It is a necessary consequence of the connexion existing between different branches of manufacture, that no one of them can receive any notable increase or advancement without benefiting many of the others. Thus, the spur which was given ten or a dozen years ago to popular reading by the establishment of works issued at a small weekly price, and many of them illustrated by wood-engravings, has been the means of inducing changes and eliciting improvements in nearly all the arts connected with publishing:—wood-engraving, paper-making, printing, bookbinding—all have been affected by a moving-power which at first sight might appear a trivial one. Some of the works now published at a penny or three-halfpence weekly can vie with the costly works of bygone years in illustrations, paper, and printing; and those persons who were schoolboys in the days when schoolboys were whipped through 'Vyse's New London Spelling-book,' will not fail to see how rapidly such books are assuming the neat gilt-lettered cloth covers of modern times in place of the nank-een 'room' of past years.

In one of our early volumes a sketch, under the title of 'The Commercial History of a Penny Magazine,' was given of wood-engraving, paper-making,type-founding, stereotyping, and printing, sufficient to convey a popular notion of those departments of 'bookmaking;' but the subject of Bookbinding was touched upon so slightly as to leave ample room for the present article. The mechanical and social economy of a large bookbinding establishment at the present day are of much interest; and we have been favoured by Messrs. Westleys and Clark with the requisite facilities for presenting the details which will now occupy our attention.

Any one who knows London intimately is aware that many of our large factories are so hemmed in on all sides by houses as to be scarcely visible externally. Such is the case with the building now under our notice. It is a large pile, built expressly for its present purpose, and presenting much the appearance of a cotton-factory; yet we can scarcely catch a glimpse of it till nearly close to its walls. To say that it is situated in 'Shoemaker Row' will not perhaps convey a very precise idea of its locality to the mass of readers; and we must therefore be content with saying that it has Ludgate Hill a little on the north, Doctors' Commons a little on the east, and Apothecaries' Hall a little on the west. The building is six stories or floors in height, and has an extensive range of windows from north to south, with an entrance in the middle. Into this entrance we will suppose the reader to accompany us.

Each floor of the building is in general appropriated to one class of operations, under the superintendence of a foreman, who is responsible for that department. A winding quadrangular staircase extends up the centre of the building from bottom to top, with landing-places, at which are several doors leading to the workshops. The basement story consists of many rooms occupied as warehouses, or for processes wherein heavy machines are employed. Thus, one room is the 'board warehouse,' where the mill-board, purchased from the stationer in sheets of various sizes and thickness, is deposited in classified recesses till wanted. Another is the 'cloth-warehouse,' where the cotton-cloth, now so extensively used for covering books, is kept and cut to sizes. Near this is the 'embossing warehouse,' filled with pieces of leather or cloth which have received some of those ornamental devices to be described hereafter. One room, which we will call the 'cloth-cylinder room,' contains two machines for imparting to cloth the diamond or granulated or speckled appearance usually presented by books in cloth boards; an appearance which nearly hides the
rectangular interlaces of the warp and weft threads. The ‘embossing shops,’ on the same range, contain three powerful machines for giving to the flat covers of books those beautiful devices which now so often distinguish them: if the book be a Bible, we have an emblematical device of a religious character; if it be a ‘Shakspeare,’ we have something pertaining to the great dramatist; if it be a lady’s album or portfolio, or letter, or blotting-book, the device will be graceful and ornamental character. This is an approach towards what may perhaps be termed a ‘principle’ in bookbinding, viz. that the subject of a book may be known from its cover; a principle which seems to have much to recommend it.

On ascending to the ground-floor, or that which is nearly on a level with the street, the hum of voices tells us that a numerous body of workpeople of both sexes are here employed. In the counting-house of the principals is one of those simple but valuable clock-sets for saving time, now so much employed in large factories; we mean a series of ‘speaking-tubes.’

Tubes pass from this room to the counting-houses or offices of all the foremen above and below stairs, and with these are associated a range of bell-wires; a bell is first rung, which draws the attention of the foreman to his end of the tube; and a message being then whispered or spoken through the tube, he hears it readily, and gives the necessary reply. All the tubes are inscribed with the names of the department to which they belong.

