

of the Trinity in St. Paul's Churchyard is given as the place of sale of a *Provinciale* printed by W. Hopyl at Paris, a practice continued in later books from the same house, both those printed abroad and in England. On the other hand, Wynkyn de Worde and Pynson seldom, if ever, give their names except in their colophons. In Berthelet's and Grafton's books the colophon is still evidently the regular place for the imprint, but names and dates frequently appear also on the title-page. We can, I think, say that the change-over took place about 1530, between which date and 1570 the colophon gradually went out of use, though the more old-fashioned printers kept up the custom for a good many years later. Apart, however, from these instances of mere survival there are a good many colophons added for a special purpose, such as those which give a printer's name and a list of stationers for whom the book was printed, as in the second edition of Holinshed's *Chronicle* and the Second Folio of Shakespeare.<sup>1</sup> In such cases I suspect that the object was simply to put the arrangement on record. In the same way a colophon was sometimes added to a book of which the title-page had been printed with the first sheet, in order to indicate a change in the publishing arrangements, as in the case of the 1610 edition of *The Spanish Tragedy*,<sup>2</sup> or to correct an incomplete statement, as in the 1629 edition of George Wilkins's *Miseries of Inforst Mariage*, where the title states that the work was printed by Aug. Mathewes for Richard Thrale, and a colophon is added saying that it was printed by Aug. Mathewes for George Vincent and to be sold by Richard Thrale.

<sup>1</sup> For this book five different title-pages were printed each bearing the name of only one of the five stationers concerned in the venture.

<sup>2</sup> See Dr. Greg in *The Library*, 4th Ser., vi. 54-5.

## Chapter Eight

### A NOTE ON PAPER

KNOWLEDGE of the processes by which paper is manufactured and of the substances of which it is composed has never, I think, been regarded as necessary to the bibliographer, however important it may be to the librarian, and it is no part of my intention to deal with such matters here.<sup>1</sup> Of late, however, in consequence partly of the prominence which has been given to watermarks in certain bibliographical arguments, the subject of paper has received a little more attention, and it will probably receive still more in future. It would undoubtedly be of use to us in the solution of many bibliographical problems if we had more exact knowledge of the different sizes, prices, and 'makes' of paper of the fifteenth to seventeenth centuries, but much detailed work will be necessary before any connected view of the subject becomes obtainable. In the meantime the following desultory notes may be found better than nothing.

<sup>1</sup> So far as I am aware, there is no comprehensive work dealing with paper both from the historical and the technical side. There are numerous books on modern paper-making and on particular varieties of paper and their different uses, but such historical sketches as there are have as a rule little to say about the composition of the early papers or the process by which they were manufactured, while the modern technical treatise is generally wildly at fault if it attempts to touch on the historical side of the matter. On such subjects as the importation, method of sale, sizes, and prices of the early papers, little or no information seems to have been brought together. As regards English paper, the fullest account of the earlier period known to me is to be found in a series of papers by Mr. Rhys Jenkins in *The Library Association Record*, vols. ii and iii (1900-1). The first paper is entitled 'Early Attempts at Paper-making in England, 1495-1586' (*L. A. R.*, ii. 479-88), and others deal with paper-making in 1588-1680 (ii. 577-88), and in 1682-1714 (iii. 239 ff.). See also 'Some Notes on the History of Paper', by Dr. P. Henderson Aitken in *Transactions of the Bibliographical Society*, xiii. 201 ff.

Paper made by similar methods to the European paper of the Middle Ages is said to have been manufactured in China in the second century A.D., and to have been in use among the Arabs in the eighth century. It does not seem, however, to have been introduced into Europe until about the twelfth century,<sup>1</sup> when the craft of paper-making began to be practised by the Moors at Valencia and Toledo. From Spain it spread to Italy, France, and Germany; a mill is known to have existed at Fabriano, near Ancona, before 1278, and one was started at Nuremberg in 1390.<sup>2</sup> In England, and indeed in any civilized part of Europe, paper was evidently procurable without difficulty from the beginning of the fourteenth century.

