

Chapter- 3:.....

LOOMS

Weaving is done on a machine called **loom**. The weaving machine provides the means to interlace warp and filling yarns to form woven fabric. It provides mechanisms by which different interlacements are made possible for warp yarns and weft yarns. Over a period of time, the loom has undergone significant modification, but the basic principles and operation remain the same.

3.1. CLASSIFICATION OF LOOMS

The loom is classified on the basis of method of insertion of weft. There are many ways for insertion of filling. The basic classification of the looms is as follows:

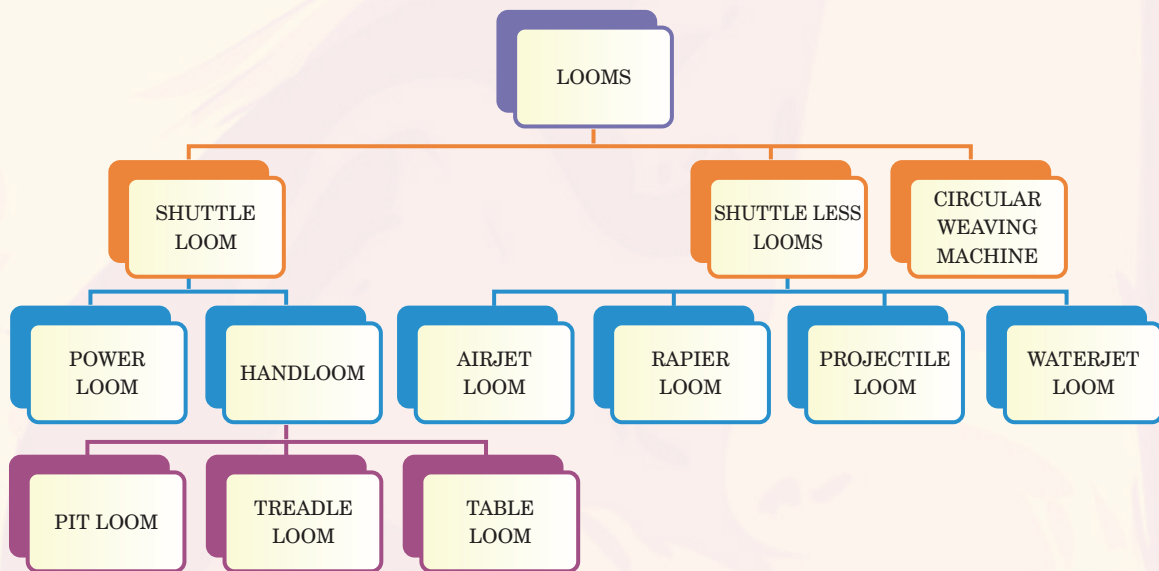


Fig 3.1: Loom Classification Diagram

3.1.1. SHUTTLE LOOMS

For many years weaving machines depended on shuttle as the primary device for weft insertion. **Shuttle** is a device that contains a bobbin on which filling yarn is wound. The shuttles are available in different shapes depending on the type of loom they are to be used. Shuttle looms are among the oldest kind of looms. They are versatile and effective but there are certain disadvantages. As the shuttle passes over warp ends during every picking cycle, it causes abrasion, which lead to thread breakage. So it cannot be used for

weaving finer count yarn fabric varieties. Compared to more modern looms they are also slow and noisier. Shuttle looms can be power looms which are used in mill sector or could be different varieties of handloom which are usually used by artisans (craftsmen)



Fig 3.2: Shuttle Loom

3.1.2. SHUTTLELESS LOOMS

Shuttle less looms were developed to overcome the problems of Shuttle looms. These looms were faster and also reduced the breakage of yarn during weaving. Finer fabric qualities like shirting and dress material could be manufactured with these looms. The modern looms use three prominent devices for pick insertion.

3.1.2.1. Projectile Looms:

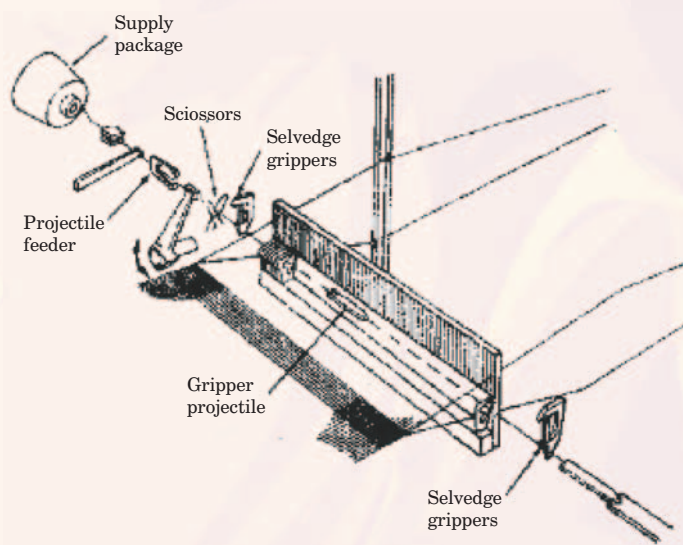


Fig 3.1: Line Diagram of Projectile loom

This is the first proven Shuttle less loom developed in 1950s in Switzerland. The projectile is like a bullet which grips the weft and carries it through the shed and returns empty. It can be used to make wide variety of basic fabrics, but it requires the yarn to be smooth and uniform to reduce friction.

3.1.2.2. Rapier Looms



Fig 3.4: Close up view of a Rapier

Rapiers, used to insert the weft, are of two types - **Single Rapier** and **Double Rapier**. Single rapier is one long rapier device that carries the weft from one side of the loom to other and returns back empty. Whereas in double rapier, one rapier feeds the weft halfway through the shed to another rapier, which then carries it across rest of the way. The double rapiers could be rigid, flexible or telescopic.