The main portion of this floor is occupied by the ‘boarding-shop,’ a technical name for the shop wherein all the operations are conducted for binding books in cloth boards, the most prevalent style at the present day. In one part of this room females are engaged in folding the sheets, gathering them into groups, sewing them into the form of a book, &c.; while in other parts are men pursuing the subsequent operations of gluing, pasting, cutting, hammering, pressing, &c., by which the book is brought to a finished state. This is a very busy scene, and presents much employment in the distinct nature of the processes carried on. In many branches of manufacture it is found convenient to locate the workmen according to the kind of labour required; but in bookbinding on a large scale it is found desirable to classify with respect rather to the style in which the book is to be bound, than to the nature of each individual process. Hence nearly all the workpeople required for binding an extensive order of books in boards are here congregated on one floor—books, whether bound in cloth or in leather, are prepared here. The large room exhibits nearly similar features to that below stairs; females, in one department, are forwarding the earlier operations; and men, in another department, are finishing the volumes. Our frontispiece represents the appearance of this room.

Another room on the same range, known in the factory as the ‘Pinnock’ room, affords us a curious insight into the amount of sale which popular works sometimes command. This room is appropriated to the sewing and covering of the little ninepenny books called ‘Pinnock’s Catechisms.’ Of these small productions the sale is so large and so uninterrupted, that the processes of sewing and covering them proceed continuously. The numbers sold must be enormous; and indeed a glance through the operations of this range of the factory shows that such school-books as are so fortunate as to obtain a ‘name’ command an extent of sale scarcely equalled by any other kind of literary productions, with the exception of Bibles and Prayers. ‘Goldsmith’s England,’ ‘Rangere’s Questions,’ ‘Carpenter’s Spelling,’ and other school-books, were piled in such heaps and groups in various stages of preparation as to indicate pretty clearly to us the extent of the demand. What improvements these books may have received from time to timeas literary productions, or may be susceptible of receiving hereafter, is no part of the present subject; but externally they have marched with the march of the times, and have yielded to the bookbinding reforms of ‘embossed-roan’ and ‘cloth-lettered.’

The fourth range of the factory is occupied by the ‘extra’ workmen; that is, those who are employed on the finer kinds of binding, such as Bibles and Prayers, gilt-edged books generally, and books exhibiting all the costly and elaborate varieties of ‘Russia,’ ‘Morroco,’ and ‘Calf’ binding. One shop, called the ‘extra-forwarding shop,’ is occupied by the folders, presseurs, sewers, &c., while the ‘extra-finishing shop’ sufficiently explains itself.

In the two upper floors of the factory are numerous rooms more or less subsidiary to those below stairs. One or two are ‘blotting-shops,’ for lettering and ornamenting the covers of books; another is occupied by the men who make cloth-cases for books; in another, the edges of books are gilt. One is the ‘leather-warehouse,’ where all the various kinds of leather are kept, as procured from the leather-dresser, and cut to the required sizes. Another is the ‘Annual’ shop, in which the Annuals are bound at the particular period of the year when they are wanted. One of the rooms is termed the ‘Coutchouse-shop,’ as being devoted principally to those workmen who produce the ‘bouconic or Indian-rubber binding; and there are a few others, which are used, or not, according to the amount of business fluctuates at different seasons.’

Among several indications of a well-arranged factory, we noticed one which is always pleasing wherever observed. Many of the superintendents and workpeople appear to have been old standards, to have grown old with the growth of the factory, and to have shared with the proprietors the progress and fluctuation to which all manufactures are subject. This is a feature that we had occasion to notice in reference to large factories, and is one of considerable importance to the well-being of both the employers and the employed.

Having thus glanced at what we may term the factory-economy of the establishment, let us next endeavour to follow the routine of processes, so far as to give the reader some idea of how a book is built up after it leaves the hands of the printer. We shall for this purpose classify the various operations in three groups, according to as they relate—1st, to making-up a book; 2nd, to covering a book; and 3rd, to decorating a book. A bookbinder would probably object to this
mode of classification; but we think it will meet the wants of the reader better than a more technical mode of arrangement.

1st. Making-up a book. It must be obvious to all who reflect that a book is printed in large sheets that these sheets must be separately folded and then connected together, before they can assume the form of a book: if we open, without cutting, a number of the 'Penny Magazine,' or of 'Chamber's Edinburgh Journal,' we see that the eight printed pages are so arranged, as to follow in proper order when the sheet is unfolded in a certain manner; and if, as in the 'Mirror,' or 'Chamber's Information for the People,' there are sixteen pages in a number, the arrangement of these pages appears singularly confused when the opened sheet is inspected; but here, as in the former case, the pages are arranged solely with reference to the order of sequence when folded. Each sheet has at the bottom of the first page a letter, figure, or other symbol, called a 'signature,' intended to assist in arranging sheets properly in the volume.

