

WEEK No.4

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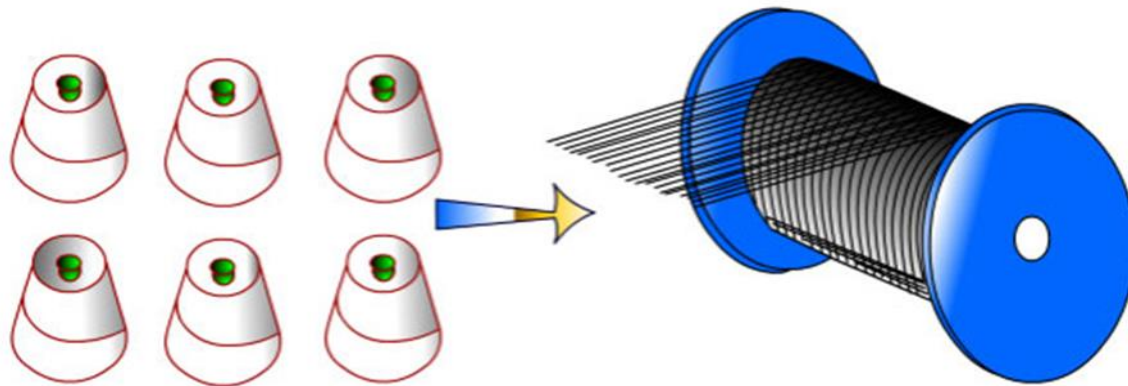
**WARPING**

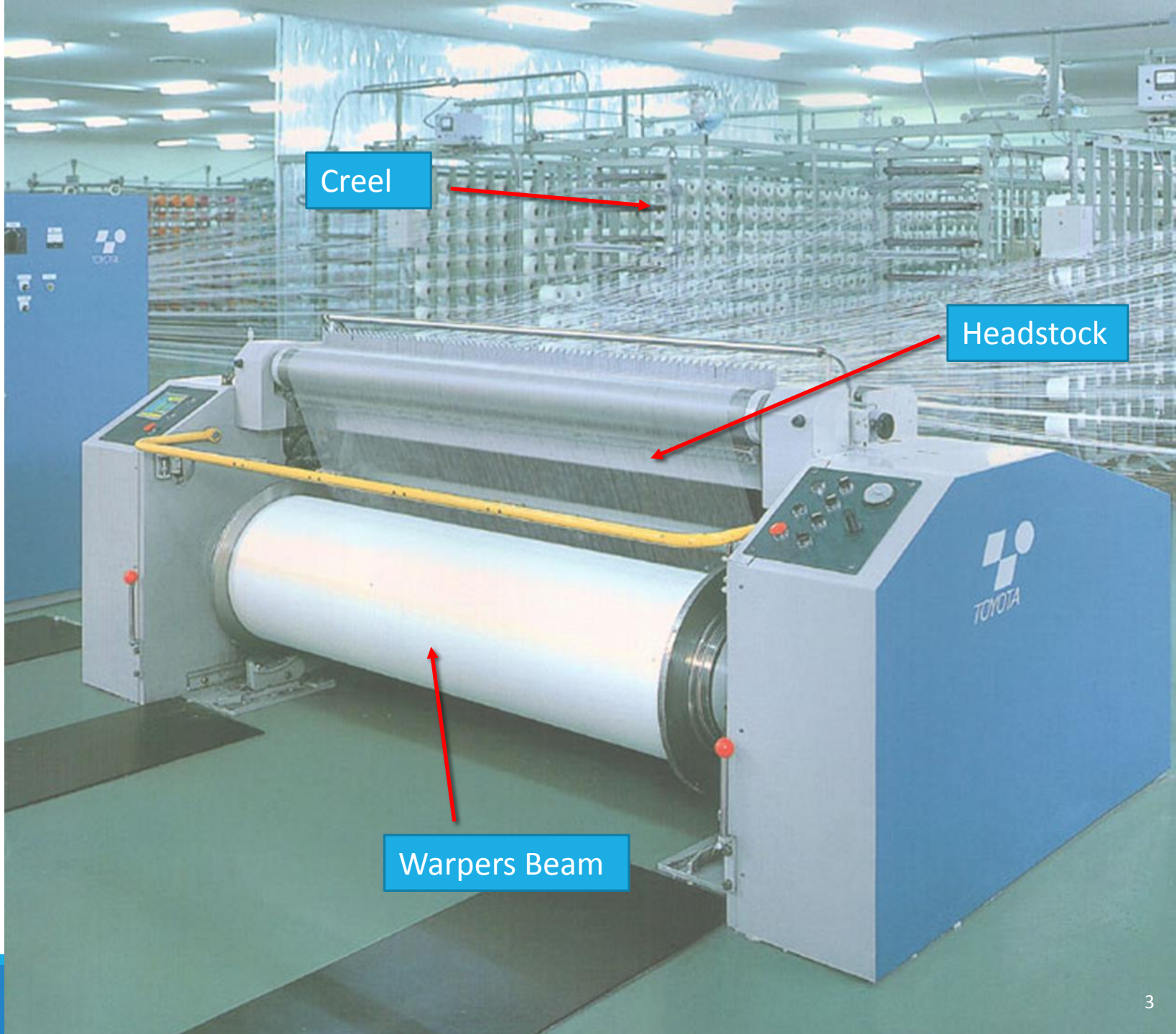
A solid blue horizontal bar at the bottom of the slide.

# Objective of warping

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- The objective of warping process is to convert the yarn packages into a warper's beam having desired width and containing requisite number of ends.
- The yarns are wound onto the warper's beam in the form of a sheet composed of parallel bands of yarns each coming out from a package placed on the creel.





Creel

Headstock

Warpers Beam

## Warping Machines(on basis of headstock)

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graph TD; A[Warping Machines(on basis of headstock)] --> B[Beam Warping machine]; A --> C[Sectional Warping Machine]
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Beam Warping machine