3.1.2.3. Airjet Looms



Fig 3.5: Airjet Loom

The looms use jet of air to propel the weft yarn across the shed of the loom. These looms are faster and also less noisy than the shuttle looms, rapier and projectile loom. The filling yarn is also under less tension. Airjet looms are used for producing wide variety of fabrics.

3.1.2.4. Waterjet Looms



Fig 3.6: Waterjet Loom - Observe the lustre on the fabric, it is because the fabric is wet due to water.

The jet of water is used to carry the weft yarn across the shed of the loom. These looms are faster and operate at less noise level like air jet looms. But the disadvantage is that they are restricted to produce the fabrics that do not readily absorb water such as nylon, polyester, etc.

3.1.2.5. Modern Looms

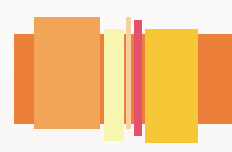
Innovative approach to weaving has been introduced through several design modifications of shedding and picking components of the traditional weaving machine.

3.1.2.5.1. Circular looms

These looms are designed to produce circular fabrics. In these looms shuttles are used that circulate the pick in the shed, which is formed around the machine. The circular looms at present are primarily used for bagging material.

Summary:

This chapter explains in detail the Loom - the machine on which weaving is done. Based on the method used for weft insertion, the looms are classified in to various categories. There are various techniques of weft insertion. An industry uses a given method depending on its requirement like - speed, type of fabric, end user and budget. The student in this chapter will understand the various types of looms that are being used in the industry. It also introduces the Modern Looms.



Unit - 1 Assignment

I. Fill in the Blanks

1. The basic raw material used by the textile industry for making a fabric is _____.
2. Any material made of interlacing fibers is called _____.
3. A finished piece of fabric used for a specific purpose is called _____.
4. The two types of textile fibers are _____ and _____.
5. The examples of Manmade Fibers are _____ and _____.
6. Interlacing of lengthwise yarn (warp) with the width wise yarn (weft/ filling) which are perpendicular to one another is called _____.
7. Weaving is done on a machine called _____.
8. _____ is a device that contains a bobbin on which filling yarn is wound.
9. _____ looms types are faster and also reduced the breakage of yarn during weaving
10. Rapiers, used to insert the weft, are of two types - _____ and _____.
11. _____ looms are restricted to produce the fabrics that do not readily absorb water.
12. The circular looms at present are primarily used for _____ material.
13. Textiles used for industrial purposes, and chosen for characteristics other than their appearance, are commonly referred to as _____ Textiles.
14. The way the warp and filling threads interlace with each other is called the _____.
15. The weaving of textiles on the loom is believed to have begun in _____ Age.

II. True or False

1. The shuttles are available in different shapes depending on the type of loom they are to be used
2. Interlooping of one yarn system into vertical columns and horizontal rows of loops called Weaving
3. The strands of fibers are twisted or spun together to form a Yarn
4. Wool fibers are a form of vegetable fibers

5. Plaiting and Baskets making was a preliminary step to weaving cloth
6. Shuttle looms were developed to overcome the problems of Shuttle-less looms
7. The basic raw material used by the textile industry for making a fabric is Yarn.
8. The Projectiles are looms classified on the basis of weft insertion technique
9. Lining in Automobiles is an example of Bonded Fabric
10. Cloth may be used synonymously with fabric but often refers to a finished piece of fabric used for a specific purpose

III. Select the Correct Answer from the options given below (MCQs):

1. In early age, weaving on looms was a house hold activity practiced mainly by:
 - a. Men
 - b. Women
 - c. Children
2. _____ is a Natural Fiber
 - a. Nylon
 - b. Polyester
 - c. Jute
 - d. Glass Fiber
3. The first loom was powered by :
 - a. Edmund Cartwright
 - b. Thomas Alva Edison
 - c. Wright Brothers
 - d. Graham Bell
4. The looms use jet of air to propel the weft yarn across the shed of the loom
 - a. Waterjet
 - b. Projectile
 - c. Rapier
 - d. Airjet
5. A delicate, hair portions of the tissues of a plant or animal or other substance that are very small in diameter in relation to its length are called
 - a. Yarn
 - b. Fabric



- c. Fiber
 - d. Cord
6. The example of knitted fabric is
- a. Sweater
 - b. Towels
 - c. Handkerchief
 - d. Bed sheet
7. Interlacing of lengthwise yarn (warp) with the width wise yarn (weft/ filling) which are perpendicular to one another is called
- a. Knitting
 - b. Bonding
 - c. Weaving
 - d. Tufting
8. The fabric is usually woven on
- a. Spindle
 - b. Loom
 - c. Warper
 - d. Charkha

IV. Define the Following:

- 1. Fiber
- 2. Yarn
- 3. Fabric
- 4. Looms
- 5. Manmade Fibers
- 6. Natural Fibers
- 7. Projectile Looms
- 8. Rapier Looms
- 9. Airjet Looms
- 10. Circular Looms

V. Answer the following the Questions:

1. Differentiate between Shuttle and Shuttle-less Looms
2. What are the various classifications of Textiles? Explain with examples
3. Write in brief about "Mechanization and Industrialization"
4. What are Natural Fibers? Classify and give examples
5. Draw a diagram of the Classification of Looms
6. What are Manmade Fibers? Classify and give examples
7. What are Airjet Looms?
8. What are Ravier Looms?
9. What is Fabric? Explain in detail.
10. Write a short note on Technical Textiles.