

Many readers have asked for technical details on printing processes and terms mentioned in TPA. I always hesitated to answer these requests within the pages of this magazine, as my command of English is too limited for detailed (technical) explanations.

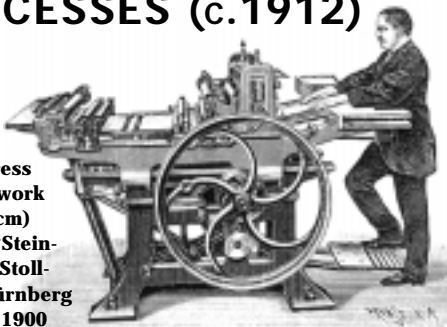
Now I think I have found a good solution for this "problem". An old article which not only explains all "modern printing processes" used before 1912, but which provides also some interesting historical information and, of course the personal/actual opinions and trends of the British authors of that time.

Comments received in the meantime referring to Colour Printing part 1 - 3 in previous TPA issues, show that I am on the right way.

COLOUR PRINTING

THE VARIOUS MODERN PROCESSES (c.1912)

"NORIS" platen press for litho work (37 x 53 cm)
Built by "Steinmesse & Stollberg", Nürnberg
Advert c. 1900



Harry Potterton kindly supplied a original copy of "THE TIMES" (No. 40,000 - Printing Number) from Tuesday, Sept. 10, 1912.

I am going to reprint most of this comprehensive article. Unfortunately the names of the authors are not mentioned. Some (company/artist/publication) names the writers refer to are unknown to me. But I strongly believe that this article will answer many questions, puts some light on the economic/technical situation in the (art) printing business of that time and has also some entertaining aspects (from today's view).

For illustration I have chosen some cards / printing trade adverts from my collection.

Con't from TPA 16: < **Part 4** >

THE MULTI-COLOUR PROCESS

A FRENCH INVENTION

During recent years there have been many attempts to print the three colours of this process simultaneously on one machine. At first almost all the effort was in the direction of working by rotary methods; that is - printing on a continuous roll of paper, running through a press having as many pairs of cylinders and inking sets as colours were required. But the difficulties encountered - particularly those of registering curved plates on cylindrical bases and the production of these curved plates of a sufficiently fine quality - have so far proved almost insurmountable; and although several gallant attempts have been made, so far no efforts in this direction have produced good results, and experience suggests that too much was being attempted at one stage.

Some ten years ago a clever French engineer, M. Lambert, invented and introduced a flat-bed multi-colour press, capable of printing three or four colours at one operation. This press consists of one long bed or table, which moves horizontally, carrying four forme beds, to each of which there are the necessary independent sets of inking apparatus. Above

this long bed and in gear with it are mounted the four printing cylinders at convenient distances apart. The sheet is laid to the first cylinder either by hand or with an automatic feeder, and after being carried over the first forme the sheet is transferred by travelling grippers to the second cylinder and so on through the machine, until the three or four colours are added to the sheet. It is then delivered to a pile at the end of the machine complete.

To watch such a press at work receiving clean white sheets at the one end and delivering the finished product at the others is a most fascinating sight, and represents one of the greatest triumphs of the printer's art and engineer's skill that has been achieved in recent years.

LOW COST OF PRODUCTION

It is not at present possible to produce the very finest work by this simultaneous method of printing, but a really good standard is attained and a fine average quality of work turned out. The great advantage of this multi-colour press lies in the low cost at which large quantities of good useful colour work can be produced, and this is mainly due to two reasons: - (1) That ordinary flat plates, either originals or duplicates, can be used. (2) That

a press which prints all the colours within a fraction of a minute permits one to work large sheets of paper without the trouble which under ordinary circumstances would be met with in the matter of registration. By way of explanation it may be said that if a large sheet of paper, say 50 in. by 40 in., be printed in one colour on one day, and the second and third colours added on subsequent days, the paper, owing to the changing atmospheric conditions which prevail here, frequently stretches or contracts to such an extent that it is not possible to make the second or subsequent formes fit or register on to the first. The multi-colour press, finishing as it does the entire printing in a fraction of a minute, does not give time for this stretching or contraction of paper and hence the large sheet can be handled with any degree of safety, that three separate machines with feeders and pressmen to each would be required to produce the one complete sheet, and that on a multi-colour press sheets 60 in. by 40 in. with all three colours can, when once made ready in register, be run by one capable pressman, it will be at once seen that in wages alone the saving is very considerable, in addition to which the speed and capacity for production is immensely increased.