Sectional Warping Machine

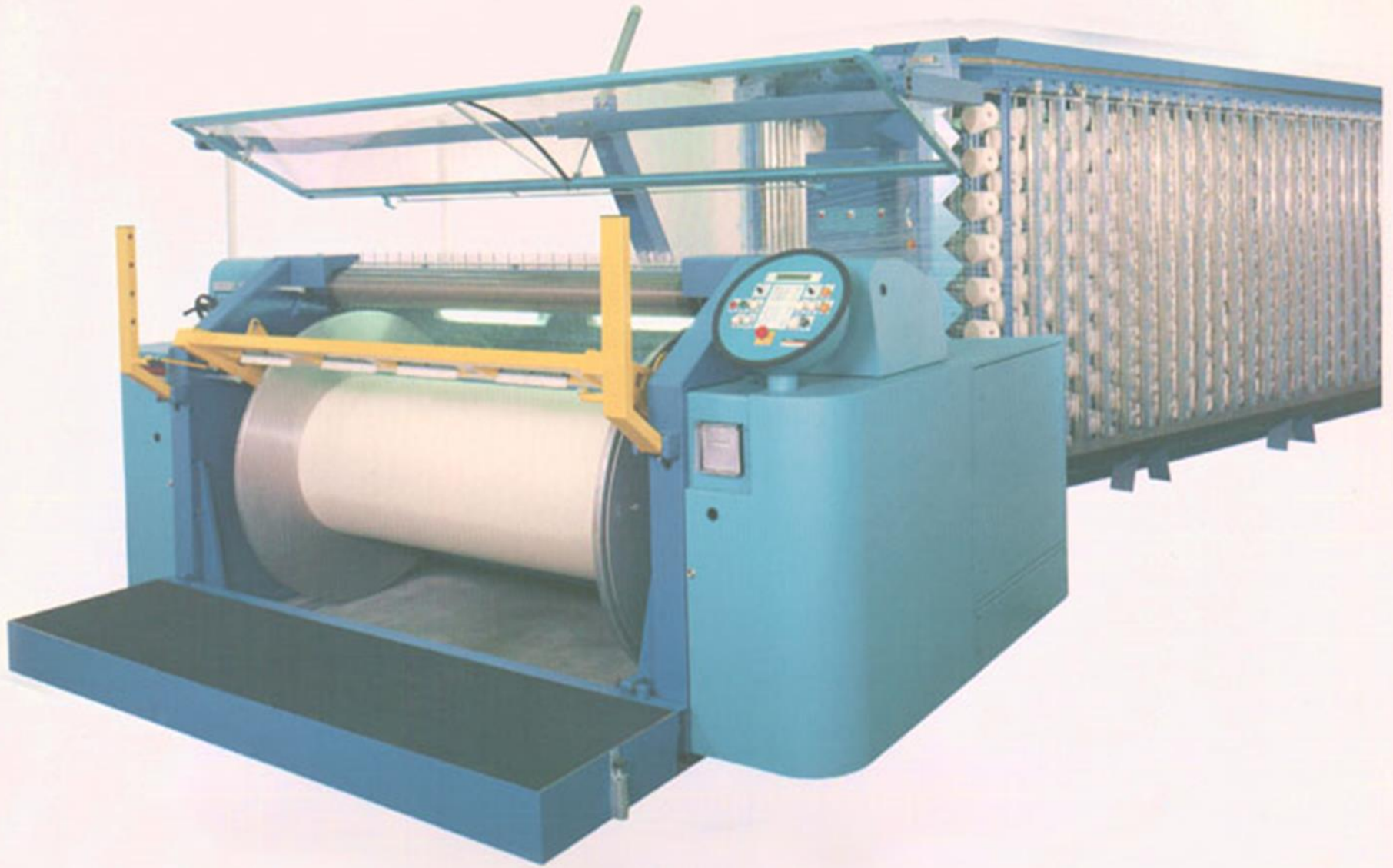
# Direct or Beam Warping Machine

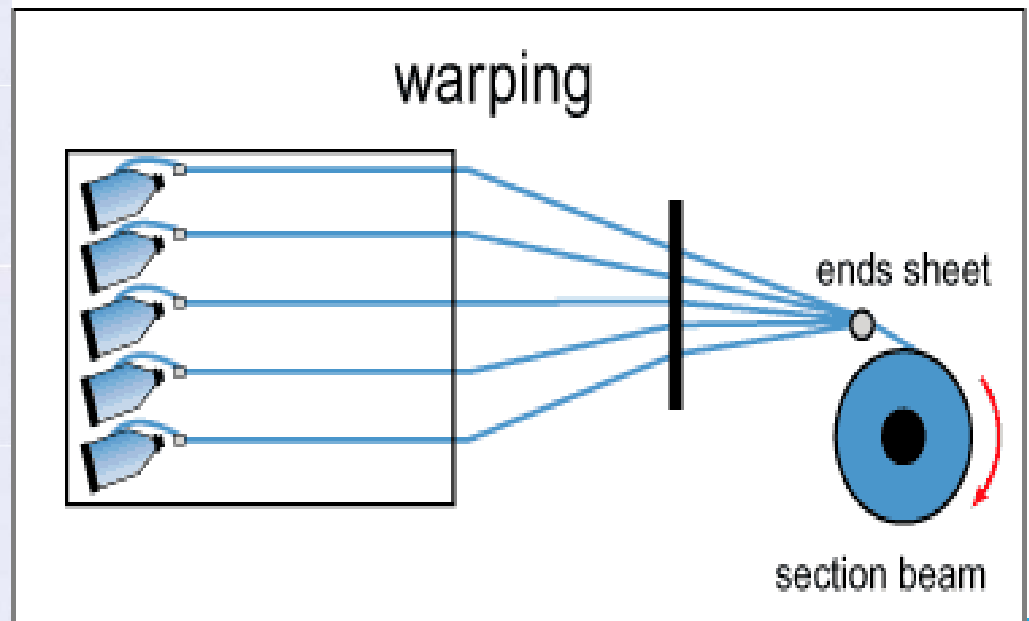
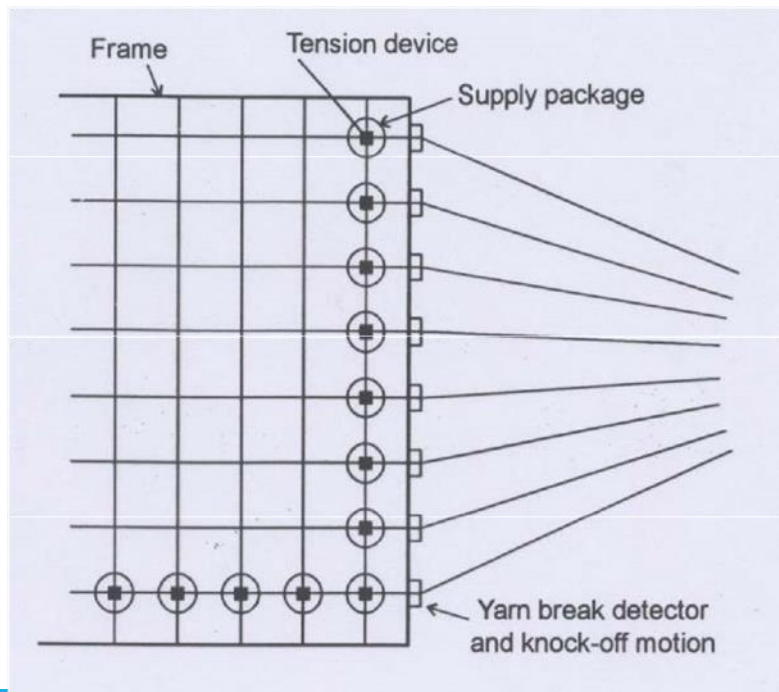
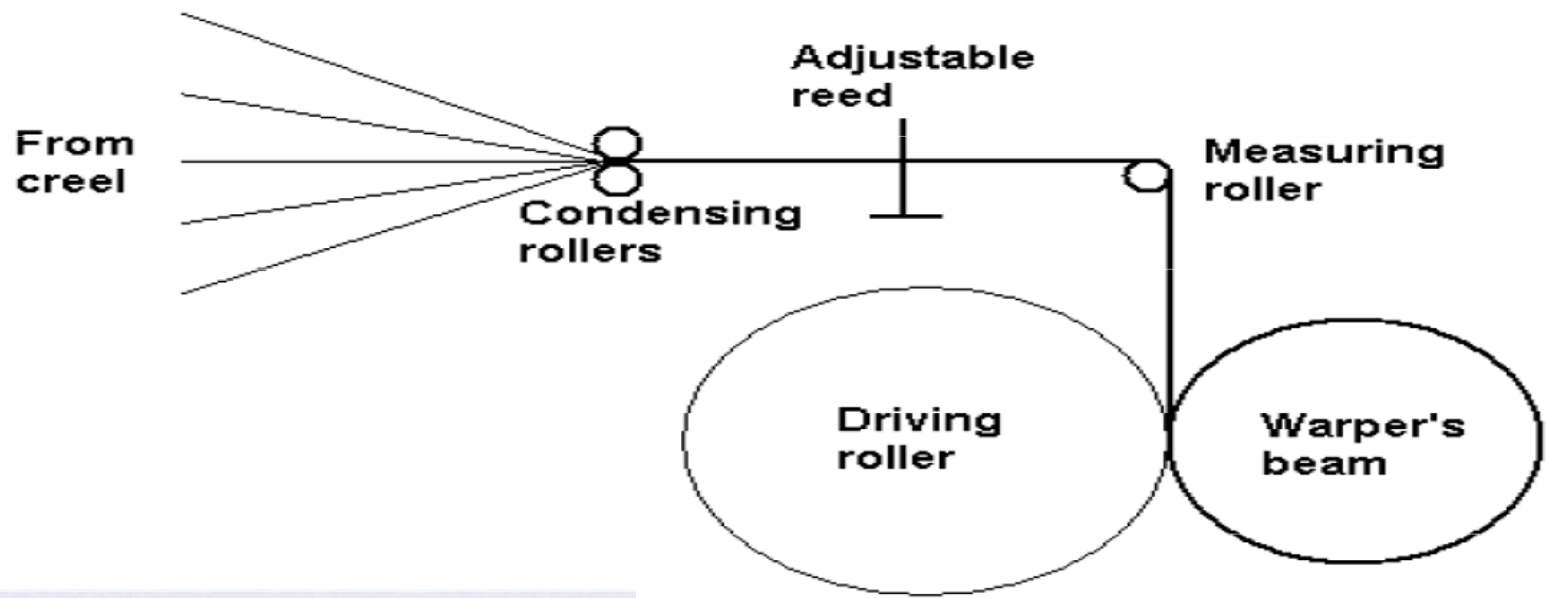
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- ❑ It produces the warper beams that are combined together as a single weavers beam in the next process of sizing.
- ❑ A warpers beam may contain 500-1000 ends.
- ❑ Direct warping is suitable for grey or mono-colored warps that require sizing.