The printer sends the sheets to the binder (we are speaking of bookbinding on a large scale) in large heaps or groups, arranged in one of two forms: either the many copies of one sheet, or ten or twelve sheets of one volume, form the group; in the latter case the heap is called a gathering, or quire; but we will suppose the former to be the case, as it will enable us to speak of the gatherers. The heap of sheets passes to the hands of the folders, who are, as we believe, almost invariably females. Each folder sits before a flat table or bench, on which she spreads out the sheets in succession. In her right hand she holds a small ivory or bone folding-knife, with which she flattens the foldings of the sheet. Every successive sheet of the group is folded in precisely the same way as that which preceded it, so that no particular skill is required in adapting the various sheets one to another; but the folding is nevertheless a process requiring much accuracy, especially in the finer kinds of binding, as the sheet is folded so as to make the top and bottom lines of the print range, without reference to the edge of the paper. The sheet is placed with the signature towards the left hand of the folder, on the under surface; and the foldings are more or less numerous according as the book is folio, quarto, 12mo., 16mo., 18mo., 24mo., 32mo., &c., terms, which relate to the number of printed pages in one sheet.

Supposing a group of signature A to be thus folded, another of signature B, and others, to the extent required for the volume, these will have to be 'gathered' into volumes at the next process. This gathering is simply breaking up the groups hitherto existing, and re-arranging the same sheets in the order necessary for the volume. Instead, for instance, of having twenty copies of one sheet, such as that with the signature A, one of A is taken, then one of B, then one of C, and so on, until there are as many groups as volumes, and each group containing the sheets for one volume. This 'gathering' is in most cases done by the printer before the sheets pass into the hands of the bookbinder.

The 'collater' now takes the group of sheets in hand and examines them to see if they occur in proper order, that no duplicates occur, that no sheet is wanting, that the folding is correct, &c. This is a process in which much expertise is shown. The group is bent at one corner, and the sheets allowed to spring back, successively, leaving to the eye just sufficient time to catch the signature at the bottom of the first page of each. If these signatures occur regularly, according to the letters A, B, C, &c., or the figures 1, 2, 3, &c., or any prescribed combination of both, then the arrangement is correct; if not, any error is immediately adjusted.

When the book of loose sheets has been thus made up, the sheets are either at once sewed, or are previously beaten or pressed, according as the work is to be 'in boards' or 'bound.' It is well known that a bound book is more dense and compact than one in boards, and this difference is mainly due to the process immediately preceding the sewing. Until recent times the sheets were separated into small groups, called 'sections' or 'beatings,' and beaten with a heavy hammer till greatly compressed; but modern invention has marked out a much more effective mode of proceeding. The rolling-press is a machine in which two rollers, worked by hand, are made to rotate nearly in contact; a man places a small number of folded sheets between two tin plates, and passes them between the rollers, on the other side of which they are received by a boy, who places the pressed sheets in heaps, and returns the tin-plates to the man. Independent of the saving of time and of muscular exertion, the rolling-press is found to be more efficacious than the hammer in producing less 'set-off,' or transference of ink from one page to another.

The sheets are placed for a short time in a standing-press, and are then again collated, to see that no disarrangement has occurred; any plates, too, which may be interspersed among the text, are now inserted. The seoer now sews the sheets to strings or bands at the back; but if the strings are to be rendered invisible, a saw-mark is made for the reception of each. The group of sheets is fixed tightly in a press, with the back edges uppermost, and a few shallow cuts are made with a saw, at right angles with the length of the book.

