Chapter III

PRACTICAL ASPECTS OF BINDING

3.1 INTRODUCTION

A full binding department is always one of the largest departments in any printing press. The book-binding is a very vast field covering from the most simple binding operations of cutting and folding to the complex letter press and stationery binding with gilding, marbling and gold embossing. Most of the operations in small binding houses are performed manually by the persons called 'Binders'. In the large binderies, high-speed automatic binding machines are in extensive use making most of the operations fully mechanized.

3.2 CLASSIFICATION¹

There are variety of products like folders, leaflets, booklets, catalogues, journals, magazines, books, letterpads, diaries, stationery and index books, labels, tags, registers bill books and receipt books etc., that are given the final shapes in a binding department. The methods of binding and producing these jobs can be broadly classified as

(1) Cutting and folding

(2) Folded sheet or section binding

¹Mendiratta, (1990), Binding and Finishing, Prinetex Publications, New Delhi, p.8.
(3) Adhesive binding

(4) Loose leaf binding

Further detailed classification of these heads are shown in a chart 'Classification of methods of binding'.
3.2.1 Cutting & Folding

Through cutting and folding, the large printed sheets of paper are reduced to a handy size either only by cutting or by cutting and folding. The leaflets, hand-bills, labels, letter heads etc. printed singly or in two or more ups are trimmed to the exact size. The folders, maps, charts, covers and many other information literatures are trimmed and folded according to the scheme of imposing and printing, which may be later either fixed in the books or used separately.

3.2.2. Folded sheet or Section Binding

The binding of pamphlets, journals, magazines, periodicals, annual reports, books, registers etc. fall under this category. The sheets containing eight or more pages printed on i: are folded in the form of sections, assembled in proper sequence and then stitched or sewn according to the style of binding. This is known as folded sheet or section binding. The section binding is decided into the following two groups:

1. Stitching
2. Sewing

Stitching is the simples: and the fasted method of securing sheets. Wires and threads can be used for this purpose. When the sections are inserted in one another, the stitches are made in the centre and are generally visible at the spine of the assembled sections. This method is called ‘Centre stitching or Saddle Stitching’. The publications having upto 64 pages are normally centre stitched and having more than 64 pages are side stitched. The

---

2 Ibid., p.9.
books in which sections are held together by the sewing thread passing through the back of each section are called ‘Section Sewn Books’ and the method is called Thread Sewn. The section sewn books will have flexible cover made of some strong paper, cloth or rexine, but most of them have hard covers made of board and suitable covering materials. The hard case binding is sub-divided into a) Letter press binding and b) stationery binding.

Letter press binding is the name given to all reading books, whether they are printed by letter press, offset or gravure process. The letter press binding may be classified as edition case binding, extra letter press binding and library style binding. The majority of books having stiff cloth covers are bound in this style, which is also referred to as ‘Publishers Edition Case Binding.’ Extra letter press binding is slightly superior class of binding making use of extra operations and extra materials and thus known as extra press binding. Library style binding is exceptionally strong and more durable binding and as the name denotes, it is used for library work.

Stationary binding is the name given to all books which are primarily meant for writing, such as account books, blank proformances, cheque books and exercise note books etc. Some of the books and exercise note books have typical styles of binding called the ‘Flush Binding’.

The following are the styles of covers or the methods of covering used in hard-case binding.

1) Quarter Bound
2) Half-bound
3) Three-Quarter Bound
4) Full Bound
A still cheaper quality of full binding called ‘YAPP BINDING’ is used for religious books like Bibles, small dictionaries and diaries. No boards are used and the covers are flexible in this style. These books have extra squares of the pulp board cover fullbound with round covers called the ‘Yapp Edges’. This style is also known as limp Binding.

2.2.3 Adhesive Binding

It is one of the fastest and cheap methods of binding for the mass production of books. Adhesive binding methods vary, but usually the folded and gathered sections of the books are trimmed from the back, to convert all the signatures into loose leaves. A special type of flexible adhesive is applied at the trimmed spine and drawn over with a suitable cover after the adhesive has dried at the back. A second layer of adhesive may be applied at the spine for attaching the covers.

2.2.4 Loose Leaf Binding

In this method, loose sheets are secured together by gripping the sheets from the back edge by means of some springy or mechanical devices. The loose leaf binding is employed in account books, catalogues and works where the loose sheets are to be arranged in one particular order. In some of the loose leaf books, it is possible to remove sheets or add leaves exactly where they are required without an additional expenditure on binding.

2.3 Warehouse Work

The elementary operations of binding such as jogging and knocking, counting, folding, gathering & collating, stitching, cutting, shitting and
trimming are performed in some of the warehouses where receiving, storing, checking and issuing the paper to the printing and binding sections are made.