The Lambert Press has now for some years been working the three-colour process by the multi-colour method in this and other countries. There are already one or two other installations which produce similar work, by means of ordinary single presses coupled up tandem fashion, and it is probable that the success attending some of these ventures will result in a still wider use of the process. It would appear to be quite a feasible scheme to produce a weekly illustrated paper in colour. The illustrated weeklies are already feeling the pressure of the illustrated dailies to such an extent that it is likely that some advance, probably in the direction of colour, will be necessary for them before very long, and whilst ultimately the rotary principle may be applied for this purpose, it is, in the writer's opinion, far more likely that the first coloured weeklies will be produced on multi-coloured flatbed machines and that in the not far distant future. →



Sears, Roebuck & Co., Chicago, Ill.
Half of stereo card no. 30 illustrated:

Where the Type is Set

The Composing Room is one of the busiest workrooms in the City of Chicago, and here are employed more than one hundred skilled printers who set the type used in the printing of all our catalogues, big and little, and all the blank forms and stationery used in our business. The enormous amount of labor required to produce our Big General Catalogue ... with its 100,000 price quotations ... its 10,000 illustrations and 1,200 pages of descriptive matter is entirely made over twice a year....

COPPERPLATE PRINTING AND LITHOGRAPHY.

INTAGLIO PRINTING METHODS

The intaglio methods which enter into printing processes are both numerous and important. To enumerate them will show that they are largely the source of the finest and most beautiful examples of monotone work. The varieties of intaglio engraving and etching are:

Copper and Steelplate Engraving, comprising visiting cards, wedding cards, many menu cards, cheques, society emblems, company certificates and coupons, cotton-reel labels, ornamental work, maps, Ordnance Surveys, charts, monograms, arms, trade-marks, views, stamps, post-cards, all of commercial application; "copperplate engravings" of pictures and portraits, and the elaborate plates which were the basis of the once famous art of Baxter.

Stone Engraving, the Continental and American counterpart of copper and steelplate engraving in Great Britain.

Etching, the companion art of many oil and water-colour artists.

Aquatint Etching, whereby books were illustrated, and now used in some forms for colour work.

Mezzotint Engraving, the process of the portrait engraver.

Music Engraving

Photogravure, the photographic imitation of mezzotint.

Rembrandt Photogravure, the mechanical imitation of photogravure.

Renaissance Photogravure, a further modification of the Rembrandt process.

Most of these methods are in daily use, and contribute in an incalculable degree to make the printing art so beautiful. Of these the last three are considered separately under the heading of Photo-mechanical Intaglio Engraving.

COPPERPLATE ENGRAVING

This engraving is divided into commercial and pictorial. The latter section may at times embrace engraving of pictures and portraits, in which the modes of engraving may be separated into linear, stipple, and chalk or grain; and there have been pictorial engravers who adhere to one mode throughout the whole of their works. The majority of pictorial productions, however, are the result of a combination of methods. Sometimes the line engraver will introduce stipple, or stipple and grain; or it may be that etching, aquatint, and mezzotint are called into requisition separately. But pictorial art, so well illustrated by the subscription engravings, has not been called upon during the past 15 years, owing to the progress of photographic methods. Apart from this skillful mode of engraving, the ordinary craftsman, known as a pictorial engraver, has to produce the delicate and detailed work required for views, buildings, trade-marks, postage stamps, portraits, and ornamental work so largely in use; while the commercial engraver is employed upon writing and lettering, labels, and all the more or less stiff line work which forms the basis of not a

