The Collotype Printing Technique

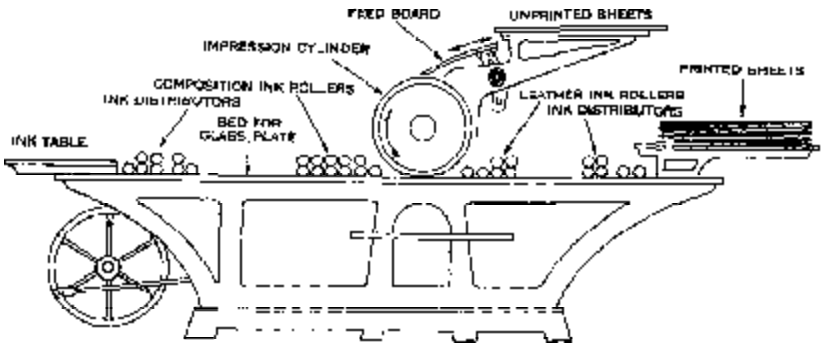
Various titles are given to the photo-gelatin process other than the one above. It is also known as (depending upon the country in which it is use), litchdruck, photo-typie, albertype, artotype and heliotype, and in much of Europe and the U.S. the process is generally designated as Collotype; this term coming from the Greek word, "kolla" meaning glue or gelatin.

In this country it is also sometimes incorrectly called photogravure.

Advantages of the Process

The chief advantage of printing by the photo-gelatin process is that it produces a true photographic gradation, absolutely unbroken by any line or screen. This, and the yielding qualities of the printing plate make it possible to produce by this method softer prints than by lithography or gravure. The shallowness of the printing plate, however, does not permit the heavy application of ink in the shadows that is possible from a deeply etched gravure plate.

The ink on a gravure print may be almost felt in places, whereas a print from gelatin has practically no thickness at all; the photo-gelatin has absolute smoothness and softness, whereas gravure may be made to give great strength and richness, as well as softness.



A traditional Collotype Press showing its major parts

Uses to Which It Is Adapted

For the better classes of reproductions, when only a small run is required, it is one of the most economical processes known, owing to the small initial expense in the preparation of the plates.

It is especially adapted to small posters, theatrical pictures, trade advertisements, shadow box inserts and fashion plates. The subject is frequently duplicated on a larger plate when large quantities are ordered, so that more than one copy may be printed at each impression. Photo-gelatin prints are also largely used as a substitute for photographs of silverware, furniture and other manufactured articles when a small quantity of reproductions is needed and something better than a halftone print and less expensive than an actual photographic print is desired.

The process is frequently used for-reproducing wash drawings of bird's-eye views of manufacturing plants when large prints are desired for framing. The prints are especially well adapted to hand coloring.

Principles of the Process

Practically all photomechanical processes are based on the action of light on gelatin in the presence of a bichromate. Ordinarily, gelatin when placed in cold water absorbs a certain amount of water and expands. In hot water it dissolves. If, however, a sufficient quantity of bichromate of potash, or of ammonia, is dissolved in the hot water containing the gelatin solution the resultant gelatin and bichromate possesses a new property, after the water has

been removed from it. It is then subject to the action of light.

Kept away from the light, it still swells in cold water and dissolves in hot water, but if the light is permitted to act upon it, ceases to have these qualities. This chemical action forms the basis of all photomechanical processes in common use.

Since the bichromated gelatin has this quality, it is easy to coat a flat sheet (traditionally made of plate glass) and expose some part of it to light while shielding the remainder. The exposed part becomes insoluble, while the shielded part retains its normal condition of solubility. Using these properties, it is then possible, through the use of a photographic negative, to regulate the action of light on the gelatin as desired.

After exposure to the light under the negative the sheet of bichromated gelatin becomes a reproduction of the negative in varying degrees of solubility and insolubility, according to the degrees of opacity in the negative. Moreover, the sheet of gelatin carries with it the other property of varying degrees of absorption and expansion. So that in printing from the finished sheet, a picture is obtained that has not only varying degrees of light and shadow, but also varying degrees of relief and depression.

In the process most used today, the bichromated gelatin is poured on a glass plate, and after drying in an oven, is subjected to the action of light through a *negative*. By exposure to light the parts where light has acted strongly (the shadows) are rendered waterproof, so that they no longer absorb water. The parts where the light has acted moderately (the middle tones) will only partly absorb water, while the parts to which no light has been admitted (the high lights) retain the normal property of absorption. In reproducing the negative on the plate, the edges of the negative are covered, so that only the part to be reproduced will print on the gelatin. Because this is a direct printing process, the negative image must be laterally reversed or "flopped", by stripping it backwards. If this reverse is not performed the final printed image from the plate would be laterally reversed.