**Jogging and Knocking**

It is a single operation completed in two stages. It is the method of piling the sheets into neatly laid edges. It is one of the most important operations in the binding department. The non-stop feeding of sheets on any automatic machine mainly depends upon exactness of jogging and knocking. A bunch of sheets are held in between thumb and forefingers from the two opposite corners by both the hands, turned upward so that the edges get fanned, pressed and stretched to allow the air to be filled in between the sheets. The air-filling separates each sheet and facilitates in knocking. The edge of papers towards the binder is knocked against the table top to align them plane parallel. The same process is repeated. The jogging and knocking of sheets can also be done with the help of automatic machines meant for the purpose. The following table shows the average speed of jogging and knocking by hand.

<table>
<thead>
<tr>
<th>Sheet size</th>
<th>Average speed per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0 (841 x 1189 mm)</td>
<td>2500 sheets</td>
</tr>
<tr>
<td>A1 (594 x 841 mm)</td>
<td>3000 sheets</td>
</tr>
<tr>
<td>A2 (420 x 594 mm)</td>
<td>5000 sheets</td>
</tr>
<tr>
<td>A3 (297 x 420 mm)</td>
<td>10000 sheets</td>
</tr>
</tbody>
</table>

---

\(^3\) Ibid., p.12.
Counting

The sheets received from the printing department are first of all counted in the binding department to ensure that each form is complete in its quantity. It is most important because even if one sheet is less, it causes shortage of one complete book in binding. In manual counting the binders count 4 to 5 sheets at a time and arrange them in piles of 100, 250, 5000 or 1000 sheets stacked on each other. In the modern and large binding houses, counting is due with electronic counting device filled against one corner of the pile. The sheets are counted from top to bottom of the pile in a few minutes time only. The following table shows the scale for counting sheets by hand:-

Table 3.2
Scale for counting sheets

<table>
<thead>
<tr>
<th>Sheet size</th>
<th>Average speed per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0 (841 x 1189 mm)</td>
<td>5000 sheets</td>
</tr>
<tr>
<td>A1 (594 x 841 mm)</td>
<td>6000 sheets</td>
</tr>
<tr>
<td>A2 (420 x 594 mm)</td>
<td>8000 sheets</td>
</tr>
<tr>
<td>A3 (297 x 420 mm)</td>
<td>10000 sheets</td>
</tr>
</tbody>
</table>

Folding

It is the process of converting large size sheets into a smaller size folder or section without disturbing the sequence of pages and to ensure that the margins are correct. A folded sheet of paper is known as a section and its folded, unopened edges are called “Bolts”. There are two basic ways of folding a sheet of paper namely,

a) Right Angle or Cross Folding and

b) Parallel Folding.

Parallel Folds / Right Angle Fold

The sheets may be folded either by hand or with the help of folding machines. The hand folding is a slow process and these methods of hand folding is commonly employed such as folding to paper, folding to print, lump folding.

Figure 3.1
Gathering and Collating

Gathering

The method of assembling sections or loose leaves in one consecutive order is called "Gathering". It can be done either by hand or with the help of machines. In hand gathering, the binder arranges the piles of sections in sequence in an arc around him. Gathering at a still higher speed is done with the help of gathering machines. Binders accustomed to gathering by hand usually give an output of 2000 to 2500 sections per hour.

Sequence of Sections for Gathering

Collating

Figure 3.2

SEQUENCE OF SECTIONS FOR GATHERING

GATHERED BOOKS PILED AND READY FOR COLLATING

It is always necessary to check before securing whether the gathered books contain the required number of sections in correct sequence or not. Once the books are bound, it became difficult to change the sequence of sections without damaging the binding. The method of checking the
exactness and correctness of sections in a gathered book is called “Collating”. It also refers to the method of checking whether all the sections of a book are in correct sequence or not. There are two methods of collating:-

1) Collating with signature Marks.

2) Collating with collating Marks.

**Stitching**

This is the operation done after folding and gathering. If there is more than one section in a booklet to be centre stitched, the next operation after folding is to inset the sections into the other before stitching. Two sections entail are inset, 3 sections, 2 insets and so on. There are two types of stitching methods, centre stitching and side stitching which may be presented as follows:-

**CENTRE STITCHING V/s SIDE STITCHING**

The following table gives the average output of stitching on the hand-fed power operated stitching machine.

<table>
<thead>
<tr>
<th>Table 3.3</th>
<th>Average output on Wire Stitching Machine</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Centre Stitching</td>
</tr>
<tr>
<td></td>
<td>Stitches per Book</td>
</tr>
<tr>
<td></td>
<td>1 Stitch</td>
</tr>
<tr>
<td>No. of Sections</td>
<td>1 Stitch</td>
</tr>
<tr>
<td>1</td>
<td>700</td>
</tr>
<tr>
<td>2.3</td>
<td>600</td>
</tr>
<tr>
<td>4.6</td>
<td>500</td>
</tr>
</tbody>
</table>
Cutting, Slitting and Trimming

Cutting means converting a pile of papers into its required divisions. Slitting means dividing a roll of paper or a roll of cloth into width of different sizes as per the requirements of the job. Trimming means removing 2.3 mm of paper from the edges of a pile of paper to make them square and flush at the edge. Trimming of books, magazines and periodicals is always done at the three edges, the fore edge, the tail and the head to have finish edges and to cut the folds of the sections so that the pages of the book can be opened conveniently without cutting the bolts.

