

while the zealous become cool, enthusiasm grows weak, and of the convinced fanciers, several lie upon the deck in careless poses.

The night passed rather inauspiciously for the fanciers, but admirably for the pigeons, not one of which was seasick.

At three o'clock there was an awakening of all by stroke of bell; every one came on deck and preparations were made for the freeing at 60 miles, which was appointed for four o'clock. The baskets were carried aft. The pigeons understood that the moment had arrived and gave evident signs of impatience. The doors were opened; what was going to happen?

The pigeons, perhaps with a little stupefaction, came out of their provisional abode. It was feared that they would not leave the upper works or yards, but they hastened to cross them with a loud noise of wings and were seen grouped in the air and turning round and round to the number of fifteen hundred. In five minutes they had disappeared.

At eight o'clock there was a second setting free under the same conditions at 120 miles. The sea being decidedly too rough for the passengers, the Manoubia put in at Belle Isle. There remain two thousand pigeons to be countermarked for the settings free at 180 and 300 miles.

The first results made known were very satisfactory. Not only did the bearers of dispatches return accurately, but the generality of the battalions gave proof of extraordinary valiantness. There were scarcely more than two or three that failed to get their bearings and remained upon the spars. As for the rest, they betook themselves toward terra firma with admirable precision. Dispatches from all parts told of the return of the birds to the cotes. —L'Illustration.

MERCUROGRAPHIC METHODS OF PHOTO-ENGRAVING.

By THOMAS BOLAS, F.I.C., F.C.S.

PHOTO-ETCHING processes, based either upon the increased readiness with which amalgamated portions of metal plates dissolve in some acid or the greater resistance which they offer to other acids, have been known for some years, but recently Mr. Villon has classified such methods, and so far simplified some of them as to render them easily serviceable for the ordinary work of the etcher, and, moreover, the application of photography to these methods is a very easy matter. The basis of the process in its non-photographic aspect may be illustrated by a few examples. An ink is made by smoothly mixing together the following:

Water.....	Grains. 100
Add and dissolve	
Sugar	50
Glycerine	50
Alcohol.....	100
Finally mix in	
Precipitated biniodide of mercury.....	40
Or a crayon can be made by incorporating	
Biniodide of mercury.....	100
Mercurous nitrate.....	10
Powdered gum	20
Water, a sufficient quantity to make a stiff paste.	

With either of the above, writing or drawing is executed on a polished zinc plate, with the result that the subject shows as bright amalgamated lines on the bluish-gray surface of the zinc, and such a plate, having been varnished at the back, is etched with 3½ per cent. nitric acid, or with hydrochloric acid of similar strength. The weak nitric acid attacks the amalgamated lines and gives an engraving in intaglio, while the weak hydrochlorate attacks the ground and gives an engraving in relief, adapted for typographic printing. In either case, should the lines show signs of being underbitten, the plate should be washed, wiped dry with a soft cloth, and carefully rolled over with the following rebiting ground, care, of course, being taken to use a hard, smooth roller, and not to let the rebiting ground go into the etched cavities. A little heat will cause the rebiting ground to flow down the sides of the relief, and so protect them; after which the etching is resumed.

REBITING GROUND.

Vaseline.....	Grains. 100
Beeswax	12
Linseed oil.....	5
Lampblack.....	5

When an original is to be reproduced by photography, a photo-lithographic transfer is made and put down upon stone or metal in the ordinary way, but, instead of inking the design with an ordinary lithographic printing ink, the following is used:

LITHOGRAPHIC AMALGAMATING INK.

Wax.....	Parts. 40
Resin.....	30
Resin soap.....	20
Biniodide of mercury.....	10

A print is now taken on transfer paper and put down upon a zinc plate. In two or three hours the lines become amalgamated, the image is washed with turpentine, and the plate is etched as above. Alternatives are to use the above amalgamating ink in the preparation of the original photographic transfer, or to dust the face of the transfer with biniodide of mercury. Again, the transfer may be made to zinc or copper with an ordinary fatty ink, and the image on the plate may be dusted with the biniodide of mercury. Another method is to treat the plate as for the ordinary dusting-on process (a gum or sugar and bichromate mixture), and, after exposure, to dust with the biniodide of mercury. When the amalgamated image is on copper, several methods of printing are available, but the simplest consists in rolling up the amalgamated copper with ordinary lithographic ink, which will only take on the unamalgamated parts, but

the amalgamation must be kept up by occasional damping with a weak solution of mercurous nitrate, or by carefully dabbing it over with the preparation known to the pharmaceutical chemist as "mercury with chalk."