few printers' staple industry. Not perhaps quite in a separate class, but still of specialised character, are the map engravers, the height of perfection in which is reached in the Ordnance Surveys. The average public has probably no conception of the labour expended upon these 2s. 6d Ordnance sheets which show in accurate detail every building and footpath, every lake and rivulet, and all the contours of elevation of the surface of the district at the time of the survey. But, after the survey party has completed the topography, and the geographical draughtsman has reduced it to an intelligible drawing, the copperplate engraver studiously executes the lines for the roads, paths, cities, towns, villages, watercourses, and so forth, finally putting in the lettering which adds the public value to the undertaking. In this task the engraver has spent may be 12, 15, or 18 months upon one single plan. Still the work is far from complete, for another engraver has to produce another plate, in which the mountains, hills, and valleys have to be depicted by a certain class of line engraving; and he, too, may take 15 to 20 months to complete this elaborate work. The remaining colours, sometimes four or five in number, have to be prepared upon separate plates; the whole being printed by an intricate series of careful registerings of one printed sheet upon all the other plates. It is not to be wondered at that if a survey party commences work upon a district it will most probably be five or six years before the survey is published.

The art of engraving is performed by the dexterous manipulation of the burin, a tool of highly tempered steel, having a fine cutting surface or point. The tool is mounted in a small circular-faced handle, but with about a third of the handle cut off straight, parallel to its face diameter; by this means the tool can be used, almost touching the surface of the copper plate, along its length, the force for cutting being exercised by the "circular" face of the handle bearing against the palm of the hand. The plate is placed upon a leather pad or cushion, so that it may be easily revolved whilst the tool is forced forward, thus facilitating the engraving of a curve. This same manipulation is the basis for the use of the various burins, and other tools, to complete the work. The engraving is actually the cutting or scooping out of the metal. when the engraving is finished the raw edges of metal

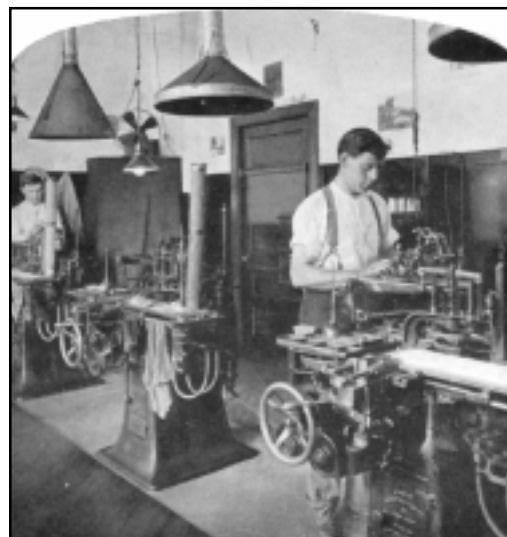
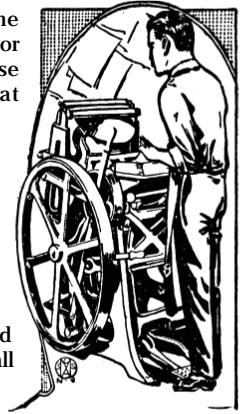
left as a burr on the lines are scraped off or planed off by the use of a very sharp flat tool.

METHOD OF PRINTING

To print from such a plate, the ink, which may be practically any pigmented mixture, is dabbed well into the work all over the plate, and allowed a little time to dry. The plate is then wiped very carefully with a rag; the cleaning being completed by judicious wiping with the thick part of the palm of the hand. The clean plate is placed on the iron table of the copperplate press, the card or paper is placed on the plate, the paper is covered with a fine hard blanket, and the table is drawn through between two iron rollers. The pressure exerted is considerable, and is adjustable. In this manner each print from a copperplate is produced.

The preliminaries of making a highly finished sketch, waxing the plate, blackening the wax, retracing the sketch, and the use of ruling machines are adjuncts which are self-evident. In all printing methods the same degree of accuracy is necessary in all the preliminary stages of producing the actual printing surface.