3.4. Binding Room Tools and Equipments

Book-binding is a craft, the perfectness of which can be achieved through the practical work only. Although the theoretical knowledge is also essential to learn this craft, but one cannot be called a perfect binder unless and until he can work with his own hands and produce good results in binding. The binders require large number of tools and equipments to do their work properly. They should be well acquainted with the names and use of each tool.

Binding room tools

The following are the binding tools commonly used in the binding section:

---

5 Ibid., p.29.
LINER

It is also called a 'Scale' or 'Foot Rule'. A binders' foot rule is not only used for drawing lines and measuring but also for straight cutting of paper, cloth and other materials. The edges of the rule are fitted with metal strips so that the rule is not cut while working knife or blade against the edge of the foot rule. The illness made of plastic and wood get worn out quickly. A good binders’ rule is made of metal with its edges calibrated in inches and millimeters to make use of it accordingly.

Set-square

A set-square is a very useful tool of the binder. A binder’s set-square is made of two strips of metal welded at one of their edges at an angle of 90 degree in the L-shape. It also helps to draw lines at right angle to the edges of the covering materials and boards. It also helps to check whether the edges of the covering materials and boards which have been cut for making cases are right angle to each other or not. It can also be used to find out whether the edges of the book have been trimmed Straight or not.

Pencil

The pencils are used for drawing lines and marking positions on the materials used in the binding section. The binders normally use medium hard lead pencils (Say ‘H’ number) because the soft pencils are likely to spoil the costly covering materials. The other problem with the soft pencils is that their edges get thickened very soon and need to sharpened every now and then.
Knife

A binders knife is a long, wide thin blade with a wooden handle and is used for cutting the miscellaneous materials. It is quite different from the domestic life. The edges of the knife is so shaped that it can be sharpened by the binder on a oil stone very easily and quickly.

Oil Stone

It is a special kind of stone used by the binder to sharpen knife, chisel and other cutting and paring tools. A few drops of water are sprinkled on the stone and the required tool is sharpened.

Cutting Plate

The cutting of materials with knife on a binder’s table or working bench spoils the table/bench top by the deep cuts made by the sharp edges of the knife. The binders therefore, normally keep thin zinc plates under the materials to be cut with knife. Since zinc is soft metal, it does not damage the sharp edge of the knife quickly.

Scissors

A large size tailors type scissor 20-30cm large is used by the binders for cutting paper, cloth, cover and other soft materials. The scissor should be sharp to ensure a perfect cut.

Folder

It is a very important companion of a binder. It is used for pressing down the creases in folding, smoothening down the pasted surfaces and in many other operations in forwarding. It consists of 5-6 mm thick, 20-25 mm
wide and 150-200 mm. long strip of hard-wood, bone or plastic with rounded ends and tapered edges. It is also called ‘Bone Folder’.

**Needles**

Strong steel needles 8 to 10 cm. long are quite suitable for sewing sections in book-binding. The eye of the needle should be large enough to take thick threads freely. A curved tail needle or a small curved needle used by surgeons is also sometimes used for repair work.

**Piercing Awl.**

It is a fine thin pointed shaft with metal or wooden handle used for piercing, holes in paper and boards to draw threads or cords. It is similar to fiercer and bodkin in working but little weaker than bodkin.

**Hammer**

A round metal hammer with flat head is used for many purposes in book-binding. It is used for reducing the swell, rounding, backing and hammering the slips and cords. A wooden hammer called ‘Mallet’ is also used by binder where high hammering is required.

Other important binding tools required are Tenor Saw, Circular Rods, Spring divider, Brushes, Punch, Tridles, Backing boards, cutting boards, chisels, pairing knife and pairing stone and adhesive pots.

**Binding Room Equipments**

The equipments other than machines used in the binding section are not costly, but they should be good in quality so that the work is done neatly and properly. In small binderies, all the equipments may not be necessary,
but in large binderies it becomes difficult to work without them. Some of the common equipments are:

**Press**

Right after folding up to finishing, the folded sections pass through different operations making use of different types of presses; - laying press, ripping press and standing press.⁶

**Laying Press**

It is also known as a 'Backing Press'. The books and sections are held in the vertical position, firm to carryout the operations like settling the groove, making the saw-cuts and backing. It is also used in edge decoration, gilding and various other finishing operations like gold tooling at the spine.