A sewing-press consists of a flat bed or board, from which rise two end-bars, connected at the top by a cross-bar. Three or more strings, according to the size of the book, are fastened by loops to the cross-bar, and are tightened down by a simple contrivance at the lower end. The seoer, seated somewhat obliquely in front of this machine, with her left arm passing round the left vertical bar (as seen in the annexed cut), proceeds to sew the various sheets to the bands, her left hand being behind the strings, and her right hand

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before: Each successive sheet is laid flat on the bed of the sewing-press, with the back edge in contact with the strings, then opened in the middle, and fastened to the strings by passing a threaded needle backwards and forwards through the central fold of the sheet; each thread, after passing from the inside to the cut, being made to loop or twist round one of the strings before entering the sheet again. As soon as one sheet is fastened to all the strings, another is laid down on it, and fastened in a similar manner. A curious kind of stitch, called a 'kettle-stitch,' is made near the top and bottom of the book, as a means of allowing the thread to pass on from one sheet to another. Nonprofessional readers may be safely puzzled to know what 'kettle-stitch' means; but we can only say that it is supposed by some to be a corruption of 'catch' or 'ketch,' while others refer it to 'chain' stitch. Those who would attempt to trace the etymology of technical terms and phrases would soon find themselves in a sea of mystery both wide and deep.

The operation of sewing is conducted with great rapidity, since a female can sew two or three thousand sheets a day. Many modifications of the process occur, according to the size of the book and the style of binding. Thus, the number of strings may be only three, or may amount to eight or ten; or instead of strings, strips of vellum or of parchment are sometimes used. In some cases the needle passes through eight thicknesses of paper, in others six, in others four, in others two; according to the size of the sheet, the number of pages in it, and the mode in which the parts are arranged. It is a fortunate circumstance, considering the very limited number of appointments for females in this country, that there are several departments of bookbinding within the scope of their ability. The greater part of that which has hitherto engaged our attention is intrusted to females; and in a large bookbinding establishment employment is thus afforded to a considerable number. This firm, for instance, in a busy season, gives employment to about 200 females, whose weekly earnings average from 10 to 15 shillings; and where a supervision, at once kind and indulgent, is exercised by the principals, an honourable subsistence is thus afforded for those who might have no other resources to fly to.

While speaking of making-up a book, we must remark that caoutchouc or India-rubber binding requires no sewing. The sheet is cut into separate leaves, and these leaves are retained solely by a cement of caoutchouc applied to their hinder edges. The leaves are allowed to assume a round contour at the back-edge by placing them in a kind of mould or gauge shaped for the purpose; they are then rasped, to give a slight roughness for retaining the caoutchouc afterwards applied. A flexibility is produced by this kind of binding, greater than can be presented by a sewed book; while at the same time the caoutchouc cement is so retentive as to bind every single leaf firmly. This new mode of binding was introduced a few years ago, and is valuable for many kinds of volumes.

2nd. Covering a Book. We have now made up the sheets into the form of a book, and have connected them together. Whether the volume is in elegant 'leather bound,' in 'cloth bound,' or in 'paper bound,' the sheets are brought together in such a manner as we have attempted to describe above. Here we shall commence the second of the three sections into which we have thought it proper to classify the operations. The 'cover' of a book, in bookbinders' phraseology, is the piece of leather or of cloth which envelopes the millboard; but the reader of a book, when he speaks of its cover, gives the term a much more extensive application. We must therefore at once explain that, the leather or cloth is called the cover, the stiffening substance within is the board, and both taken collectively the case.

When the book is taken from the sewing-press, an inch or two of each string is left hanging to it; these are afterwards either scraped so thin as to be but little conspicuous, or are employed for fastening the book to its case. The back of the book—that is, the assembled back-edges of all the sheets—is glued, to increase the bond by which they are held together. When the book has gone through one or two other minor processes, that one succeeds which is perhaps as remarkable as anything displayed in bookbinding; viz. rounding the back and hollowing the front. Most persons can understand the production of a square back and edge to a book; but the graceful convexity of the one and concavity of the other, in most books bound in the modern style, are as curious in the mode of production as they are pleasing in appearance. In the process of ‘hollowing,’ by which this effect is produced, the book is laid on a bench, held or turned by the left hand of the workman, as shown in the annexed cut, and hammered near the back edge, with such a peculiar movement of the left hand as causes the back to become rounded while the hammering proceeds. The effect is so instantaneous that a looker-on scarcely knows how or when it is produced. The state of the back is such as to enable the sheets to yield to the rounding action of the hammer, being coated with glue not yet dried; and the subsequent drying of the glue retains the sheets permanently in the position which they thus acquire.