THE PRODUCTION OF AERATED WATERS ON A SMALL SCALE.

THE manufacture of aerated waters, including artificial mineral waters, has given rise to important industries in nearly all of the cities and large towns of the civilized world. But in small isolated places a do-

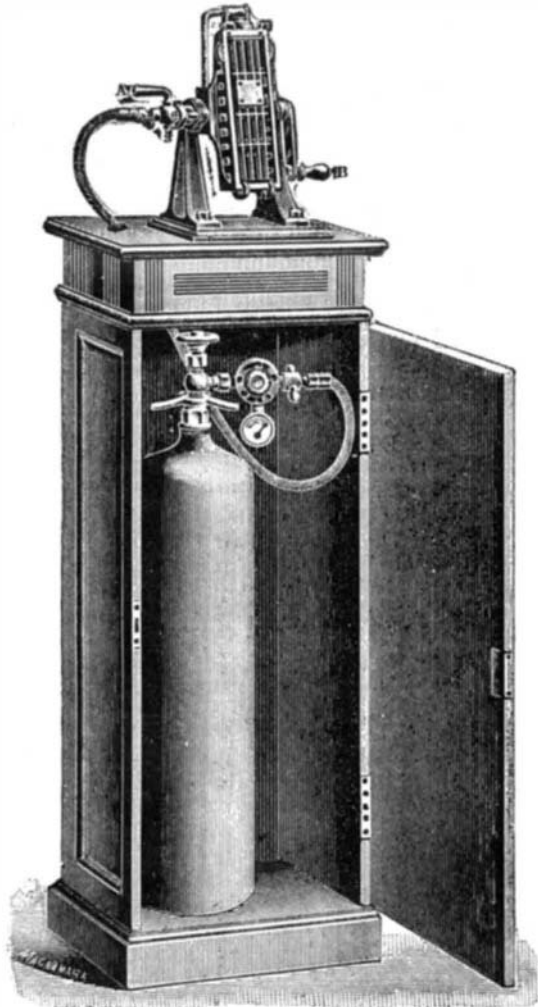


FIG. 1.—CARBONATOR OF THE LANE AND PULLMAN SYSTEM.

mestic apparatus fulfills a useful purpose. The apparatus which we illustrate, made on the Lane-Pullman system, is between the large carbonators and the portable gasogene, and with it either one or a large number of bottles may be charged, and by adding soluble salts any of the well known mineral waters may be produced. In this apparatus the carbonic acid is kept in steel tanks or cylinders, as shown in Fig. 1, which is a general view of the outfit.

Fig. 2 shows the mechanism used in filling the bottles. In the complete apparatus a stand is provided which is sufficiently large to accommodate a cylinder containing enough gas to charge 3,000 bottles. The cylinder is provided with a tight-fitting needle valve and a pressure gage to ascertain the pressure in the cylinder and to properly control the charging pressure. The bottles are placed in the metallic box shown on the top of the wooden stand. This metal box guards against accidents caused by the breakage of the bottle. This holder is secured to the stand by two trunnions. One of these trunnions is hollow and is con-

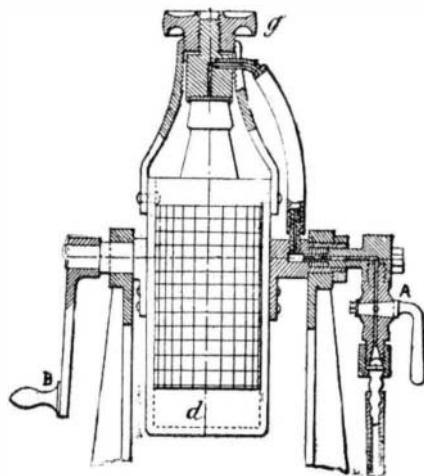


FIG. 2.—CHARGING APPARATUS FOR ONE BOTTLE.

nected with the cylinder of gas by means of a flexible rubber tube. The other trunnion is provided with a handle for shaking the bottle while it is being charged. From the trunnion to the top of the apparatus the gas is conducted by another rubber tube provided with a metallic envelope. A valve, A, controls the flow of gas to the bottle. The milled head, g, Fig. 2, is connected with a screw cap which is forced into the neck of the bottle.