**Nipping Press**

Nipping Press is made of cast iron with a solid base. It may be bolted down to a solid wooden or iron bench at a convenient height. The top plate of the ripping press is screwed up with a handle through the frame fixed to the base plate. Two vertical bars guide the movement of the top plate. The standard sizes of the presses vary from 200mm x 300 mm to 450 mm x 600 mm size of the base plate.

**Standing Press**

It is a little bigger, superior and precise version of the nipping press. It is made of cast iron with a heavy solid base connected with four iron bars/pillars at the corners. The top plate here also is screwed up with a handle

---

⁶ Ibid., p.32.
through the frame fixed to the base plate exactly as in the case of a ripping press. It can exert the tremendous pressure essential for good work for both preliminary and final pressing. It is normally used for very large work and in large scale production to press the gathered sections as well as pasted, covered and cased books. Pressing boards in between the piles of books help a lot to distribute equal pressure all over the work.

Figure 3.3

Standing press and hand sewing on a sewing machine
Sewing Frame

The sewing of sections on tapes and cords by the manual process is done on the sewing frames. The speed of sewing gets considerably increased by the use of a sewing frame. Preferably all hand sewing should be done on a sewing frame.7

Board - Cutting

The boards for making pads, books and hard cases should not be cut frequently on the paper-cutting machine. They should be cut on a board cutter meant for this purpose. The boards are trimmed sharp and square without damaging the blade. The smaller quantities of boards are usually bent on a horizontal board cutter while the larger quantities are cut on a rotary board cutter or a board skitter.

3.5 BINDING MATERIALS

The cost of a book is greatly influenced by the style of binding and the quality of materials used for the binding. Superior materials increase the cost of binding, but they add to the aesthetic look of the books and increase the strength of binding. Inferior quality of materials do not feed properly on the automatic binding machines and pose lot of problems due to the frequent stoppages of the machines. It also hampers the output and leads to high wastage of materials on the machines. For example, a cheap and weak thread will break after every few sections on a sewing machine and make it difficult for the operator to sew the books.

7 Ibid., p.36.
Classification of Materials

Since the materials form an important element of the cost of production in the bindery, there are varieties of materials of different quality used by the binders\(^8\). Some of the important materials may be classified into the following groups:

- i) Paper
- ii) Board
- iii) Reinforcing materials
- iv) Securing Materials
- v) Covering Materials
- vi) Adhesives
- vii) Finishing Materials
- viii) Decoration Materials
- ix) Miscellaneous Materials

Paper

Paper is the basis of the craft of book-binding. Binders use varieties of papers for different purposes, for example, for making dummies and end papers, stationery, covering reinforcing, wrapping and packing. Paper is normally sold in the market in packs of 500 sheets called a ‘Ream’. Thick papers are bundled in 125/250 sheets whereas a ream of thin papers like manifold and also handmade papers contain 480 sheets. Special papers and cards are available on gross (144 sheets) basis. Printer’s quire consists of 25 sheets and binders’ quire contains 24 sheets but in general there are 20 quires in a ream. Basically a quire is a twentieth part of a ream. A paper is a matted or felted sheet of fibres formed from a pulp-water suspension. The quality of

\(^8\) Ibid., p.38.
Paper mainly depends upon the quality of fibres used in its manufacturing process. The strongest and best quality papers are produced from rag, which is obtained from cotton, linen, jute and hump.

**Paper Manufacture**

The paper can be manufactured by hand or with the help of machines. The important steps involved in the manufacture of paper are:

a) Preparation of pulp  
b) Preparation of stock  
c) Making of paper  
d) Pressing, drying and calendaring  
e) Cutting and packing

### a) Preparation of Pulp

The rag, linen and cotton is sorted, cut into small pieces, boiled with caustic soda, beaten to a small pulp in Hollanders and bleached in line chloride for preparing the stock. The wood from the trees may be converted into fibrous pulp by any of the following methods.

1) Mechanical Method

2) Chemical Method

Chemical wood pulp is costlier and superior than the mechanical wood pulp. The total amount of pulp produced by chemical method is always much less than that produced by mechanical method from a given raw wood. A good amount of pulp is wasted in pulp cleaning process in the chemical method.

### b) Preparation of Stock

The chemical wood pulp is thoroughly cleaned, bleached and refined by the beating process. If the beating is short, the paper produced is soft,
bulky and opaque and if the beating is large, the paper produced is hard, smooth, thin and less opaque. Sizing materials are most important in the manufacture of paper. The paper produced without sizing is nothing but a blotting paper, which is neither having a smooth surface, nor it is ink and water resistant.

c) Making of Paper

The paper making unit of the machine is called the four brinier. For making paper, required amount of suspension is released from the tank and allowed to fall on the endless moving belt, which also vibrates uniformly to ensure proper inter-weaving of fibers in the paper. The excess water is drained of from the wire mesh and also sucked by the sustain boxes. The sheet of paper thus formed still contains 75-80% water.

d) Pressing, Drying and Calendering

The paper now jumps from the wire mesh on to a specially woven cotton felt and passes through a series of cylinders called couch rolls to extract more water from the paper. The couch rolls are arranged exactly one above the other in sets of two cylinders each. The paper contains 65 to 70% water when it leaves the pressing unit. The drying unit brings down the moisture content of the paper to 6-8%.

e) Cutting and packing

The calendered paper is first wound in the form of a big roll and then cut into sheets of the required size. The cut sheets are packed in reams of 500
sheets each. Same time the big rolls before packing are cut into small rolls of different widths for using on web-fed machines.