After exposure the plate is sponged, first with water which opens the pores of the gelatin, and then with a solution of water and glycerin, the glycerin to prevent as far as possible the rapid drying of the plate. In those parts where it has not absorbed water, the ink will be retained. Where water is partly absorbed, the ink also partly adheres, and where the gelatin has absorbed its full quota of water, the ink will not adhere.

Lithographic ink, which is the ink used in Collotype printing, has an oil or grease base. After the plate is thoroughly sponged and dried, a roller charged with this ink and passed over the plate speedily reveals the light-produced image. The picture so secured is transferred, by pressure, to paper and the operation is repeated for each print required.

Making the Plate

Very little is available , commercially, for the collotype printer. Most materials (except the ink) are made by the individual printers.

It may be interesting to follow out one of the methods of actually making a photo-gelatin plate and printing from it. The following is a quotation from a photo-gelatin process manual:

"As a substratum for the plate, shake to a froth in a bottle ten ounces of albumin or dextrine and six or eight drops of sodium silicate. Let it stand for half an hour and then filter.

Take the clean plate glass and go over it on one side with the mixture, using a sable brush. Set on edge to dry. Then repeat the operation, this time letting the glass dry the other way up. Repeat once more, flowing a gentle stream over the plate for half a minute and they dry again."

"When finally dry, coat with a mixture, made as follows:

44 grains of Nelson's gelatin, soaked for twenty minutes in cold water and heated until melted, preferably by means of a water kettle.

Then pour into it the following warm solution, which must not be permitted to reach the boiling point:

One-half ounce of water and six grains of ammonium bichromate. Mix well and filter."

"Take the glass plate with the substratum and flow this solution over it, placing it at once

in a drying box. It will dry in a few hours and is then ready for immediate use. It must lie absolutely level in the drying box."

The time of exposure of the gelatin under the negative will vary from fifteen minutes to an hour, dependent on the character of the negative, density or otherwise, and the prints are made in much the same manner as those from halftone or line negatives when made on metal for etching.

Printing from the Plate

When thoroughly dry, the plate is ready for printing. The glass plate with the gelatin printing film is locked or clamped to the press. It is inked by means of a lithographic roller, freshly inked for each impression. The plate is first dampened with a very weak solution of glycerin and water and this is allowed to evaporate slightly. If the high lights begin to show a muddy appearance, the plate should be dampened again with glycerin and water. Two colors, usually two shades of the same color, are sometimes used, each being applied with a different roller. The shades most frequently used are blacks, browns, dark greens and dark blues.

Both hand and power presses are in use for printing from photo-gelatin plates. A hand press is used for proving and small runs, while for large plates and the longer runs a larger press is used of the type shown in the illustration of Page 1. Best results are obtained in the photo-gelatin process by printing on hard mat surface ledger and bond papers that are not too rough.

Usually, when the run is completed, the gelatin is removed and the plate glass used over and over again. It is obvious that when the gelatin film is removed from the glass it is destroyed. If left on the glass, even though it may have had only a short run, it cannot: be preserved any great length of time for later editions.

Copy Collotype Reproduction

Photographs, retouched photographs, wash drawings, crayon drawings, paintings—in fact, any copy that can be reproduced by the halftone process can be reproduced by this process.

Because of the nature of the gelatin image on the plate, the best results are obtained from copy with soft tonal effects rather than from that with strong color and/or hard lines. The process is not generally used for products with crisp edged line work, i.e., type, rules, etc.

In cases where these are a part of the final product, they are usually produced as a secondary step by an alternative process such as letterpress, lithography or even screen printing.

A Secret Well Protected

Collotype, as a process, has a long history as one of the "black arts" of graphic communications.

It is a somewhat mysterious process which seems to be primarily performed by skilled craftspersons who are reluctant to share their special secrets and techniques.

While this may not be exactly true it is, without doubt, one of the most elusive areas if one wishes to learn the details of its production process.

There are no specialized presses made for this printing system. Nearly all collotype presses are greatly modified lithographic units.

There are very few educational curriculums which include the process as a course of study, except as a fine art exercise.

Partially as a result, in the United States, there are few successful facilities for commercial work. The process is now almost exclusively the domain of the fine artist.

The technique, which offers photo realistic reproductions has largely been displaced by (on the high end) dye sublimation technology and (on the low end) by wide format ink jet systems.

The dye sublimation technique offers high quality. The ink jet systems do have artifacts in their reproductions in the form of ink droplets, but is considerable an acceptable trade off for many products.