Components of Warping Machine are:

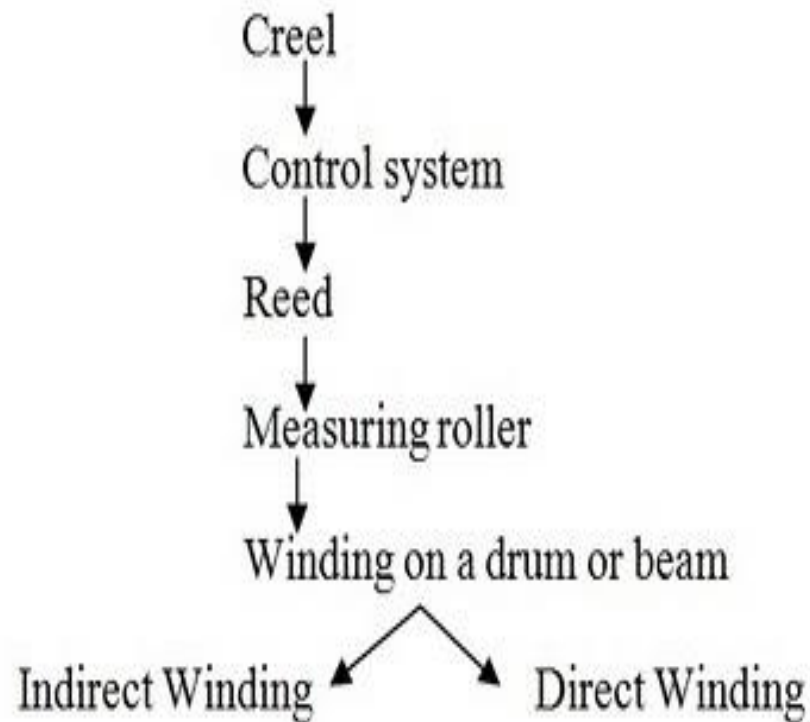
- Creel;
- Headstock;
- Control devices.





# Working principle of Winding machine

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# COMPONENTS OF WARPING MACHINE

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## CREEL:

1. Cone Holder : Hold the cone or arrange the cone in the creel.
2. Yarn Guide : To guide the yarn.
3. Tension Rod : Maintain yarn tension by upper & lower disc tensioner.
4. Ceramic Guide Disc : To guide the yarn from creel to warping m/c.
5. Auto Stop Sensor : To sense the breakage yarn.
6. Creel Panel Board : Display where the yarn break.

# COMPONENTS OF WARPING MACHINE

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## Head Stock :

1. Guide Reed : Uniformly spread the yarn over the warp width.
2. Adjustable V-Reed : Guides the yarn to follow the fixed path.
3. Speed Controller : control the speed, crawl speed or full speed.
4. Pressure Roller : Exert required pressure to the warp yarn.
5. Measuring Device : Measures the length of the yarn.
6. Beam Bracket : Holds the warp beam.
7. Emergency Stop Device : For emergency stop.
8. Automatic Knock Off : Stop m/c at achieving required length of beam or in case of yarn breaks.
9. Electrical Panel Board : To give the automatic controlled function.

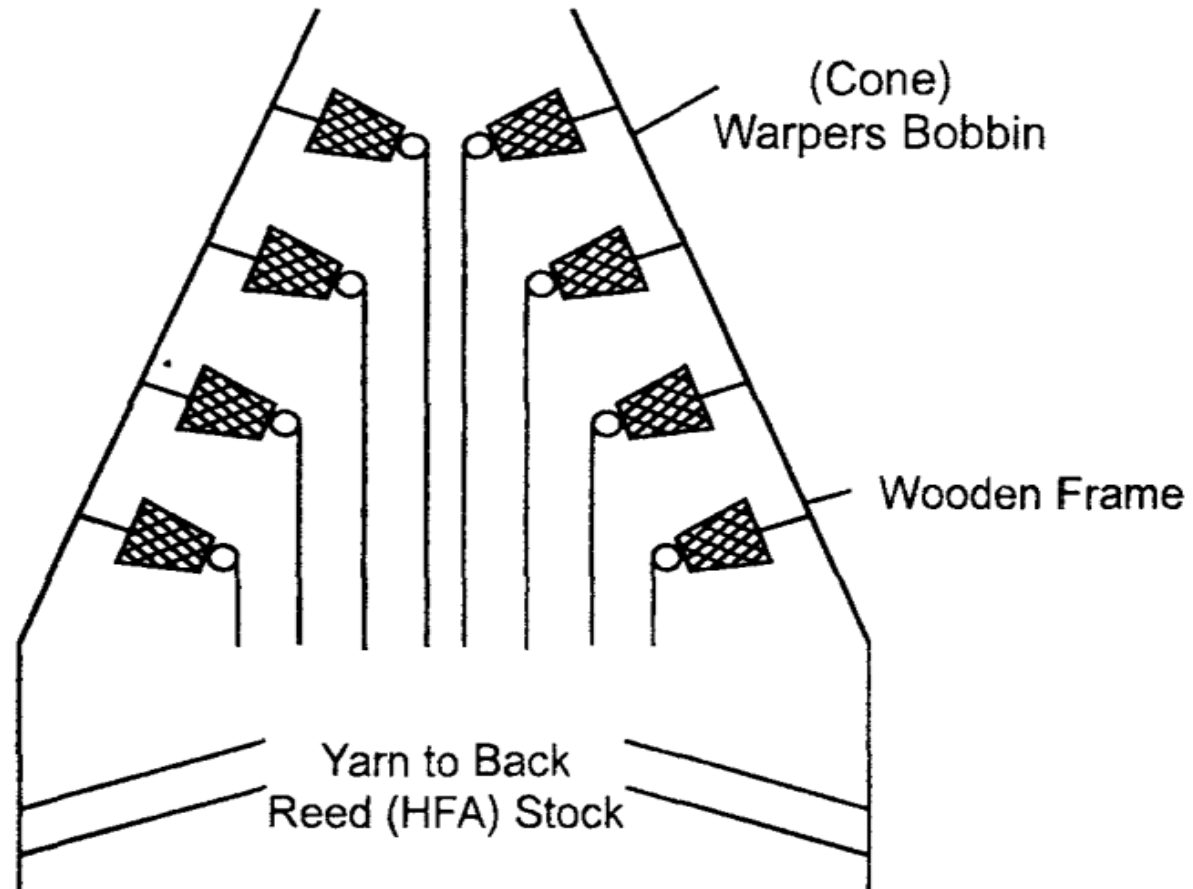
# Creel

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- Creel is a stand for holding the supply packages in the form of wound packages.
- It enables to hold the supply packages in proper position for warping.
- No single type of creel can give the same beaming efficiency for different types of yarns.
- Different types of creels are:
  - V-creel;
  - Rectangular creel;
  - Truck creel ;
  - Continuous chain creels
  - Magazine creel;
  - Automatic Creels;
  - Special Creels.