**Kinds of papers**

The most commonly used papers by the printers binders and finishers are Machine finished paper, cover paper, newsprint, bond paper, art paper, ledger paper, Antique paper, offset paper, Maplitho paper, White/colour printing, chromopaper, wrapping paper.

**Paper Sizes**

All papers except hand-made papers are manufactured in a continuous reel and cut into sheets of the required sizes that is, the conventional and metric paper sizes.

**a) Conventional Paper Sizes**

The common existing or the conventional paper sizes being used in India are the same, which were followed by the British. These papers have dimensions in inches. The basic papers with their sizes in this category are:

<table>
<thead>
<tr>
<th>Name of the paper</th>
<th>Size in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small foolscap</td>
<td>13½ x 16-½</td>
</tr>
<tr>
<td>Foolscap</td>
<td>13½ x 17</td>
</tr>
<tr>
<td>Post</td>
<td>15½ x 19</td>
</tr>
<tr>
<td>Crown</td>
<td>15 x 20</td>
</tr>
<tr>
<td>Royal</td>
<td>20 x 25</td>
</tr>
<tr>
<td>Medium</td>
<td>18 x 23</td>
</tr>
</tbody>
</table>

---

9 Ibid., p.43.
The regular sub-decisions of the conventional paper sizes are indicated by folio, quarto, octavo etc. The irregular sub-divisions are denoted by long folio, long quarto, long ectavo etc.

<table>
<thead>
<tr>
<th>Folio</th>
<th>Quarto</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 VO</td>
<td>160 mo</td>
</tr>
<tr>
<td></td>
<td>32 mo</td>
</tr>
</tbody>
</table>

**Metric Paper Sizes**

Metric sizes of papers have dimensions in millimeters and are also known as “ISO” or international standard paper sizes”. The substance (weight) of the paper in the metric system is expressed in GSM, which means grams per square meter. There are 3 series in the ISO sizes, namely, A – B and C series. The basic sizes in these series are AO, BO and CO. A series is used for general printing purposes including stationery and publications. B series is primarily for posters and wall charts and C series is for making envelopes. The interesting point in the metric sizes is that the proportion of sides of all the basic sizes and their regular sub-divisions is 1:2. For finding out the dimensions of the divisions either the shorter side of the basic size is doubled or the longer side is halved. The area of a AO size of paper is one square meter.

<table>
<thead>
<tr>
<th>ISO Stock Paper Sizes</th>
<th>For extra Trim or Bled Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Normal Trim</td>
<td></td>
</tr>
<tr>
<td>RAO = 860 x 1220 mm</td>
<td>SRAO = 900 x 1280 mm</td>
</tr>
<tr>
<td>RAI = 610 x 860 mm</td>
<td>SRAI = 640 x 900 mm</td>
</tr>
<tr>
<td>RA2 = 430 x 610 mm</td>
<td>SRA2 = 450 x 640 mm</td>
</tr>
</tbody>
</table>
Metric Division

The description of the A-series consists of Capital A followed by a figure attached to the series designation. The figure indicates the number of folds given to a basic size of the paper. They are, for example, A0, A1, A2, A3 A4 etc.

The higher the figure which follows the letter A, B or C, the greater is the number of folds given to it and smaller is the sub-division of the sheet. The basic size, one square meter area, has the description A0, Half of it A1 and half of A1 is A2. Where larger dimensions are required, the letter A is preceded by a figure. Thus 2A0 means twice the size of A0; and 4A0 means four times the size of A0.

Board

It is most important material used in the binding and packaging. In the book binding, boards are used for making cases of hard-bound books, binding of stationery and account books; and for making pads, bill books, cheque books etc. In the packaging industry, boards are used for making variety of boxes, cartous and product wrapping devices.
**Kinds of Boards**

Boards are made from various fibrous materials such as straw, wood, waste paper, Jute and other by-products of the Industry. They range in quality, size, weight, thickness and their prices are according to the raw materials used. Substances are expressed by grams per square meter and boards are sold by weight or count. Three typical kinds of boards used in book-binding are

1) **Straw Board**

Straw Board has a thick surface on both the sides which cause show through it covering material and the paper used for end papers is thin. It has warping characteristics, absorbs moisture and bends on the opposite side after absorbing moisture. This is the cheapest board of the three types and is mainly used for the binding of books and making of boxes, carton, containers and showcards.