The first English paper-mill of which any record is to be found was one kept by John Tate at or near Hertford. This mill is mentioned in a verse prologue to the *De Proprietatibus Rerum*, printed by Wynkyn de Worde in 1495 or 1496, as the source of the paper used in the book. Tate died in 1507 and the mill is referred to in his will as still existing, but there seems reason for thinking that the manufacture of paper had been abandoned. Indeed, as Mr. Jenkins points out, there is no actual evidence of paper being made there before 1495 or after 1498.

Half a century later, about 1549, we are told that no paper is being made in England on account of foreign competition.<sup>3</sup> About 1556, however, a paper-

<sup>1</sup> Various authorities date the introduction of paper into Europe from late in the eleventh to early in the thirteenth century. The earliest definite dates for the use of paper in Europe seem to be 1145 and 1154, see P. Henderson Aitken, u.s., p. 209.

<sup>2</sup> Jenkins, *L. A. R.*, ii. 481.

<sup>3</sup> *A Discourse of the Common Weal of this Realm of England* (by John Hales?), ed. E. Lamond, pp. 65-6, quoted by Jenkins, u.s., p. 484. The passage is substantially unchanged in the refurbishment by W. S. under the title of *An Examination of Certain Complaints* in 1581, but need not be taken as true at the latter date also. Dr. Aitken notes that in the archives of the Drapers' Company of London, docu-

mill was started by Thomas Thirlby, a statesman and ecclesiastic of some importance in his day, with the help of a certain Remegius, whom he brought over from Germany. This mill is mentioned by Churchyard in his *Spark of Friendship*, 1588,<sup>1</sup> but he gives no details, not even the place at which the mill was situated, though this seems likely to have been at Fen Ditton, near Cambridge, where there is good evidence of the existence of a paper-mill in 1557.<sup>2</sup> There was also one at Bemerton, near Salisbury, which, according to different authorities, was established in 1554 or 1569.<sup>3</sup> Before 1565 Sir Thomas Gresham set up a mill at Osterley, Middlesex, but he lost money by it,<sup>4</sup> and it would seem that the experiment was soon abandoned.

After this failure we hear of no further attempt at manufacture for nearly twenty years. In or about 1585, however, the well-known printer and stationer Richard Tottel presented a petition to Burleigh, asking for the grant of a monopoly of paper-making in England, together with a prohibition of the export of rags, for thirty-one years,<sup>5</sup> which looks as if he at least did not regard it as a hopeless venture. Nothing seems to have come of Tottel's petition, but a few years later, in 1588/9, a ten years' licence for paper-making was granted by Elizabeth to her jeweller, a German named John Spilman.<sup>6</sup> He started a mill at Dartford in Kent and evidently at last made the business a success, for

ments of the early part of the fifteenth century are invariably on Italian paper, those from the end of the century always on French.

<sup>1</sup> See Nichols's *Progresses of Queen Elizabeth*, ii. 594.

<sup>2</sup> Jenkins, u.s., p. 485; cf. Ames, *Typog. Antiq.*, ed. Herbert, i. 201, where it is mentioned as existing in 1562.

<sup>3</sup> Jenkins, u.s., pp. 485-6; by a slip Jenkins has 1596 for 1569.

<sup>4</sup> Churchyard in Nichols, *Progresses of Queen Elizabeth*, ii. 597.

<sup>5</sup> Arber's *Transcript of the Stationers' Register*, i. 242. It appears from the petition that the chief difficulty was the cheapness of the French paper, the makers of which imported English rags.

<sup>6</sup> For a detailed account of Spilman, see G. H. Overend in *Proc. of Huguenot Soc. of London*, viii. 180-96.

his mill was visited by King James in 1605 and Spillman was knighted.<sup>1</sup> It remained in operation until late in the seventeenth century, by which time several other mills had been set up in various parts of the country and the making of paper was a well-established industry.