# V- Creels



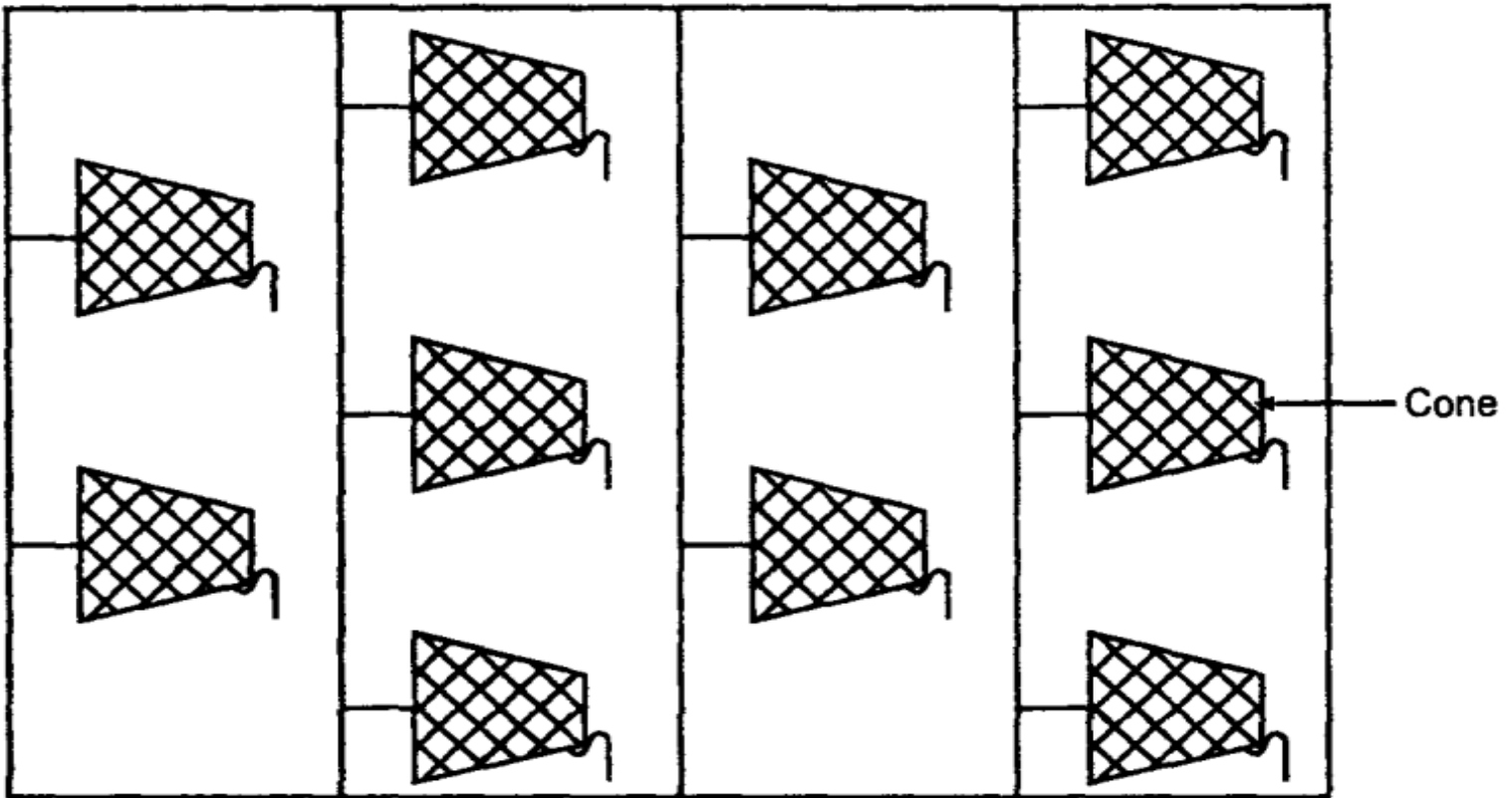
*Fig. 1.1 V-Creel*

# V- Creels

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- ❑ This type of creel is in V-shaped.
- ❑ It consists of wooden pegs horizontally to hold the supply package.
- ❑ This is arranged so that the apex is in line with the centre of the machine.
- ❑ The arm of this V-shaped wooden frame diverges on both sides from its apex.
- ❑ It enables the ends to be with drawn easily from the supply package without touching or getting entangled with one another during passing to the back reed of the head stock of the machine.

# Rectangular Creels



# Rectangular Creels

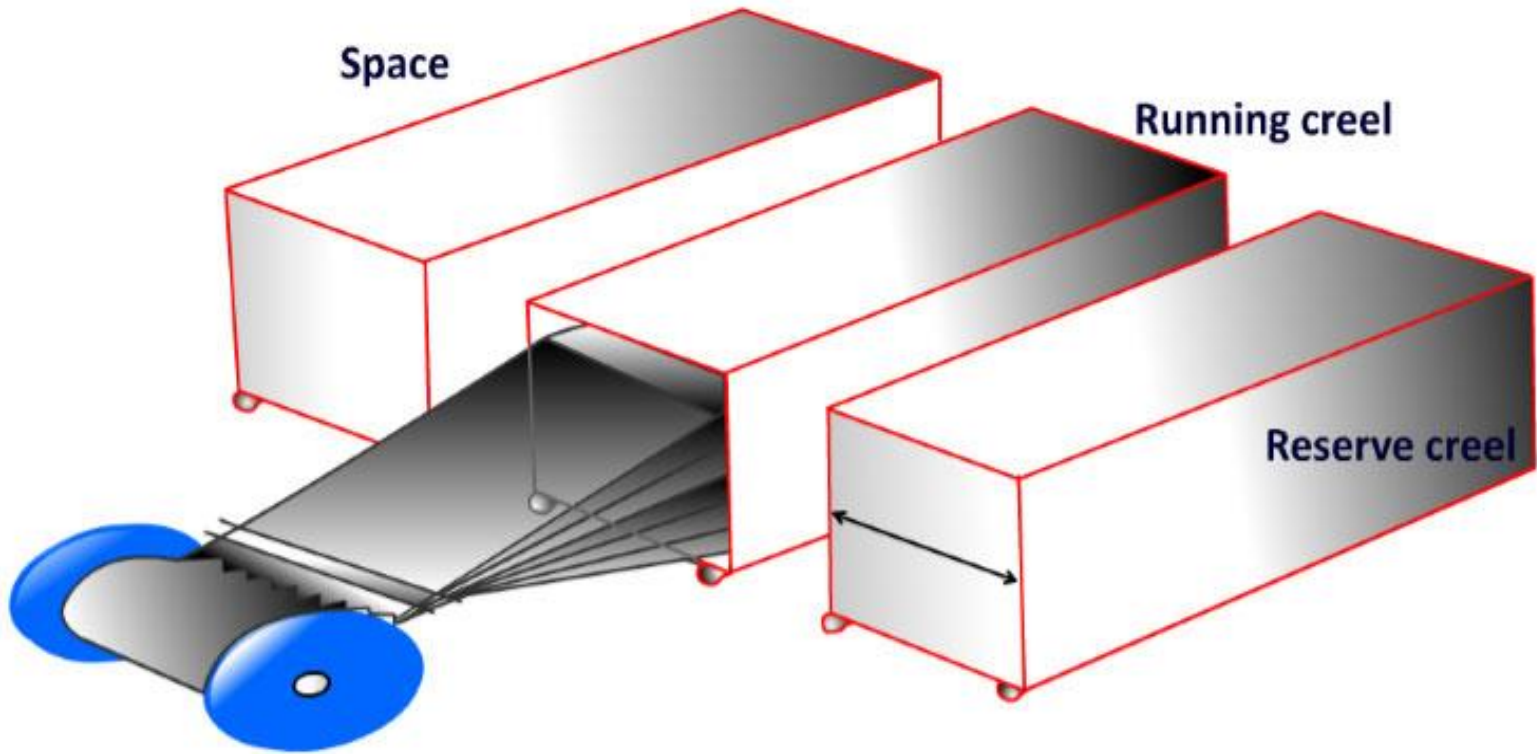
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- It is rectangular in shape.
- Frames are provided with pegs to hold supply packages horizontally.
- Frames can be increased to accommodate more number of supply packages & vice versa.
- Each frame consists of thread guides, indicator lamps etc.
- It is mostly used in slow speed warping machine.