2) **Chip Board**

It is manufactured from waste paper, waste fibrous materials and some wood free pulp. It is manufactured in reel and then laminated and sheeted. Chip Board is softer and more flexible than straw board. It is less brittle and hence can be creased and shaped easily. Due to the larger fibers giving better
bendability, this board is commonly used for making boxes, cartons, cartainers and show cards.

3) Mill Board

It is a machine made grey board manufactured from a pulp made of waste paper including some percent of wood-free pulp, used ropes and coarse cloth. It is made in a continuous large sheet, compressed to a desired caliper and sheeted to the required size. As it is compressed, it becomes very dense and dimensionally more stable. It is used for fine leather binding, library work, best-quality ledgers and for making boxes and solander cases. It is used for making split boards and spring backs for the stationery books. It is best suited for gold blocking and blind embossing.

3.6 REINFORCING MATERIALS

The materials used for increasing the general strength of binding are called re-inforcing materials. The sewing is made stronger by using cords and tapes. The spine is made strong by lining with a mull cloth. The end papers and folders are made strong by attaching a cloth/linen guard at the folding edge. The maps and charts to be folded in small size pasted over mull cloth to avoid tearing on folds.

Mull Cloth

It is an open weave cotton cloth, heavily starched and stiffened with size. Alone, it is weak, but it re-inforces any material to which it is attached by an adhesive. It is commonly used for first lining in the hard case binding, hanging of cheap books and re-inforcing backs of old-books in re-binding.
**Jaconet Calico Cloth**

It is a close-weave highly starched and calendered cloth. It is slightly superior than mull cloth but is used almost for the same purpose in bindings of better quality. It is available in rolls of a meter width and 15-30 meter length.

**Buckram**

It is a closely woven cotton material duly lined with tissue or pigmented filler to prevent the adhesive penetrating through it. Buckram is used as covering material for case binding and re-inforcing of end papers, boxes and portfolios.

**Tapes and webbings**

These are made from cotton and hemp fibres woven in different widths ranging from 5.25m. These are supplied in rolls of 50 to 100 meter length and basically used at the spine in sewing books by hand and on machines. Webbings are stranger and costlier than tapes.

**Cords**

These are string like materials made flax and have very large fibres in different thicknesses and twists. Cords are used in place of tapes and webbings in sewing books having raised bands. These are sold by-weight in Kilograms.
Securing Materials

Loose sheets and signatures also called 'sections' are secured together with the help of threads, wires, cords and different kinds of plastic and metal mechanisms.

3.7 COVERING MATERIALS

Binding Cloth

It is made from a closely woven good quality cotton fabric and is normally sold in rolls about 15, 20, 25, 30 meters long and between 90 to 100 cms wide\(^ {10} \). Laminated or coated papers, textile materials and leather are the commonly used covering materials. The textile materials are heavily starched to prevent glue penetration. The special treatments given to the textile materials improve their appearance, handling and wearing qualities. The binding clothes are available in many attractive colours but red, blue and green are most popular. Stripes of binding cloth are sometimes used as tapes for the sewing of cheap books. Buckram is another covering material which is a stronger and more durable material than binding cloth. It is useful for heavier binding where large life is required. Imitation Book cloth is having high tensile and flexing strength which is commonly used where low cost of binding is the primary consideration. Rexine is also used for superior bindings, diaries, albums, ornamental boxes etc. The width of the roll varies maximum up to 140 cms in order to make the best and most economical use. Leather cloth is obtainable in an expensive range of colours, grains, effects and qualities. It has a leather like softer surface on one side. Because of its

\(^ {10} \) Ibid., p.53.
greasy nature, some of the leather cloths tend to reduce the output in blocking and case making. Leather is a highly satisfactory material for covering costly books and is more durable, attractive to eyes and pleasing to handle.

It is relatively costly, and for this reason has gradually been superseded by textiles. Leather is still extensively used on account books and on the more expensive pocket diaries. The common brands of leathers used by the binders may be levant, Morocco, Basil, Parchment, Law Calf pig skin, Vellum etc.

3.8 DECORATION MATERIALS

The materials, which in addition to their basic requirement, tend to increase the beauty of a book and have not been covered under the finishing materials are termed as decoration materials\textsuperscript{11}. To name a few are the head bands and maker or register.

Miscellaneous Bindery Operations

Treatment of Plates

Pictures or illustrations printed in two or more colours on a different quality of paper than the text are often found in books. These, in the binding are called ‘Plates’. The plates have no page numbers. In some books, plates have a separate content page known as ‘List of Plates’. In such cases the plates are numbered by their facing pages. Sometimes the plates are placed at the beginning or at the end of the book and printed as two or more pages together on one sheet. Whenever they are printed for folding in pairs, they are merely folded and inserted in their respective sections or used as a complete

\textsuperscript{11} Ibid., p.56.
separate section. But normally they are single sheets and are fixed along with maps and loose leaves in the books. The common methods used by the binders for attaching the plates are 1) Tipping 2) Guarding 3) Broken guard 4) Thrown out on Guards 5) Insetting and 6) Outsetting.