From its first invention, until the closing years of the eighteenth century, paper was made entirely by hand, though water-power was occasionally employed in crushing the pulp. The material used in the early days seems almost invariably to have been linen rags, which, after washing, were boiled for a long time and then beaten with hammers until they formed a smooth pulp. This pulp was stirred up with water in a vat to the consistency of cream. Shallow wooden frames were provided of the size of the paper to be made and furnished with a bottom of interwoven wires, those running longitudinally being fine and very close together, while those running crossways were thicker and from three-quarters of an inch to an inch apart. These frames or moulds were dipped by the workmen into the pulp, the water of which drained away as they were lifted out. During the lifting a peculiar horizontal shake was given to the mould, the result of which was to cause the fibres of the pulp, as they settled on the bottom of the mould, to cross or interlock together. As soon as the water had drained away, the wet sheet of paper was turned out to dry, generally on pieces of woollen material. It was then pressed, sized more or less according to the purpose for which it was intended, and dried.

It was customary from an early period in the European manufacture of paper, for the maker to introduce into all the better qualities, at least, his device or some distinguishing mark. This was done by interweaving the design in wire in the network of the bottom of the mould, the impression of these wires, as

<sup>1</sup> Nichols, *Progresses of King James I*, i. 515.

of the close and widely spaced wires of the bottom itself, appearing as semi-transparent lines in the paper when held up to the light. The devices, known as 'watermarks', used in early papers are of the most varied kind, ranging from simple stars, crosses, initials of the maker, &c., to elaborate heraldic devices embodying the arms of the town or district of manufacture or of the maker's patron. Among the commoner watermarks of sixteenth- and seventeenth-century papers were hands or 'gloves', various kinds of ewer or jug, pillars, and crowns. A very large number have been reproduced in the great work of C. M. Briquet, *Les Filigranes*, 1907, and it is sometimes possible with the help of this book to determine the place of origin and date of samples of paper with fair accuracy. Unfortunately, however, it is often most difficult to identify with any approach to certainty the watermark of paper used in a printed book of smaller size than a folio, on account of its position, in a quarto or octavo, in the back fold, or, in most other sizes, in the margin where most of it has usually been cut away by the binder. As a rule the utmost that we can do is to determine whether in a particular book or group of books the watermark is the same throughout or not, a point which indeed may be of great importance as indicating whether or not the whole was printed at or about the same time:<sup>1</sup> it is seldom that we can go

Cf. Dr. W. W. Greg's investigations into the '1619' Shakespeare quartos in *The Library*, 2nd Ser., vol. ix. Arguments from similarity or dissimilarity of watermark must, however, be used with extreme caution, for it seems quite clear that many printers bought their paper in job-lots, and it is common to find a number of different watermarks in a book about the printing of which there appears to have been nothing abnormal. At the same time, if we had reason for thinking that a certain part of a book had been inserted after the original printing, and we found that the paper of the rest of the book, both before and after this particular section, bore the same watermark whereas this section itself had a different one, we could certainly claim the fact as strongly supporting this view.

further and infer anything from the watermark as to the actual date of printing.

The watermark seems to have been normally placed in the centre of one half of the sheet, so that when the sheet was folded in two, as in a 'folio' book, it appeared in the centre of a leaf. The question of how far we may regard this position as a standard one is of some importance in bibliographical work, for it is evident that if we could rely on its always occupying the same place in the sheet this would give us valuable information not only concerning the number of times a sheet had been folded, a point which determines the 'format' of the book, but also, in the case of some foldings, its original size. Though, however, at least in the sixteenth and early seventeenth centuries, the normal place for the watermark was as I have stated, it is not by any means safe to regard this position as an invariable one: it is indeed far from infrequent to find the watermark somewhat nearer to the centre, and I should not like to declare that it was never placed quite centrally on the sheet. But the subject is one which, so far as I can learn, has not yet been fully investigated, though an excellent beginning has been made by Mr. Edward Heawood in a paper on 'The Position on the Sheet of Early Watermarks' printed in *The Library*, 4th Series, ix. 38-47 (June, 1928).