It may perhaps have occurred to many a reader, that, as the board of a book is frequently of considerable thickness, it is likely to project beyond the back and to form a stiff and inconvenient hinge. This is prevented by a very simple contrivance, adopted at the time when the book is ‘backed.’ It is placed between two pieces of plank called ‘backing-boards,’ the hinder edges of which are placed precisely where the two hinges of the book are to come. The book with the boards thus placed, is then squeezed tightly in a press, with the back edge uppermost; and the back being thus again hammered in a round form, a portion of edge projects over the boards, so as to form a kind
of groove into which the millboard may afterwards conveniently be adjusted.

The reader will bear in mind that the edges of the book are all at this time rough and uneven; but the time has now come when these edges must be brought to the level and smooth surface which adds so much to the beauty of a book. There are a few minor processes carried on about this time; but the plan of our article requires that we should notice only those of most prominent importance. In former times the edges were cut in a most clumsy and rude manner by means of shears, one blade being fixed to a bench, and the other being moved by the right hand of the workman, while his left hand held the book, and thus the leaves were cut a few at a time. The cutting of the edges was partly effected by this method, and partly by drawing the edge of a sharp knife along the leaves, guided by the edge of a board. The 'cutting-press' of the present day is however a much more effective arrangement: The book, after being properly adjusted between two boards, is screwed in a press, with one of the ends projecting a little above the level of the bench. The ends of all the leaves are then cut off while in this position, by means of an instrument called a 'plough,' the cutting edge of which, in its mode of action, is midway between that of a pointed knife and a plane-iron. The edges are all cut to a perfect level; and the book being reversed, the other end is similarly treated. But by far the most remarkable part of the process is the concave front edge which the concave front edge is brought to such a regular curve. Most persons who have thought on the matter at all may have conceived that this concavity is produced by scooping out a portion of the back, and indeed the circumstance of the concavity being just the same in degree as the convexity of the back has given rise to many sage conjectures wholly wide of the truth. The glue with which the back of the book had previously been coated is so far softened as to suffer the bands and the back edges of the sheet to yield to pressure; and this is followed by an operation which makes a stranger fear that the round back of the book is destroyed for ever. The workman takes the book in his hand, first bringing the uppermost, and strikes the back forcibly against the edge of a board, thus transforming the round back into a square back. Then, using some contrivances to keep the sheets in this position, he drives the book in the cutting-press, and cuts the front edge in precisely the same way as the top and bottom; and thus making all the edges perfectly square, and all the leaves perfectly equal in size. The most remarkable part of the operation then succeeds; for immediately on removing the temporary fastenings from the book, the whole of the leaves spring back to their former position, that is, convex at the back edge; and the slightest consideration of the nature of curve will make it manifest that, as all the leaves are made perfectly equal in the cutting-press, a convexity at one edge must be accompanied by an equal concavity at the other. Hence it is produced the hollow or 'gutter' of the front edge.

In this, as in other parts of bookbinding, the process is modified to suit different circumstances. Books in boards are either not cut at all at the edges, or are only partially cut; while bound books are carefully cut at top, bottom, and front edges.

We next turn our attention to the boards, which are permanently attached to the book in different stages of its progress towards completion, according to the nature of the binding. Millboard, the stiff substance of which the sides of books are formed, is a thick paste-board composed of many parallel layers, glued or pasted together, and pressed in a mill to make them dense and smooth. The sheets are of various sizes and thicknesses, according to the size of book for which the glues two together, to produce a board of double thickness. From the large sheets the smaller pieces are cut to form the sides of the books. In the first place, a pattern-piece, or size-pattern, is prepared, having the exact size and form of the boards to be cut. The cutting-machine is then adjusted to these dimensions, by causing an edged instrument, analogous to a scissor-blade, to work at a certain distance from a groove or raised ledge, against which the edge of the board is placed. The actual cutting is effected, as here represented, on the same principle as by a pair of shears; but the arrangement of the machine enables the pieces to be cut with perfect accuracy, both as to size and to rectangular form.

The boards are cut by the same machine, whatever may be the department of the factory where they are to be used; but the period of adjusting them to the book depends on circumstances which we may now explain. If a book is put into 'cloth boards,' or is 'bound in cloth,' the cloth cover is attached to the boards before the latter are attached to the book; but if the book is 'bound,' or 'half-bound,' in leather, the boards are first attached to the book by means of the strings, and the leather cover is pasted on afterwards. In the one instance the cloth is cut from the rolls to the required size in the cloth-warehouse, and banded over to the 'cloth-case maker,' in the other, the leather is cut from the skins in the leather-warehouse, and consigned either to the binders or to the embossers.