**Tipping**

Tipping is the most simplest method of attaching the plates, which are in the form of loose leaves. A thin and uniform film of adhesive is applied to a narrow back edge of a leaf and it is pasted in its respective position in a book and then left under weight to dry. For tipping on large scale, a bunch of 20 to 30 plates is taken, knocked up square at head and back and fanned in such a way that back-edges over-lap each other 3.5mm depending upon the thickness of the paper. Adhesive is applied with the help of a paper guard, one plate is picked-up at a time and fixed either on the outer page of a section or on the inside of a section. When a plate is tipped on the outer side, the method is known as ‘Tipping-on’ and when it is tipped inside the book or a section, it is known as ‘Tipping-in’.

**Punching**

Holes and cuts of different shape and size are made at the back edge of the sheets to secure them in loose leaf binders. For this punchers are being used. A bunch of sheets depending upon the thickness of the stock is taken, knocked up square at head and back, placed against the lays on the bed of the machine in position and punched in any of the following shapes:-
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Round Hole</td>
</tr>
<tr>
<td>2.</td>
<td>Key Hole</td>
</tr>
<tr>
<td>3.</td>
<td>Slot</td>
</tr>
<tr>
<td>4.</td>
<td>Thong</td>
</tr>
<tr>
<td>5.</td>
<td>Blind Thong</td>
</tr>
<tr>
<td>6.</td>
<td>Prong</td>
</tr>
<tr>
<td>7.</td>
<td>Slotted Round Hole</td>
</tr>
</tbody>
</table>

Steel punch with sharp-cut edge of any shape and size can be fitted on a punching machine to achieve the desired punch.

**Drilling**

Round holes are more quickly done by drilling rather than by punching. The drills are of hollow construction and the waste moves up through the drill during the drilling process and delivered into a bin. Drills on the machines are usually power operated and adjustable to the desired speed.

**Thrown-out on Guards**

When some big maps and charts requiring folding are to be fixed in a book, the back side of the map is made of the same thickness as that of the folded sheet. Some extra hinges or guards are required at the back to counter balance the thickness caused by the folded maps. When the books are sewn or stitched by the sides, the plates are merely inserted in their proper place.

**Insetting**

Sometimes the pictures or illustrations are printed on a bigger sheet and folded in the form of a section. It is then placed into another and sewn or stitched in proper position. This method of placing one unit of folded pictures into another unit of text pages is called “insetting”.
Outsetting

When a section of plates is wrapped around over another section and fixed in a book, the method is known as ‘Out setting’. In this method half of the plates appear before and half of them appear after the section around which the plates are wrapped.

Perforating

Perforating means making a series of small holes on a sheet of paper so that it can be turn out straight and easily along the line of perforation. Invoices, cheques, estimates, receipts etc. are often perforated for a quick separation.

Round cornering

The corners of small pocket books, dictionaries and invitation cards are often cut round and the method is known as ‘round cornering’. It is done mainly for two reasons-

1) To prevent the wearing and dog-earning of the square corners and 2) To look the corners different from the ratine square corners and thus increase the over-all get-up of the job. The shaped cutter is mounted in a hand or power-operated machine. The work is placed in angled Ganges and the cut is made.

Creasing

It is the process of pressing down the fibres in a thick paper, card or a board to facilitate folding or bending.
The other important bindery operations are scoring, eyeleting, graining, varnishing, laminating gumming, numbering, nipping, bundling, tacketing, ruling, banding, lacing and indexing.

**End Papers**

The careful examining of books reveal that they have some blank or decorative equal number of pages in the beginning and at the end of each book. These pages in the book-binding are called “End papers”. In some of the books the end papers are found printed or marbled. The end papers are made by the binders before use. The method of making end papers has varied throughout the history of book-binding. As a rule the most complicated book construction carries the most complex end papers. Depending up on the method of preparing, fixing, and the number of pages contained in it, the end-papers are of the following kinds:

1) Self end Paper
2) Single end paper
3) Double or inserted end paper
4) Made end paper
5) Cloth-joint end paper
6) Zig-zag end paper
7) Cloth-joint Zig-zag end paper

**3.9 SEWING**

In the binding jobs where wire is not acceptable or where re-binding quality is of paramount importance, thread is usually preferred to wire. Securing with thread is called ‘Sewing’. It is one of the most important operations in the construction of a book. If the sewing is weak, the binding cannot be expected to be strong and durable. The sewing may be done either
by hand or with the help of machines. The hand sewing is certainly much stranger than machine sewing but the appearance of sewing is not so neat and clean as in the machine sewing.