# Truck Creel

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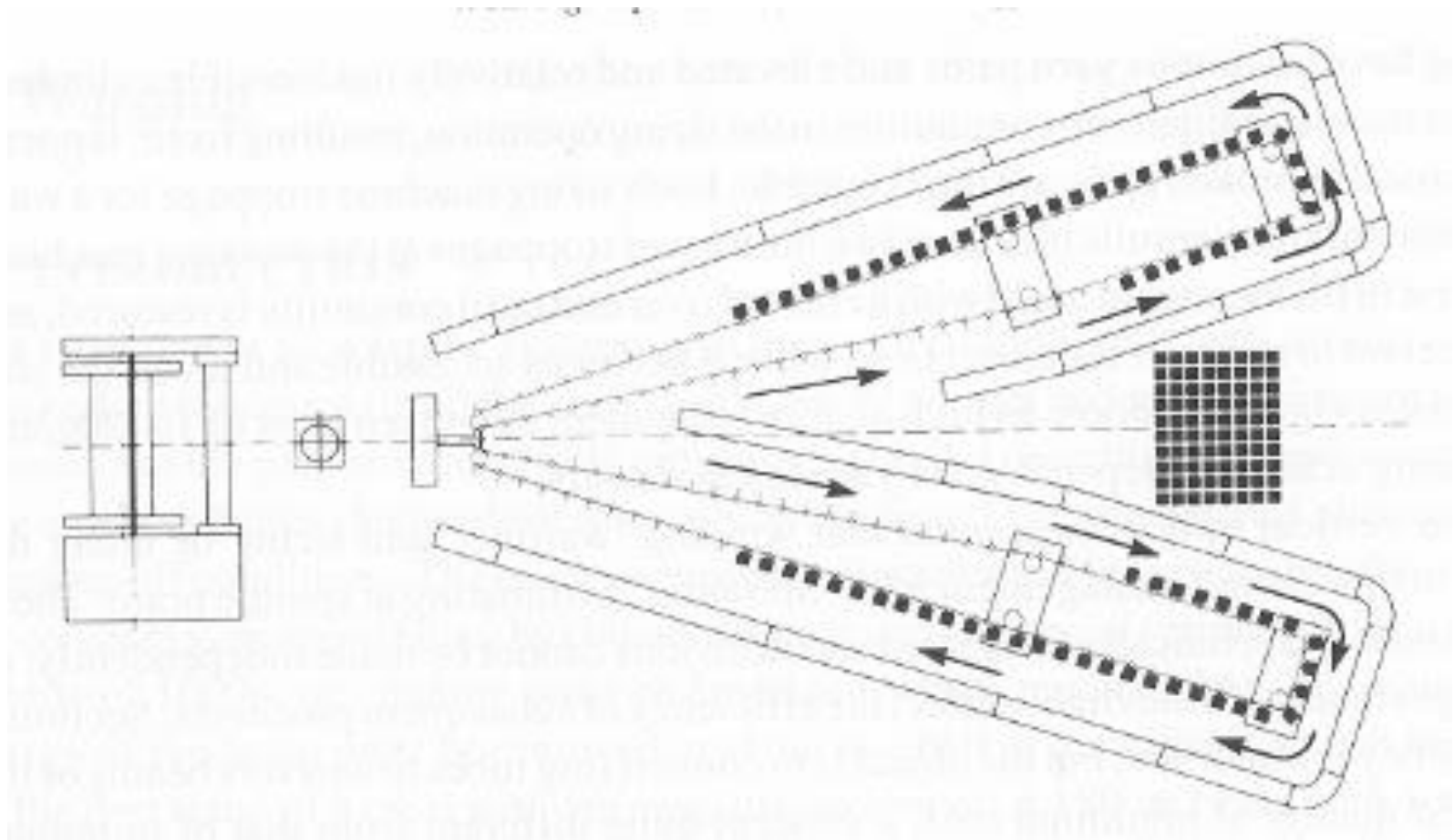


# Truck Creel

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- ❑ It utilizes Trucks or Mobile package carrier units.
- ❑ Each unit consists of number of columns & tiers on either side and can be inserted on the axis of the creel frame to become a part of the creel.
- ❑ Tension units are positioned in relation to the packages , & the unit is movable.
- ❑ Trucks can be creeled to the winding machine & thereby minimize handling of the supply package provided there are sufficient number of trucks.
- ❑ This system is not cost effective as many trucks are required.

# Continuous Chain Creel

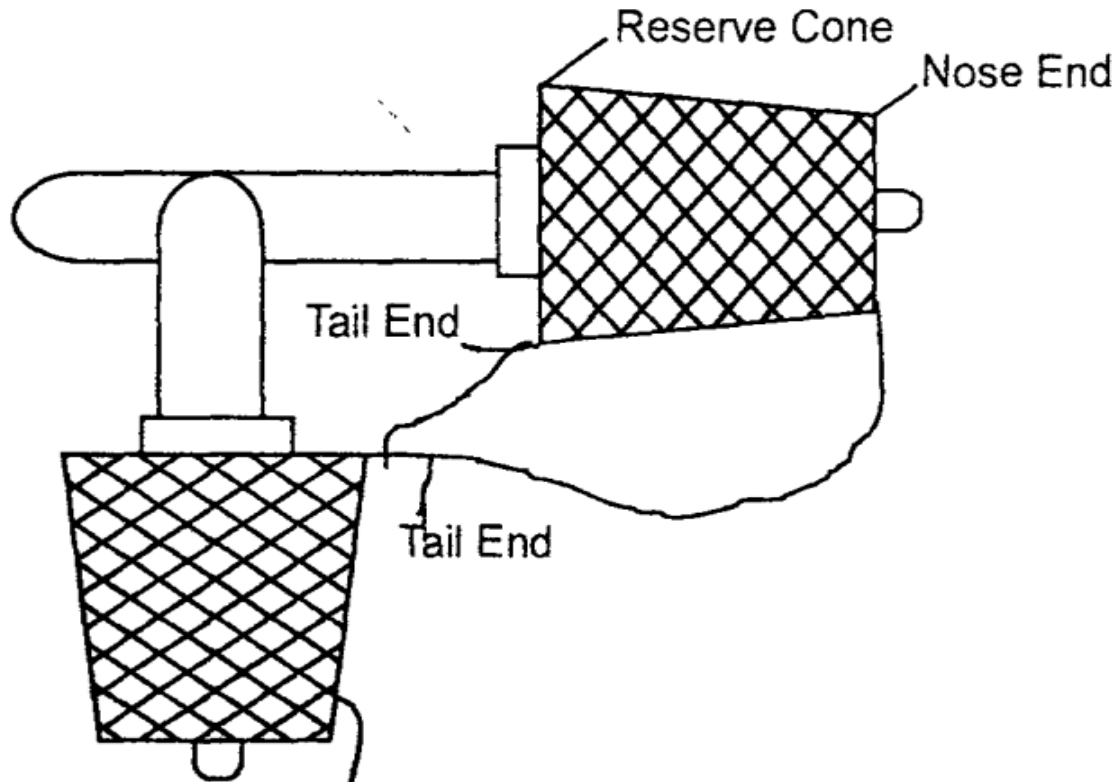


# Continuous Chain Creel

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- First used by Barber Coleman & Co.
- Creel is in the form of 2 arms that form acute angle with each other.
- These carry an endless chain that moves the column of supply package holders & tension units into working position.
- It also moves the exhausted package away from the working position, enabling creel changes in short time(15 mins).
- Creel is being transferred from creeling position to running position.
- The creel also has free space to accommodate storage of packages/ creel trolleys.