A 'boarded book' is attached to its covers almost entirely by the boards being pasted to the blank leaves, or 'end-papers,' placed by the binder at the beginning and end of the book. The 'cloth case' is first prepared by pasting the cloth upon the boards, placed sufficiently wide apart to allow for the thickness of the book, and the case, thus made, is attached to the book by the back of the book being covered with stout linen and afterwards fastened to the case; the end-papers are then glued to the boards.

In a bound book, however, the process is different, and more carefully conducted. The boards being adjusted to the proper sizes, the back of the book rounded, the edges cut, holes made through the boards opposite
to the strings, and the strings of the proper length, the boards are fastened to the book by passing the ends of the strings through the holes and pasting them down. The 'hollowness' in the backs of some books depends on a cause independent of the fastening of the bands or strings. If we open a 'hollow-backed' book, we shall see that the leather or cloth cover springs away from the back edge of the sheets; whereas other books appear to have the leather firmly attached thereto. This difference arises simply from the interposition of a doubled layer of paper or cloth between the back and the back edge of the sheets: this layer helps to strengthen the book, and, at the same time, admits of the back being made close or hollow, according as the two layers of paper are or are not made to adhere together. If we suppose a hollow cylinder of paper to be pressed flat, and one side pasted to the back edge of the sheets, while the leather cover is pasted to the other side, we shall have some idea of the nature of a 'hollow back.'

When a book, attached to its boards by means of the bands, is ready to receive the leather covering, the leather is cut to the required size, allowing about half an inch all round for paring and turning in. The edge is pared or cut away obliquely with a keen knife, to prevent the uneven projection which would otherwise result. If it is to receive any of those decorations which add so much to the external beauty of a book, the imprinting of the devices is done partly before and partly after the leather is attached to the book, as we shall explain further on. But the mode of pasting the cover on the book is the same in both cases. The leather is laid smooth with the face downwards, and the back surface well coated with paste. The workman then takes the book in his hands, lays the back evenly in the middle of the leather, and draws and smooths and works the latter until it adheres closely to the back and boards of the book. This is a process of very great nicety; for not only must the more obvious parts of the surface be closely covered, but the overlapping edges, the turning-in, the corners, &c., must all be finished with great exactness, or the book will be at once spoiled. It is one of those operations, so frequent in manufactures, wherein success depends on a nicety of manipulation, as incapable of being described as of being imitated without long practice.

There is one little appendage which we may notice here, viz., the head-band. Every one is familiar with the fact that his Bible has a little band or edging of silk at the top edge, where the paper joins the covers. This head-band is partly for service and partly for appearance; it helps to sustain the leather at the back of the book at the same level as the boards; and it gives a neat finish where slight imperfections might otherwise be visible. The better kinds of head-bands are formed of little strips of vellum or paste-board, with coloured silk twisted over and around them in the process of fixing them to the book; while the commoner kinds consist of a cord inserted in a doubled piece of coloured silk or cotton-cloth. We may also here mention the 'raised bands' which are sometimes used for ornament in the better kinds of books; they consist of little strips of leather or cord pasted across the back of the book before it is covered, and afterward painted and gild so as to contribute to the beauty of the volume.

3rd. Decorating a Book.—We have glanced through the more prominent operations by which the book is made to assume its compact, convenient, and durable form; omitting mention of many slighter manipulations which would neither suit our limits nor be intelligible to general readers. There is, however, a wide difference between a book thus prepared and as given in a finished state from the hands of the bookbinder. The edges of the leaves are cut; but they are white, neither coloured nor gilt: the boards are covered with cloth or with leather; but neither cloth nor leather is embossed or stamped, or gilt or lettered. As these adornments are subsidiary to the formation of the book itself, we have thought it better to group them by themselves, whether they are done before or after the cover is laid on the book.