The inking and printing of copperplates has been and is largely at present a tedious one-man operation. The plate has to be inked and cleaned for each print, and pulled through a press at a comparatively slow speed. In a measure, this has been improved by the introduction of machinery. The earlier forms of machines of 1885 and 1888 have been the incentives for the much improved types of machines made by the *Johnstone Die Press Company*, and more recently by *Messrs. Waite and Savill, J. Richmond and Co., and Linotype and Machinery (Ltd)*. With these mechanical helps copperplates, specially cut for the purpose, can be printed very efficiently at 1,000 to 1,200 per hour. The work produced by these machines is very brilliant and has the appearance of die stamping. The prints produced are not only from lettering, but include pictorial engraving. →



Sears, Roebuck & Co., Chicago, Ill. Half of stereo card no. 31 illustrated:

Type Setting and Type Making

The printing industry has passed through a wonderful evolution within the past twenty years. The methods in use today in the manufacture of all sorts of printed matter are radically different from those employed even ten years ago.....Nothing can be more fascinating than the operation of these automatic machines; they display almost human intelligence and the observer can readily believe that their gradual evolution from the first idea of fifty years ago has cost millions of dollars.....

COLOUR PRINTS

Pictorial engraving as one of the fine arts, with its subdivision into line, stipple, and chalk modes of execution, has a further application in the method adopted of using wood mezzotint, or stipple and line engravings, or chalk engravings, or a combination of methods, as the basis for colour prints which was, and probably is to-day, the most attractive form of coloured engravings yet produced. In modern times this art was revived by Messrs. Macmillan and Co.'s publication of the colour prints of the eighteenth century. The method adopted was to use photogravure plates made directly by photographing the originals, thus retaining the true form and details of the artists' work. The production of this work – the first in the modern revival – was carried out with great care and judgment. The prints themselves stand as monuments of the power of rendering true copies, by a mode as similar as necessary to that originally employed. In this firm's later publications, such as "Emma Lay Hamilton", may be found the results of copying both colour prints and paintings by the same mode. The production of the paintings is at once striking and attractive. Although a colour print method has been employed, there has been a special treatment given to these plates, making them much more truly representative of paintings than is generally the case with colour prints. In the production of their works since the first, in 1899, Messrs. Macmillan have largely employed mezzotint as the base instead of photogravure.

THE DEMAND FOR GOOD PRINTS

The demand for such prints was soon recognized by other art publishers, notably Messrs. Henry Graves and Co., who in their early work in 1902 used mezzotint as the base. But to them it soon became apparent that pure engraving or etching was not suitable for the variety of subjects which they published. They resorted to a mixture of modes, just as the famous copperplate engravers had done, with the result that pictures like those by Sir Thomas Lawrence could be copied more truly. The copies which have been made from the picture of the Earl of Stafford's Children, from pictures in the Bartolozzi style, from Turner's "Fighting Temeraire", from the "Lady Peel", and

lastly, from the "Lady Carlisle", all show how well the mixed method meets the nature of the original, and finally, what success can be attained. A series of copies from Downman's sketches, with appropriate French framings, are excellent. Even pencil drawings have been copied in a manner unequalled by photography.

If it were necessary to enlarge upon the modern prints of this style, the publications by Messrs. Frost and Reed, from plates made by Miss E. Jowett, represent some of the brightest as well as the most attractive prints that have been made.

Whichever basis be used – photogravure, mezzotint, or mixed engraving – the ultimate treatment for obtaining the colour print is the same. The engraved plate is thoroughly cleaned, and by the use of small dabbers and pencil stumps the various coloured inks are worked into the plate in their respective places. Such plates must be inked by artistic craftsmen, and may take hours to complete before one print can be taken. The print is simultaneous colour impression, and bears all the distinctive marks of fine mezzotint, copperplate engraving, or etching.

STONE ENGRAVING

As a means of producing fine work, copperplate engraving has maintained a very strong hold upon the British printing craft, notwithstanding the fact that Germans and Frenchmen have from time to time come into Great Britain and have practised the art of stone engraving, which is a method that gives greater freedom to the engraver and a character to the print seldom excelled by copperplate engraving. The great use of stone engraving on the Continent and its subsequent adoption in America have not changed the British preference for copperplate work. At present there are probably not more than six houses in the kingdom where stone engraving may at times be practised. (...)