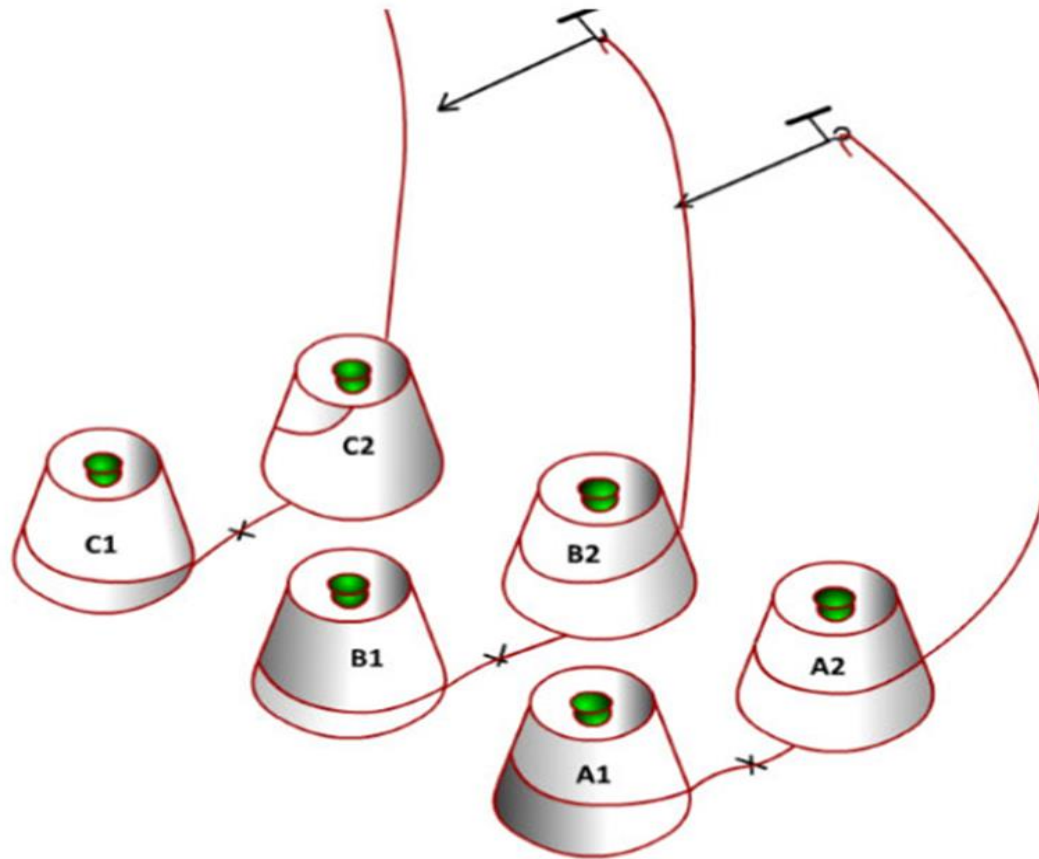
# Magazine Creel



*Fig. 1.3 Magazine Creel*

# Magazine Creel

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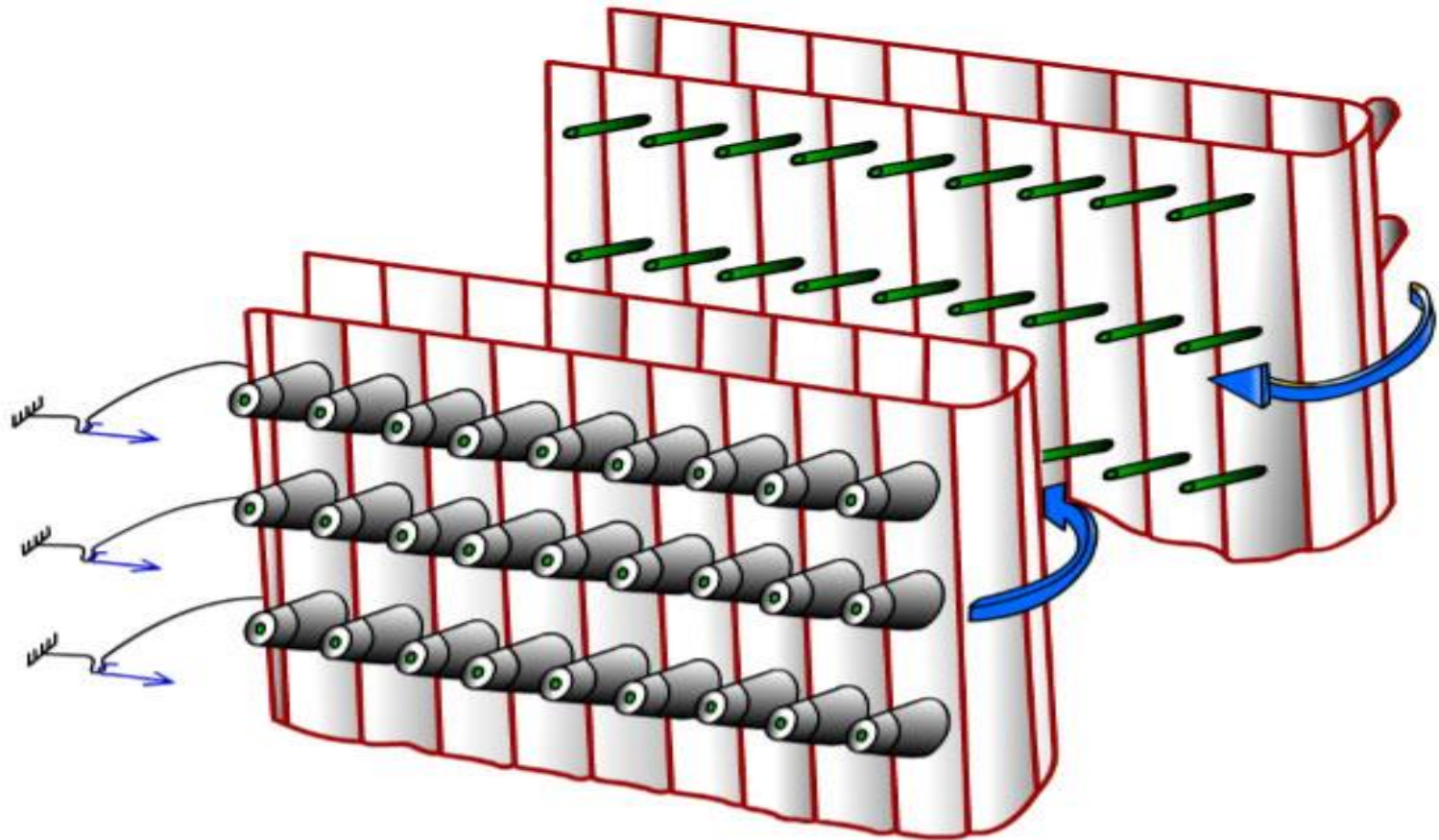
# Magazine Creel

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- ❑ In magazine creel, the tail end of the yarn from one cone is tied with the tip of the yarn of another neighboring cone.
- ❑ When the first cone is exhausted, the transfer to the second cone takes place automatically and machine does not stop.
- ❑ Thus the creeling time is completely eliminated which helps to improve the running efficiency.
- ❑ However, due to sudden change in unwinding position and tension variation associated with this, some of the yarns break during the transfer (known as transfer failure).
- ❑ The magazine creel has reduced capacity. If the creel has 1000 package holders, then the warp sheet can actually have 500 ends.

# Swivelling Creel

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# Swivelling Creel

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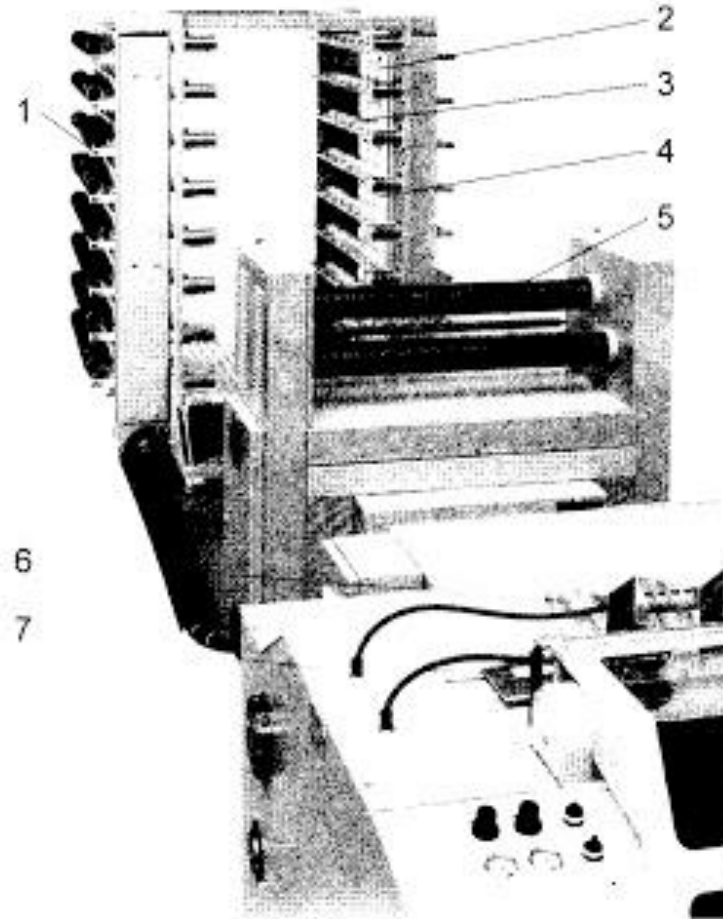
- ❑ In swivelling creel, the pegs with full packages can move from inside (reserve) position to the outside (working) position when the running packages are exhausted.
- ❑ Thus considerable time is saved.
- ❑ Then the operator replaces the exhausted packages with full packages when the machine is running.