First, then, for the edges. The majority of cut-edged books are treated in one of two ways—sprinkled or gilt; the first being the most general method for bound books; and the second for Bibles, Prayer-books, Annuals, and the higher class of bound books. The sprinkling is a singular process, and one which differs greatly from the idea which many may have formed of the matter. The edges of the majority of bound books present a speckled appearance, arising from a coloured liquid or paint being laid irregularly over them; and the peculiarity consists in the mode of producing the small spots. The colour is laid on, not with a brush, as in painting, but by the following contrivance:—A set of books, to be sprinkled of one colour, are ranged side by side on a shelf, in a recess shielded from other parts of the factory. A colour is mixed up, ofumber, umber, or any other cheap pigment, with water and paste, or size; it is now warmed in a large jar, and then strikes the handle or rim of the brush against a stick held in the other hand at a height of two or three feet above the books: the action is so vigorously worked as to cause a shower of spots to fall on the edges of the books; which spots are not so thickly congregated as to cover the whole surface, and are yet such as to have an equable appearance when finished. The mode of handling the brush is obviously the point on which the success of the process hinges. Some books have the edges marbled, instead of sprinkled; this is done in a manner similar to that observed in making marbled-paper, and is the work of a separate class of men.

The operation of gilding the edges of books is one which illustrates in a striking manner the dense and compact form into which the leaves of a book are brought by pressing and binding. The edge of a well-bound Bible presents a fine, smooth, glossy, and brilliant surface, so equable and uniform as to render the distinct leaves almost invisible; yet these leaves can be parted as easily as if the edges were not gilt, and each edge presents its fine and delicately-marked line of gold. Were not the leaves pressed together as compactly as a mass of wood, this effect could not be produced.

There is in the process of gilding edges, as well as that of cutting them, a necessity that the front and back of the book should be brought perfectly square before the operation. The leaf-gold could not be bent into the curvature of the 'gutter' if this were not temporarily made flat: the book is therefore brought to the required form (while the case or cover is yet in an unfinished state), held tightly in a press, and the edges scraped smooth with a straight-edged piece of steel, to remove all asperities left by the cutting-plough. The edge is then coated with a liquid composition of red chalk and water; and, while this is setting or partially drying, the gilding-tools are being prepared. The leaf-gold is blown out from the book in which it is sold by the goldbeater, upon a cushion covered with leather, where it is placed out smooth by means of a knife. Each leaf is then cut up into two or more pieces, according to the size and thickness of the book whose edges are to be gilt. On the work-bench is a cup containing white of egg beaten up with water, a little of which is laid, by means of a camel-hair pencil, on the still damp surface of chalk and water. The gold is then taken up, piece after piece, by a flat
camel-hair brush, and laid on the book-edge. This is done to all the three edges in succession; the book being turned round in the press to bring the successive edges uppermost. After the lapse of a very few minutes the gold has become sufficiently dry and set for polishing, a process which would seem calculated rather to buff every atom of gold than to polish it. The workman holds in his two hands a long-handed burnisher, at the lower end of which is fixed a very smooth straight-edged piece of hard stone; this he places on the gilt surface, and with his left elbow resting on the workbench, and the handle of the burnisher resting on his right shoulder, he rubs the gold with great force at right angles to the direction of the leaves. No gold is rubbed off, but the whole is brought to a high degree of polish; the compactness of the leaves being such as to allow no chalk-colour or egg or gold to penetrate between them. If the burnisher were worked in the direction of the leaves, the polish would not be so high. The boards of the book are during these processes turned back as far as possible; and when the gilding is completed, paper is wrapped round the gilt edges, to prevent the gold from being soiled in the subsequent finishing of the book.

The covers of books are decorated in a greater variety of ways than the edges: Roan-bound school-books are sometimes 'marbled' outside; a process which bears some resemblance to the sprinkling of the edges. A liquid composition of coppers, potash, water, and any common colouring substance, such as gum, is made. The books are opened, and hung over two bars, so that the boards may be nearly horizontal, and the leaves hang vertically downwards. The liquid colour is then dashed on somewhat in the way before explained, so as to cover the back and sides of the book; the spots or splashes being larger or smaller, according to the mode in which the brush is handled.

A mode of improving the appearance of Morocco leather for the covers of books is not a little striking. Whoever compares the appearance of a piece of Morocco in a slipper or a chair-cover with that presented by a well-bound book will perceive that the former has a series of irregular lines or grooves; whereas the latter has a regular granulated appearance. In our notice of the Leather Manufacture, in the Supplement for May, we explained how the wrinkled appearance of Morocco leather is produced; and have now to describe the simple contrivance whereby it is removed. The leather is first wetted and laid on a bench. The workman fastens to the palm of his right hand, by means of a strap passing over the hand, a large flat piece of cork. Then, doubling one portion of the leather over another, so as to bring two surfaces into contact, he gently rubs the upper fold of leather to and fro with the piece of cork; varying the extent and position of the doubling, and the direction of rubbing, so as to let every part of the surface be rubbed against some other part. The effect is very marked; for not only are all the wrinkles removed, but they are replaced by a kind of granulated surface, consisting of a uniform series of minute raised spots. When the leather has been allowed to dry, it retains this texture permanently, and is then applied to the covering of the book.