MACHINERY FOR ENGRAVERS

Although copperplate engraving is an art craft, it has been found essential to assist the handwork by delicate and accurate apparatus for much of the mechanical engraving, both for plate and stone. The chief item is the ruling machine, whereby straight lines

may be cut at varying distances apart for skies, buildings, backgrounds, and letter shading. This form of machine has been made more comprehensive, and is now obtainable as copying machines and pantographs. The latter is perhaps one of the greatest improvements and aids that the engraver has at his command. It is by such machines that medals may be accurately copied by the manipulation of an index point or stylus over every detail of the original. Pantographs also – especially those elaborate machines made and worked solely by Mr. Thomas Macdonald – have placed at the disposal of engravers the means of obtaining copies of plates or original designs in any shape either larger or smaller than the copy. Such machines, too, are the source of the well-known "engine-turnings" – elaborate waved, crossed, and ornamental work of geometrical nature so much in use upon cheques. (...)

AQUATINT

The aquatint method gives an artist considerable play for his skills, the difference being that the etcher starts with a clean plate and has to produce everything he wants, while the aquatinter commences by laying a "ground" on the plate, of resinous matter, which when warmed reticulates, leaving the plate bare between the network. The bare plate is then etched to produce the very lightest tints. After stopping the etch, portions may be covered with an acid-resisting varnish and a second etch administered. By a continuation of these processes of stopping out and etching a picture of very high merit is produced, having a wash or tint appearance.

MEZZOTINT

Of the copperplate engraving methods, this stands out alone as an artistic and highly skilled method of production, whose adherents are so few that it is seldom seen in modern times. The process of production is unique, being the reverse of general practise. For mezzotint the plate must be granulated evenly all over, so finely that when an impression is pulled it gives a matt velvety solid black all over the paper. With a plate so prepared, the mezzotinter, with but few tools, – burnishers and scrapers – proceeds to flatten the grain or scrape it off in certain parts, until the picture grows out of the darkness. The plate is a delicate production, and, like an aquatint plate, will not permit of a very large edition of equally good prints. A mezzotint engraving is often used as the basis for "colour prints" in the recent revival of that art.

MUSIC PRINTING

The last and least artistic of the intaglio methods of engraving is music. Some fine works have been printed entirely from engraved copper plates, but this expensive method has been superseded almost exclusively by lithographic printing from transfers pulled from punched (intaglio) pewter plates. The outfit of a music-punching artist includes the form of note, the stroke, the clef marks, sharps, flats, complete alphabets, and so forth. By punching into the soft pewter the whole "work" is produced uniformly. Seldom, if ever, is an edition printed from such plates, the general practise ➔



Sears, Roebuck & Co., Chicago, Ill.
Half of stereo card no. 33 illustrated:

Where the big catalogue is printed

This view through the center aisle of our press room in the Printing Building is but a glimpse of the largest private press room in the world. Each of these great presses receives the paper from a roll and prints, folds and delivers five thousand thirty-two-page sections of our Big Catalogue every hour. These great automatic machines, the most modern of their type, are run by electricity produce in a single day thirty thousand copies of our twelve hundred-page catalogue six million per year ...

being to take transfers from these pewter plates and put them upon lithographic stones, zinc or aluminium plates, and print off the necessary quantity by the flat-bed machine or the fast-running rotary.

In London there is the old house of *Novello* and that of *Messrs. Curwen and Sons*. Of later date is **the firm of C.G. Röder, which with the Leipzig house has 51 Rotary machines almost entirely employed on music printing.**

PHOTO-MECHANICAL INTAGLIO ENGRAVING

The skill of the craftsman in photogravure is not necessarily so great as the art of the master who makes his pictures by etching, aquatint, or mezzotint, or by the methods of pure copperplate engraving. Photogravure is a mechanical photographic process involving skill and attention in its manipulation. As in aquatint, a resinous grounding is laid upon the plate – preferably by the dusting box. The ground is fixed by heat, and is then ready to receive a carbon tissue negative, which, when pressed well into contact, forms a “resist” to the mordant, allowing the etching fluid to pass through the positive picture and etch the copperplate. The perchloride of iron etch or mordant is used in about six strengths, the strongest being used first, as it attacks less than the more dilute solutions.