Later papers, from about 1670 (?), often have a second watermark, termed a 'counter-mark' and generally consisting of the maker's initials, in the centre of the opposite half of the sheet.<sup>1</sup>

The question of sizes of paper is also one which needs some investigation. From the early days of printing a number of different sizes seem to have been used. Blades states that Caxton used at least three

<sup>1</sup> Mr. R. W. Chapman tells me that during the eighteenth century the usual position for both watermarks was in or near the centre of the half-sheets, and that he has not met with abnormally placed marks until quite the end of the period.

sizes measuring respectively  $15\frac{3}{4}'' \times 22''$ ,  $13'' \times 18\frac{1}{2}''$ , and  $11'' \times 16''$ . In the later sixteenth century we can recognize two sizes as especially frequent (forming respectively the 'large folio' and 'small folio' of certain booksellers' catalogues), the larger sheet measuring about  $15'' \times 20''$  (the modern 'crown' sheet) and the smaller about  $12'' \times 16''$ . There seems, however, to have been much variation, and these sizes can only be taken as approximate. There are many books which, unless indeed they have been most extravagantly cut down, must have been printed on paper from  $13''$  to  $13\frac{1}{2}''$  by  $17''$  or  $18''$ ,<sup>2</sup> and the paper of a manuscript volume which I have measured, all of which is entirely uncut and has the whole of the deckle<sup>3</sup> preserved, is in two sizes measuring respectively  $12\frac{1}{2}'' \times 15\frac{1}{2}''$  and  $12\frac{1}{4}'' \times 15\frac{1}{4}''$ . So far as I have been able to ascertain, the sizes had at this date no recognized names, the modern names when first introduced referring to the watermark and indicating the make or quality. Thus when Prynne complained that 'Shackspeers Plaies are printed in the best Crowne paper, far better than most Bibles',<sup>3</sup> he is talking of the quality, not of the size of the paper. By 1674, however, as Mr. Chapman has shown,<sup>4</sup> such terms as 'pott', 'crown', &c., had passed from denoting the watermark to denoting the size, and all the modern names for sizes, with others now obsolete, were in use. The sizes were indeed not quite fixed, but the series was the same as to-day, *pot* being the smallest and *super-royal* the largest.

<sup>2</sup> The double leaf of the largest known copy of the First Folio of Shakespeare is said to measure  $13\frac{3}{8}'' \times 17''$ .

<sup>3</sup> The 'deckle' is the edge of a sheet of hand-made paper, which is always slightly uneven. This irregularity is regarded in modern times as an ornament, and 'deckle-edges' are artificially produced on many of the better qualities of machine-made paper.

<sup>4</sup> *Histrio-Mastix*, 1633, 'To the Christian Reader', fol. 1, side-note.

<sup>5</sup> *The Library*, 4th Ser., iv. 175, vii. 402-8. In the second article a detailed inventory of a number of lots of paper offered in 1674 by two paper merchants is printed in full.

An important question which still awaits solution is at what date paper of double any of the normal sizes was introduced. Seeing that hand-made paper is now manufactured up to  $22'' \times 30''$ , there seems no reason why the sixteenth- and seventeenth-century workmen should not have been capable of turning out paper double their usual smaller size, say  $16'' \times 24''$ . Now if they did this and if they followed the usual rule of running the close wires lengthways of the frame, then a printer making use of imposition by half-sheets would produce a book in the ordinary sizes but with the chain-marks running in the wrong direction: his folio would have transverse chain-lines and his quarto vertical ones. The same result would, of course, follow if he used the ordinary imposition, but cut his sheets in two before printing. A practice of this kind would afford a simple explanation of those odd cases with which we sometimes meet, of books printed apparently partly in octavo and partly in quarto, with the leaves nevertheless all of the same size.<sup>1</sup>