The cotton-cloth with which so large a number of new books are now covered has an ornamental character given to it in three different ways, either before or after it is applied to the boards of the book. One of these is the imprinting, all over the cloth, of a small and uniform pattern calculated to hide the barrenness and stiff uniformity of the threads in the cloth. If the reader has an opportunity of inspecting the backs of many cloth-bound books, he will see that there are a great variety of patterns thus given to the cloth. The process is as follows:—In the basement story of the factory which has been engaging our attention, are two machines for preparing the cloth, each of which consists of two cylinders rotating in contact by means of the usual machinery, as here represented. The cylinders are engraved with the...
to the boards; but the action of the machines and the nature of the device are the same in either case. The large embossing-press here represented, with its powerful horizontal wheel, its enormous screw, and the ingenious arrangement for heating the lower bed, is perhaps the most note-worthy machine in the factory.

When we compare a cloth-bound book, or the cheap embossed-roan Bibles now so much used, with an elegant morocco or russia-bound book, we see that the ornamental devices are raised above the common surface in the former case, and levelled below it in the latter. Hence a very different system of working is required. The name of blocking is given to the operation whereby the depressed device is given. This is either effected by a number of punches and other small tools used by hand, or by means of a small blocking-press. In the 'extra-finishing' shop, a name given to the shop where the higher class of books receive their ornamental devices, are several tripods or standing frames, which act as gas-stoves. A jet of gas is so placed as to heat a central compartment, into or against which the tools are placed, whether for lettering or ornamenting, whereby the blocking, or rather 'tooling,' is effected. Sometimes the depressed device is not coated with gold, in which case it is called 'blind-tooling;' in others, gold is laid on the book, and then stamped down with the heated tool. The workman has a vast number of tools, such as rounds, squares, points, scrolls, diamonds, lines, letters, &c., the combination of which, according to the taste which he is enabled to display, produces a pattern. The book is laid on a bench, with its back or sides uppermost, according to the part under operation, and the workman presses the heated tools down on the level surface, leaving a device which is at once depressed and polished.

In large or elaborate devices he has a paper pattern for his guidance.

When the device is to be gilt one, the leather requires certain preparatory processes to fit it to retain the gold. It is first coated with size, then two or three times with white of egg, and lastly slightly touched with a piece of oiled cotton at the time the gold is laid on. The gold is laid on in slips of greater or lesser size according to the pattern; and the heated tools are immediately impressed on it, whereby the gold is made to adhere permanently to the leather. The loose or superfluous gold is then wiped off with a rag,—which rag, we may remark, becomes an article of no small value in the course of time.

All that we have here said of ornamental devices applies equally to the lettering of a book. Where, however, it may be done conveniently, the punches or small devices, instead of being fixed in handles and used singly, are fixed, by means of glue and cloth, to a metallic plate, and thus impressed on the book at one blow by a press. This is then called 'blocking.' In the 'blocking-shop' are drawers and boxes filled with various small devices in brass, which the workman combines according to his taste, and fixes to a flat block or plate. The plate is attached to the upper bed of a press, heated by means of gas within; and the case of the book being introduced beneath, the block is let down on it, and imprints the device, whether it be gilt or 'blind.' Where a fillet, or line, or running sprig forms part of the ornament on the back, sides, or edge of a book, it is frequently done by a wheel or 'roll' in the manner here represented. The edge or periphery of the wheel has the device in relief, and this, being wheeled along carefully over the surface of the book, leaves a corresponding depression.

Such are the principal modes by which a book is decorated. We have been able merely to give a type or general representation of each, and must necessarily pass over minuter shades of operation. The costly bindings in velvet and silk, the gold and silver clasps of expensive Bibles, and all the niceties which the connoisseur in book binding regards with such an admiring eye, we must pass over in silence.

It remains only for us to acknowledge the courtesy of Messrs. Westleys and Clark, which has enabled us to give this brief sketch; and we cannot conclude without again bearing testimony to the excellent moral effects that the manner in which their establishment is conducted produces upon the persons of both sexes who are in their employ.