As the grain on a photogravure ground is very fine it is possible to utilize full tone negatives; the breaking up of the tones by the granulation of the ground being sufficient for copperplate printing methods. Pictures by this process possess all the depth of a photograph with the softness resulting from the use of coloured printing inks. This method is often used for portraits and copies of first-class pictures. But the speed of production is slow, and to facilitate the output of pictures of this kind it becomes imperative to use a process known as «Rembrandt photogravure».

REMBRANDT PHOTOGRAVURE

The achievement of printing rapidly from copperplates by the various die presses has been repeated in the case of photographically prepared photogravure plates. The extreme fineness of the grain in pure photogravure is in this process made somewhat coarser by the intervention of a very closely ruled cross-line screen – finer than those used for letterpress printing blocks – thus dividing the work up into areas – mere dots – large enough to permit of rougher usage in printing than for pure photogravure. The inking and wiping as the printing are all done mechanically, as in the die presses, the wiping of the plate being almost entirely effected by the plate or cylinder passing under a knife or docteur, which scrapes off the ink cleanly. The whole process is carried out by fast-running machines, and the products compare admirably with pure photogravure. The results are of great commercial value, and several companies are constantly busy meeting the demand. Adaptations of this process and the machines have been made, in order that machine photogravure may be applied to newspaper and other cheap forms of illustration. The same process has come before the public

under the names of machine photogravure, Allezzogravure, and Vandyke; Dr. Merten's process and Heleure; the Saalberg process and Vandyke; and mezzogravure. The manipulation is similar, but the skill and adaptation of machinery make the difference. Works in colour entirely printed by this process have appeared; but it has been found more satisfactory to employ other printing methods by which to add the colours.

The Rembrandt process was introduced in 1895, and is now known as Rembrandt Gravure, by the “*Rembrandt Intaglio Printing Company*”. Their work has gone all over the world, and, contrary to the general rule in the case of printing, very large consignments go into Germany. Their work for brilliance of production is frequently preferred to pure photogravure. In the course of long business experience every form of copying has passed through her hands, and it is a common thing to see the title or other printed matter appertaining to the picture treated by the same process.

The success which attended their efforts has no doubt been the origin of the adaptation of a similar process to printing advertisements in newspaper, or the entire production of periodicals – pictures and type as well – because the selfsame process is equally applicable to straight lines and letters as it is to pictures.

NEWSPAPER PHOTOGRAVURE

In this connexion it may be mentioned that *Dr. Mertens* was one of the early users of this process who recognized its full possibilities. By his machine the speed of production was increased to 3,000 per hour, so that in addition to the picture, he was able without very serious economical loss to reproduce the letterpress matter as well. Some of the full-page advertisements in Continental newspapers show admirably this application of the process, and its practicability in combining fine photogravure printing with newspaper work.

RENAISSANCE PHOTOGRAVURE

In the Rembrandt process the paper is brought into direct contact with the printing plate or cylinder, and has been found to give excellent results, but with the development of the offset process a variation in printing is now known as Renaissance photogravure, in which the plate or cylinder gives its impression to a rubber-covered roller. The paper is then pressed against the rubber roller and the print produced.

In direct machine photogravure printing there has always been a faint tinting or blurring of the line, as in etching, which has added largely to the effect. In the Renaissance photogravure or indirect method the same effect is obtained, but is more intensified by reason of the offset process, and gives to the picture the depth and fulness characteristic of a mezzotint. It may be added that by a special extra cylinder letterpress matter can be added simultaneously. The machine for this process is in course of adoption and is being placed on the market by Linotype and Machinery (Ltd.). —

Next issue (*IF you can stand more technical stuff*), all about Lithographic, collotype and offset printing.



Typical high quality (“sepia-look”) postcard produced by Rembrandt Intaglio Printing Co. A small trademark ‘RIP’ in circle is almost hidden in down left hand corner. *Promotional imprint on address side reads: “Have you seen our Rembrandt Gravure inset in the present issue of «Printer's Ink» – the 6d journal for serious advertisers? The Rembrandt Intaglio Printing Co., 36, Basinghall Street, London, E.C.”* P/u but postmark illegible, Half-penny postage.

Below: View of “Rembrandt Intaglio Printing Co. Ltd.”, Lancaster, in 1895.

