any desired shape or size, fixed in and protected by a case or frame of metal or any other suitable material; these mirrors are connected together by means of a universal hinge, which is so arranged that the mirrors can be set and fixed at any angle to produce any required design. One of the mirrors is loose in its frame, and can be moved toward or from the other, so that at whatever angle they may be fixed the edges of the mirrors can be made to touch each other, thus preventing the pattern or design from being broken in the center. The apparatus can be closed up in a portable form, similar to an ordinary pocket book. Patterns having any number of angles or sides may be produced by varying the mirrors. The improved hinge for connecting the frames of the mirrors consists of three joints, that is to say, one joint for each frame, and a center joint on which the other two hinge. By this means the frames can be opened to the full extent, and turned back to any angle, and they can be folded close together. This hinge is applicable to articles of furniture, and to other appliances. The above resembles the common kaleidoscope which is sometimes used for the same purpose.

"PLASTIC CRYSTAL" OF DINAS.—C. Bischof.—The substance so named is a variety of Portland cement remarkable for its plasticity, and consisting of—

Silica.....	86.42
Alumina.....	9.33
Oxide of iron.....	0.86
Lime.....	0.34
Magnesia.....	0.22
Alkalies.....	0.37
Loss on ignition.....	2.40
	99.94

—Dingler's Polyt. Journal.

HOW TO AVOID THE BLACKENING OF WINES.—Dr. P. Wagner.—The author recommends that no article of iron, such as nails, screws, etc., should be allowed to come in contact with the wine.

FIXATION OF INDIGO UPON TISSUES.—M. Prud'homme.—After giving a brief summary of the present methods of fixing indigo upon tissues, the author proceeds:—"We have recently discovered a new method of reducing and fixing indigo, which, without great practical value, presents nevertheless some interesting peculiarities. A mixture of glycerin, carbonate of soda, and protoxide of tin, in a paste, reduces indigo perfectly at about 120°. If water is used instead of glycerin, the reduction is incomplete.

*It often occurs in analytical operations that the increase of volume in the liquid is not desirable. Excellent results may be obtained by rapid inversion of the flask in an empty dish. As soon as enough of the liquid has escaped to cover the mouth of the flask, the settling of the precipitate begins. The admission of air bubbles caused by the cooling of the liquid does no harm.

NEW PHOTO-PRINTING PROCESS—THE DES-PAQUIS METHOD.

By ERNEST LACAN.

M. DESPAQUIS forwards me some details of his photo-mechanical process in greasy ink. This process is based upon the double exposure of the gelatine; that is to say, after the plate covered with gelatine is put under a cliché in the ordinary manner, the former is turned round and exposed to light a second time from the back, until the action of the rays have met together. A glass plate, by reason of its transparency, is especially adapted for the vehicle of the gelatine, and it is upon the latter that the printing is done, in the same way as Albert, of Munich, and others proceed. Thanks to its supple character when wet, the film of gelatine is less open to injury than even steel, and it permits of a much larger number of impressions being taken than if it were metal. Other reasons are in favor of the printing being direct from the gelatine. Gelatine will not adhere to a polished metal surface, and will adhere but slightly if it is grained. To work a grained copper plate, the same must be coated with a thin film of gelatine, so that the large transparent portions of the clichés allow the light to pass as far as the metal itself, and in this case the grain of

are added in which the gelatine has been previously dissolved. The filtration of the liquid is conducted by means of the paper or fine linen. The drying chamber is warmed so that the gelatine surface should not set before it has become perfectly level, a result which might happen if the chamber were cold. Then the solution is poured upon the plates in such a way that the superfluous liquid escapes at the margin, and leaves a perfectly uniform film. So that the fluid may run the more uniformly, it is well to wet the margins of the plate by passing the finger along them. When this second film has dried, you may then proceed without fear to expose the plate a second time under the cliché. The process, in a word, resembles very much that of M. Albert, of Munich, but there are some important differences of detail which are said to have much influence upon the result.—*Photographic News*.

REMOVING VARNISH.

MANY methods have been suggested for removing the varnish from old plates. A mixture of benzine and alcohol in equal parts, agitated and poured on the plate, generally acts very quickly and very well. The last traces of reduced silver which may yet adhere are then removed by iodine

DESIGN OF OLD GERMAN CARPET, REPRODUCED BY CHARLES GIANI, VIENNA.—From the Workshop.

the copper is entirely reproduced upon the image, giving the latter a very disagreeable appearance; only a limited supply of copies can be struck off in this case, and these are of a defective nature. If the film of gelatine is a thick one, the grain is less apparent, but then but a very few prints can be pulled, because of the tendency of the gelatine to swell up when moistened.

Even with the process of M. Despaquis (exposure of the film to light on both sides) it is necessary to employ polished plates. No matter how finely a glass is grained, the grain always appears upon the print in the end, and takes away from its delicacy. One other condition is indispensable to success: it is necessary that the film of gelatine upon the glass should be of uniform thickness throughout. The manner of operating adopted by M. Despaquis is as follows:—After the gelatinized plates have been exposed to light from the back, as M. Albert, of Munich, recommends, they are placed in a perfectly horizontal position in the drying cupboard, employing a water level to ascertain if this is the case. A solution composed in the undermentioned proportions is, in the meantime, prepared, namely:—

Ordinary water.....	1000 cubic centimetres
Strong gelatine.....	25 to 30 grammes
Bichromate of ammonia....	6 to 7 "

The bichromate is dissolved in one hundred cubic centimetres of the water, and then the remaining nine hundred

alcohol (alcohol 100, iodine 0.50). When the surface is properly cleaned it is rubbed over with the finger or a tuft of cotton lightly impregnated with tallow, and wiped dry.

Plates thus prepared may be kept indefinitely, and are protected from dampness, the enemy which too often imposes itself between the collodion and its support. It is well to rub the plates, whatever may have been the previous mode of cleaning, with a little talc, which increases the adherence of the sensitized coating, and does away with the gelatin or albumen, the use of which would otherwise be indispensable for the preparation of dry plates.

INSTANTANEOUS PHOTOGRAPHY.

MR. MUYBRIDGE, the photographic artist, succeeded last July in taking "Occident" while trotting at the rate of a mile in 2.27. The negative was exposed for less than the one-thousandth part of a second, yet the positive printed from it is perfect in the most minute detail. Mr. Muybridge says the exposure was made while "Occident" was trotting past him at the rate of 2.27, accurately timed, or thirty-six feet in a second, about forty feet distant, the exposure of the negative being less than one-thousandth part of a second. The length of exposure can be pretty accurately determined from the fact that the whip in the driver's hand did not move the distance of its diameter. Mr. Muybridge intends