# Automatic Creel

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- ❑ More sophisticated creel and used for modern warping machines.
- ❑ Basically a truck creel with automatic chain loading & unloading & is designed to reduce the creel change time.
- ❑ The yarn is threaded by an operative, from the supply package simultaneously through tension device & break detector & then gather all warp threads from 1 tension column, & twist them together before locating them in a holder on a threading truck.
- ❑ As the thread is pushed forward; it automatically threads & separates the end according to creels , tiers & columns.
- ❑ It requires shortest creel change time.

# Unrolling Creels



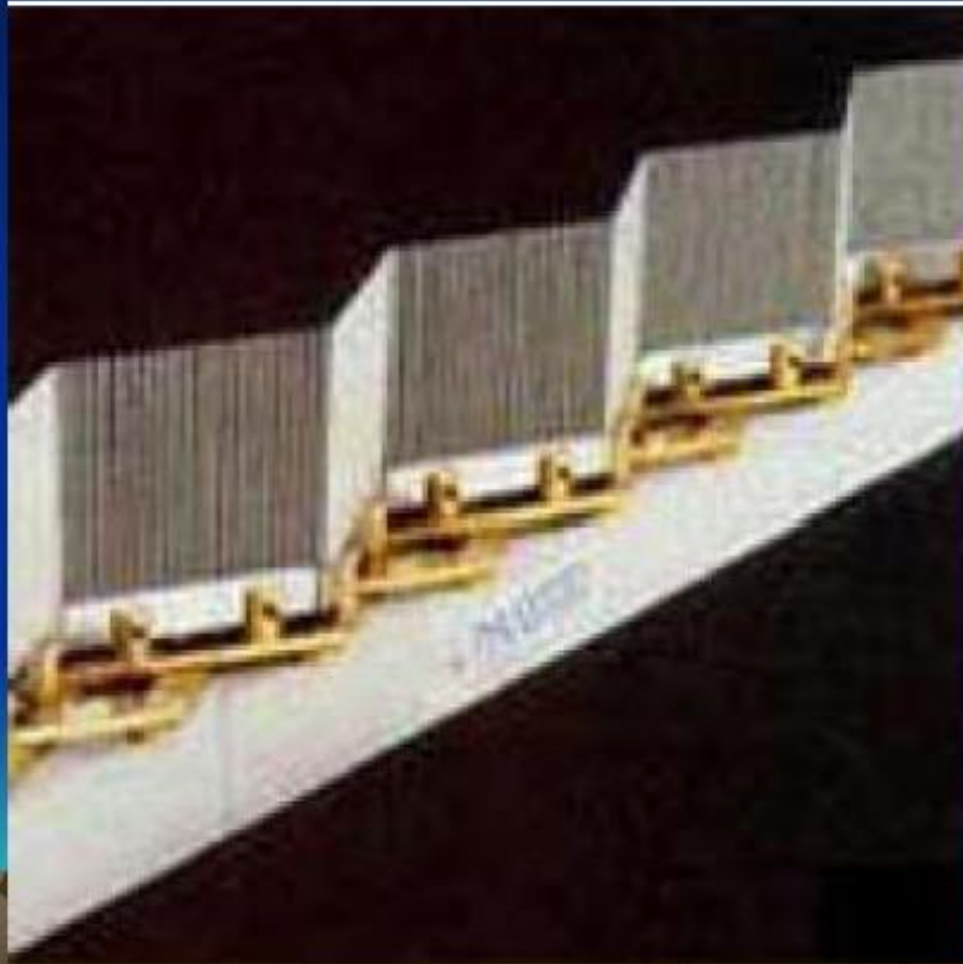
1=Lever,  
2=Bobbin,  
3=Take-up roller,  
4=Stop motion,  
5=Pre-tensioning device,  
6=Spacer reed,  
7=Warped.

# Unrolling Creels

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- ❑ In situation in which elastic materials are being warped in section onto warp beams from individual bobbins, an even yarn tension can only be achieved using a positive thread feed.
- ❑ Cylindrical bobbins on one or more rollers that are turning synchronously in the same direction are unwound tangentially.

# Adjustable reed



# Brake & Stop Motion

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- ❑ In order to stop the heavy warping beam rotating at high speed , a very efficient brake is required.
- ❑ Brake may be operated by mechanical, hydraulic or electrical devices & is fitted at the head stock or at the creel.
- ❑ Mechanical is used in conventional machines & electrical devices are used in modern machines.

# FUNCTION OF COMPONENTS OF CREEL

## Function of components of creel:

1. **Cone** or cheese spindle for high speed warping.
2. **Thread guide:** To pass through the yarn in the reqd way.
3. **Tensioner:** To keep the yarn always in a uniform tension.
4. **Yarn cleaner:** To remove various faults of yarn like slubs, neps etc.
5. **Suction fan or blower:** To remove the dirt & dust from the yarn.
6. **Breakage indicator:** To indicate breakage in package.
7. **Stop device:** To stop the m/c when yarn will be broken.



Fig: Combined tensioner



Fig: Auto Stopper



Fig: Ceramic Guide



Fig: Balloon Breaker



# HEAD STOCK

## Features of components of headstock:

1. **Adjustable or variable v-reed or wraith:** To control the width of the warp beam.
2. **Measuring & making device:** Measure the amount of warp yarn on the beam & marks the yarn.
3. **Yarn speed controlling device:** To control the speed of yarn.
4. **Pneumatic pressure unit:** To press the warp beam with the surface contact of driving drum.
5. **Break assembly:** It stop the m/c after read length is wound on beam.
6. **Driving drum:** Beam is in contact & control with driving drum.
7. **Stop motion:** Used to stop the m/c after read length is wound on beam.
8. **Beam bracket:** To support & hold the beam.
9. **Lease rod:** Used for separation of yarn individually.



Fig: Control Panel



Fig: V-reed



Fig: Suction Fan

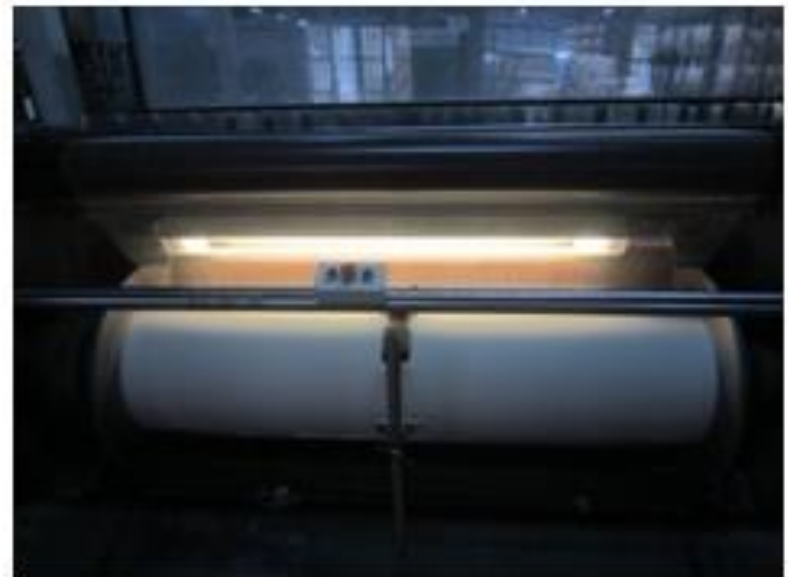


Fig: Pre-beam



Fig: Measuring Device



Fig: Driving Drum

### **Control device:**

Similar to winding, warp yarns are threaded through tension devices , stop motions, leasing rods and the reed. The stop motion electrically links each warp end to the warper braking system; when a warp end breaks, the warper stops. A light indicates the location of the broken end. The warping process is generally irreversible, unwinding, of the beam would cause yarn entanglement. The stop motion device which can be mechanical or electronic for quick response, is usually located near the creel. Fans are used to prevent lint accumulation when warping staple yarns.