**Sewing tools and Materials**

The following tools and materials are usually required for hand sewing:

1) Sewing frame
2) Strengthening materials
3) Good quality sewing thread
4) Needles of different thickness and size with big eyes
5) Set squares
6) Binders Scale
7) Scissors
8) Pencil for marking the spine
9) Rectangular wooden plates of different sizes and thicknesses
10) Alpins for fixing tapes on the frame

**Methodology of Hand Sewing**

There is a standard procedure of section sewing by hand involving the following steps:

1) Nipping the folded sections. 2) Knocking the gathered book at head and back. 3) Marking up at the spine. 4) Saw-cutting and 5) Sewing

**Styles of Sewing**

The most common styles or kinds of hand sewing are:
1) Sewing with thread only (French Sewing). 2) Sewing on tapes. 3) Sewing on cords. 4) Sewing two sections on. 5) Over casting (Whip Sewing). 6) Saddle Sewing. 7) Side Sewing

3.10 ADHESIVES

The sticky substances which are used to hold together two or more surfaces by providing a layer of it between them are called ‘Adhesive’ in book-binding. The method of combining the surfaces with the help of an adhesive is called Adhesion.

Kinds of Adhesives

The adhesive used in book-binding may be classified under the following four heads:

1) Vegetable adhesives
2) Animal Glues
3) Synthetic Adhesives and
4) Hot Melts

The adhesives derived from vegetable sources are called “Vegetable adhesives”. They are paste and gum. The glue manufactured from the bones and skins of animals is called ‘Animal Glue’. The Hot melts are 100% solid construction of polymers, resins and waxes. These require heating between 150 to 170°C to liquify. They set off within 5 to 10 seconds after being removed from the heat source. Hot melts have to be kept constantly hot for easy working. Synthetic Adhesives are made from polyvinyl acetate and are

12 Ibid., p.95.
in liquid form with thin creamy consistency. They have good high flexibility. The common brands in use are favicol, stitch fast etc.

3.11 FORWARDING AND PRE-FORWARDING

The operations involved in the manual process of hard binding can be classified as

1) Pre-forwarding  2) Forwarding  3) Finishing

1) **Pre-forwarding**

It means a group of operations which are performed before the forwarding operations. The operations carried out between the receipt of printed sheets and up to the state of sewing are covered under pre-forwarding.

a) Jogging and knocking  
  b) Removing of one side of printed and spoiled sheets  
  c) Counting  
  d) Folding  
  e) Bundling  
  f) Gathering and collating and  
  g) Sewing

The forwarding in book-binding includes all those operations, which are performed after sewing up to the stage of covering. In other words, forwarding means attaching the covers to a sewn book. Forwarding is of two types – the one in which the case is prepared separately and attached to a book block. The first includes the following important operations:-

1) Removing the swell  
2) Fixing the end papers  
3) Fraying art the slips  
4) Gluing the back
5) Trimming
6) Rounding and backing
7) Fixing head and tail bands
8) Lining the back
9) Edge decoration
10) Cutting the boards
11) Capping-up

12) Holding the Boards and squaring
13) Lacing – in
14) Covering
15) Setting the joints
16) Pasting down
17) Pressing and
18) Jacketing

In case the hardcover is prepared separately and attached to the book, it requires the following operations \(^\text{13}\) after edge decoration excluding the operation of fraying out the slips

1) Cutting the Boards and covering material
2) Preparing the case
3) Casing – in or Drawing on
4) Setting the joints
5) Typing – up
6) Pasting Down
7) Pressing and
8) Jacketing

3.12 FINISHING

The finishing includes all those operations which are performed on the cover of a book for its identification and beautification. The decoration of a book is very important from the viewpoint of sales appeal. A book is never complete until its title appears on the cover and the spine. The decoration of the cover can be carried out by various processes. The books may be decorated by flocking, tooling, gilding, gold blocking and blinding to make it aesthetically appealing. The decoration of edges, attaching head and tail

\(^{13}\) Ibid., p. 101.
bands, fixing-up of a book-marker etc. definitely add to the beauty of the book. Sometimes the body of the book is also made attractive and of more utility by carrying at certain additional operations which combined together is termed as print finishing processes. These comprise operations like varnishing, paper graving, laminating, embossing, perforating, round convening and eyeleting.

**Edge Decoration**

The edges of the books, that is, head, tail and fore-edge are normally left plain but sometimes they are treated to make them more attractive and to look different than the edges of usual books. The common methods of edge decoration are colouring, tinning, sprinkling, marbling, and Gilding.

Although Binding is the last major operation in the channel of production of books, it is not much less important than the others like typesetting, processing and printing. Being the last operation, if not done carefully and thoughtfully, may spoil the entire labour of the designer, the processor and the printer. It therefore needs special attention.