From about the beginning of the nineteenth century, machine-made paper began to supplant hand-made for all the ordinary purposes of book-production. The principle of the paper-making machine was to replace the mould by a continuous travelling wire web which dipped into the vat of pulp. This web carried along the pulp raised by it for a sufficient distance to allow it to drain—the whole web being shaken to consolidate the fibres as a mould used to be shaken by hand—and become sufficiently firm to be passed to other heated rollers which dried it, the web of paper being then wound into a roll to be afterwards cut to the sizes required. The wire web which in these machines took the place of the bottom of the hand-moulds was closely woven and did not leave on the paper the impression of rectangular lines (chain-lines and wire-lines) which were usual in hand-made (laid) paper. Paper which has

<sup>1</sup> See p. 174 below.

an appearance of even granulation instead of these chain- and wire-lines is called 'wove'.

It would seem that in the early days of machine-made papers, 'wove' paper was normally machine-made and 'laid' paper generally hand-made; but the two kinds cannot by any means always be so simply distinguished. There was wove paper before the days of the machines, a mesh of woven wire being presumably used to form the bottom of the frames instead of the old cross-wires; and it was not long before the paper-makers discovered a method of giving a 'laid' appearance to the paper made by machinery. This was done by impressing the lines on the paper while still damp by running it between special rollers, and it is thus that the laid lines are produced in almost all papers, both machine-made and hand-made, at the present day, the watermark, when there is one, being produced by the same process.

Into the question of modern papers, their sizes and varieties, we need not enter beyond noting that very much larger sizes are now employed in printing than was formerly the case, papers double, four, or eight times the basic size being used, e. g. besides crown paper measuring  $15'' \times 20''$ , we have double crown  $20'' \times 30''$ , 'quad' crown (i. e. quadruple),  $30'' \times 40''$ , and double quad crown  $40'' \times 60''$ ; and that almost any required appearance can be produced by varying the 'finish'.

The sizes of paper commonly used in book-work with the size of an octavo page produced by them are as follows:

	<i>Double.</i>	<i>Quad.</i>	<i>Page of 8vo.</i>
Foolscap	$13\frac{1}{2} \times 17$	$17 \times 27$	$6\frac{3}{4} \times 4\frac{1}{2}$
Crown	$15 \times 20$	$20 \times 30$	$7\frac{1}{2} \times 5$
Demy	$17\frac{1}{2} \times 22\frac{1}{2}$	$22\frac{1}{2} \times 35$	$8\frac{3}{4} \times 5\frac{5}{8}$
Royal	$20 \times 25$	$25 \times 40$	$10 \times 6\frac{1}{2}$

Several other sizes are in use for other kinds of paper such as 'medium' ( $19'' \times 24''$ ) for various kinds of cover

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or wrapping paper, 'post' (16"×20") for writing papers, &c.

The nominal 'measure' of paper is 24 sheets = 1 quire; 20 quires = 1 ream, but printing paper is, as a rule, sold in reams of 516 sheets (= 21½ quires), and occasionally in reams of 504 sheets (= 21 quires). The 516 sheet ream has the practical advantage of allowing about the right amount (in a short run) for printers' wastage, to give 500 perfect printed sheets per ream.

Hand-made and 'art' papers are usually sold in reams of 480 sheets.

The substance of paper is usually indicated by the number of pounds weight to the ream; hard paper, of course, on account of the closeness of the fibres, weighing more in proportion to its thickness than the softer varieties. Thus a quad crown (30"×40") paper such as is used in ordinary books may weigh anything from about 50 to about 120 lb. per ream. If it is a hard and dense paper it will probably weigh from 80 to 120 lb.; if a light and soft kind, such as is generally used in novels and books in which 'bulk' is regarded as more important than durability, from 50 to 90 lb. The so-called 'art' papers, the surface of which is coated with china-clay to make it perfectly smooth and thus able to take a clear impression of the minute dots (80 to 160 to the inch) of which a 'half-tone' print is made up, are much heavier for their thickness than ordinary printing papers. They are also much less durable as the surface tends to flake off.