In operation the apparatus is very simple. The bottle is filled with water or water containing salts or flavors and placed in the metal box and the top

screwed down. The gas is then admitted to the bottle until the pressure gage shows that the desired pressure has been reached. The box, d, is then oscillated so as to be sure that the water is evenly aerated. The top, g, is then unscrewed and the bottle is put in communication with the air. The interior pressure closes instantly the small ball in the bottle which acts as a cork and the bottle is replaced by another.

The apparatus can be arranged to fill several bottles at once, as shown in Fig. 3, which represents one of the fillers. In general the same arrangement is used, but in place of the flexible tube a metal tube is used and the head, g, is modified to permit of the bottles being

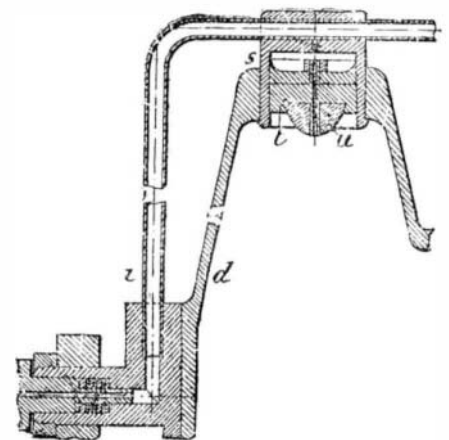


FIG. 3.—CHARGING APPARATUS FOR MORE THAN ONE BOTTLE.

charged without so much hand work. A rubber cork of caoutchouc insures a tight fit during the charging process. It is really a movable piston, and when the pressure of the gas is removed, readily allows the bottle

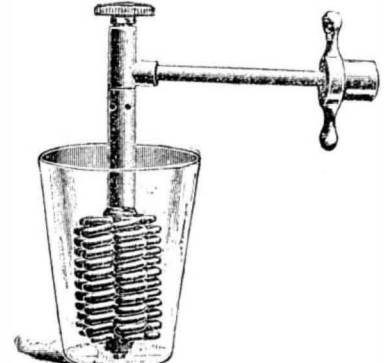
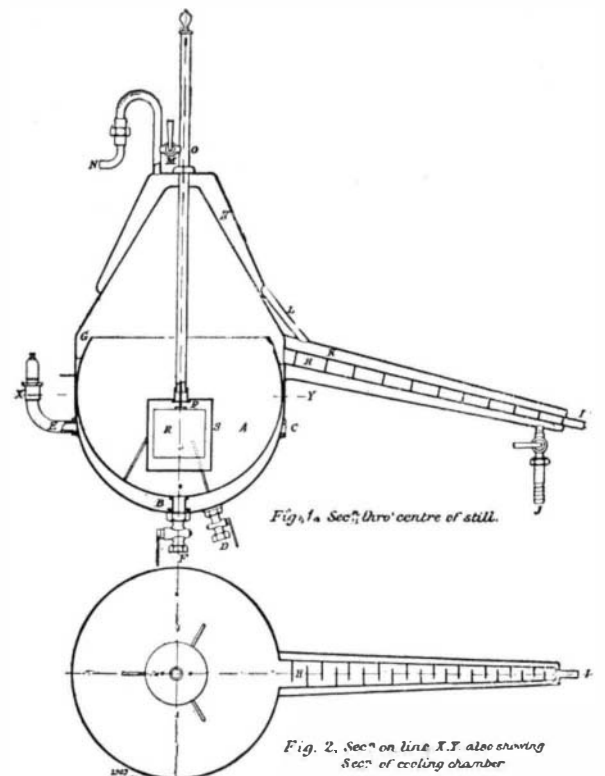


FIG. 4.—APPARATUS FOR COOLING BEVERAGES.

to be removed. It is estimated that the total cost of charging bottles with this apparatus is only about one cent a dozen bottles. The same cylinder may be used to obtain iced drinks by means of the serpentine shown in Fig. 4, which is placed directly in the beverage. The ice thus obtained by the action of the gas is pure and of the same flavor as the beverage. This device has proved particularly valuable in tropical countries. For our engravings and the foregoing particulars we are indebted to the Revue Industrielle.

IMPROVED STILL.

WE illustrate a useful type of still now being introduced by Messrs. Llewellyns and James of Bristol.



IMPROVED STILL.

The apparatus consists of a pan or still A, Fig. 1, which is inclosed by a jacket B, into which the steam for evaporating the contents of the still is admitted. The top of the still is closed by a cone as shown, there being a channel G left between it and the top of the