It may be worth remembering that in the case of an octavo book and using 'quad' paper, the commonest size for ordinary work,

$$\frac{\text{number of pages of book}}{32} = \text{reams required per 1,000 copies.}^1$$

If this be remembered it is easy to calculate the paper

<sup>1</sup> If the ream is not 516 a small allowance must be added for waste.

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required when other sizes of either book or paper are under consideration. Thus:

(a) If either the book is in quarto or the paper is 'double' instead of 'quad', then in each case twice the number of reams will be required.

(b) If either the book is in 16mo or the paper is 'double quad', then in each case half the number of reams will be required.

Thus 1,000 copies of a book of 256 pages (including, of course, all preliminary pages, &c., which are generally paged separately), in 8vo printed on quad crown paper will take

$$\frac{256}{32} = 8 \text{ reams.}$$

2,500 copies of a book of 360 pages in 8vo printed on double quad crown paper will need

$$2.5 \times \frac{360}{32} \times \frac{1}{2} = 14\frac{1}{8} \text{ reams.}$$

500 copies of a book of 256 pages in quarto on double demy paper will need

$$\frac{1}{2} \times \frac{256}{32} \times 2 \times 2 = 16 \text{ reams}$$

Various well-meant proposals have been made for simplifying the apparent complexity of paper sizes and measures, such as that all papers should be sold by the 1,000 sheets,<sup>1</sup> or that the sizes should bear some definite proportions to each other, but most of such apparent simplifications would be bought at great loss of practical convenience. One ingenious proposal may,

<sup>1</sup> An agreement was reached in 1925 between paper-makers and printers that this new unit should be adopted, but we shall see! Since printers' wastage cannot be eliminated, either the unit of paper must be irregular—a few sheets over even hundreds—or the number of perfect copies produced of anything printed must be irregular. It is more convenient to a publisher that his edition of a book should consist of 1,000 copies than, say, 983, and the person who pays the piper proverbially calls the tune.

however, be mentioned, that of Mr. Alfred Watkins<sup>1</sup> of Hereford, who has pointed out that if the sides of an original sheet are proportioned as 1 :  $\sqrt{2}$ , then however often one folds it by doubling, the proportions of the resulting leaf are unchanged, and that this particular proportion is an excellent one for most kinds of book. He therefore suggests that all sheets should be so proportioned. The only objection to this proposal is that the power to vary the shape of page according to the particular matter which it is desired to set forth is of great practical value, and that it would be very foolish to forgo it for the sake of a theoretical uniformity.

<sup>1</sup> Well known to all photographers for his exposure-meters and other excellent devices.

## Chapter Nine

### THE DECORATION OF BOOKS

IT is no part of my purpose to attempt here an account of book-decoration from the aesthetic point of view. That is an interesting but intricate subject which in no way concerns us; but a few notes on the more material side of the matter may be of use, though for the avoidance of complication they must be limited to English work.

It is necessary, in the first place, that we should distinguish between decoration and illustration. The former is intended primarily to beautify the book in which it is used, and it must therefore always be regarded in close association with the typography and general appearance of the work, and is more or less successful according as it harmonizes well or ill with this: the latter is intended primarily to elucidate the text or to place the reader in a better position for visualizing the events narrated, and is to be judged on its success in this aim and on its merits as an independent work of art. At the same time, however, it must be confessed that one cannot by any means always keep these two sorts of embellishment separate, for there are many things to be found in books which partake in some degree of the characteristics of both. Even here, however, one or other quality is generally predominant.

There is besides these, still a third variety of ornament to be found in printed books, those devices, coats of arms, &c., which are intended both to add beauty, or at least distinction, to the work and at the same time to identify it with a particular printing or publishing house, or sometimes in the case of coats of arms, &c., with a particular patron.

Like most other things in printed books, the idea of