# Sectional Warping Machine



# HEAD STOCK OF SECTIONAL WARPING MACHINE:



Fig: Sectional or Pattern warping

# Sectional Warping Machine

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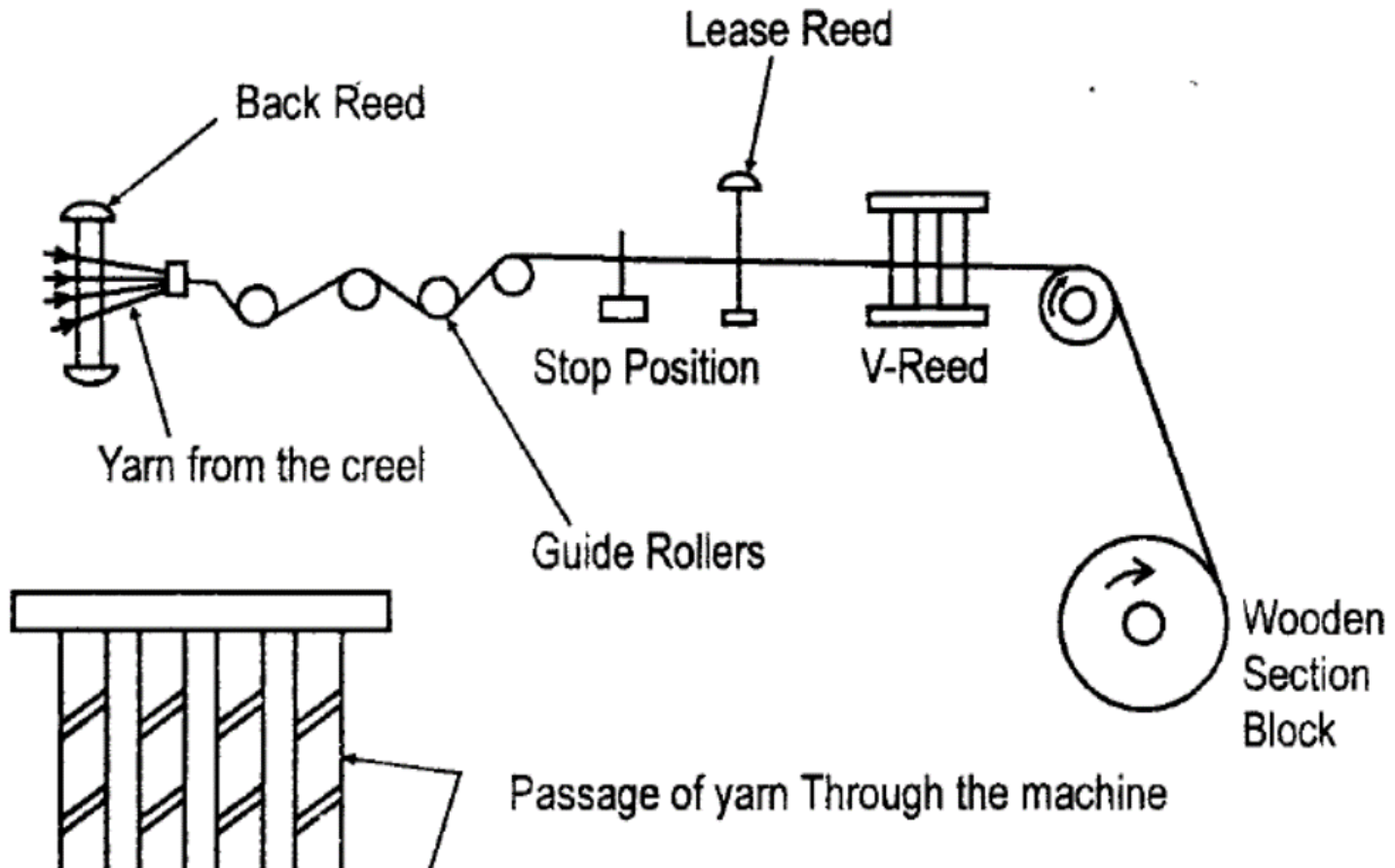
- ❑ Sectional warping is preferred over beam warping for multi-colored warp. Here the entire width of the warping drum is not developed simultaneously. It is developed section by section.
- ❑ Also used for double/grey or mono-colored warps that do not require sizing.
- ❑ Here a weavers beam is produced, where as sizing beam is produced in direct warping .

# Sectional Warping Machine

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- ❑ In case of single colored yarns, the yarns are sized and then wound on the beam.
- ❑ The yarn is wound in sections & each section has particular width.
- ❑ Thus the total number of warp ends for the weavers beam are divided into suitable number of sections on the warping drum.

# Sectional Warping Machine





# Passage of the Yarn

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- ❑ Cone/Cheese are placed on a V-shaped creel or a semi-circular creel depending upon whether stop motion is used or not.
- ❑ The yarn from the creel passes through the back reed. Reed maintains uniform spacing of the yarn throughout the width of the warp.
- ❑ Then yarn passes over & under guide & drop rollers. The drop rollers impart tension to the yarn passing under them & holds the yarn tight when the machine is stopped.

# Passage of the Yarn

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- ❑ Then yarn goes through the leasing reed. The use of reed is to form an end to end lease at the start & completion of each section.
- ❑ Each end of the warp passes separately inserted in the warp at the completion of one section of warp & reed is lowered.
- ❑ The purpose of the leasing is to wind as well as unwind the warp without any entanglements between threads to distribute evenly.

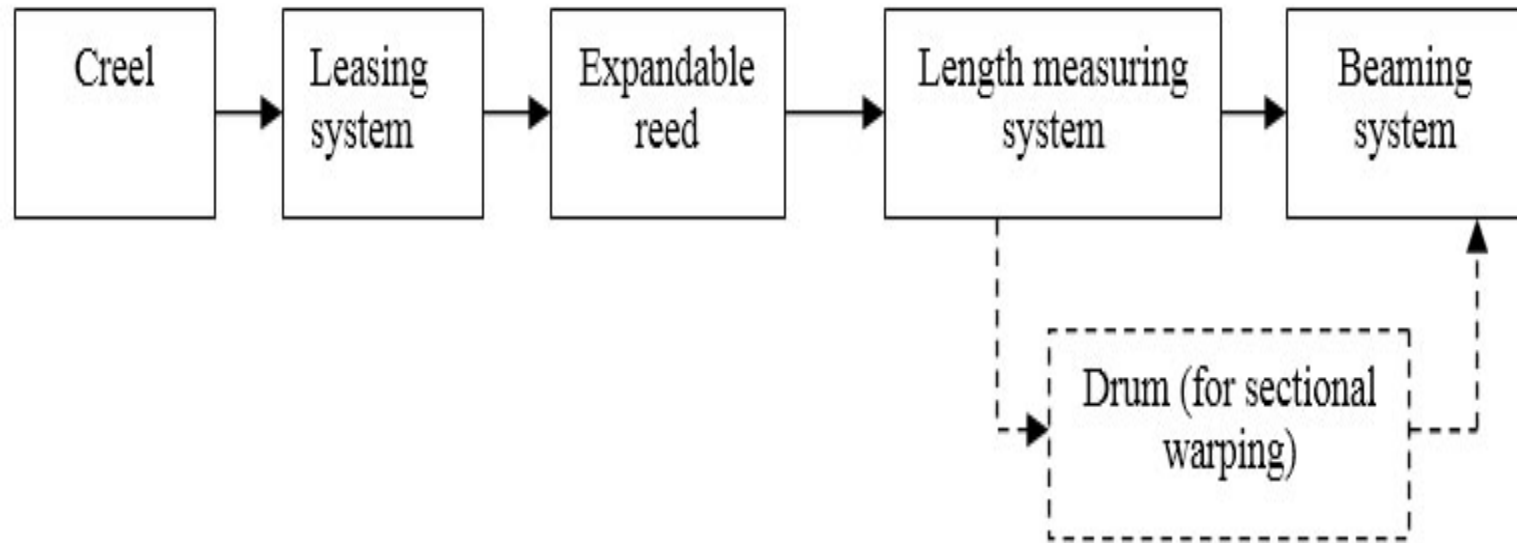
# Passage of the Yarn

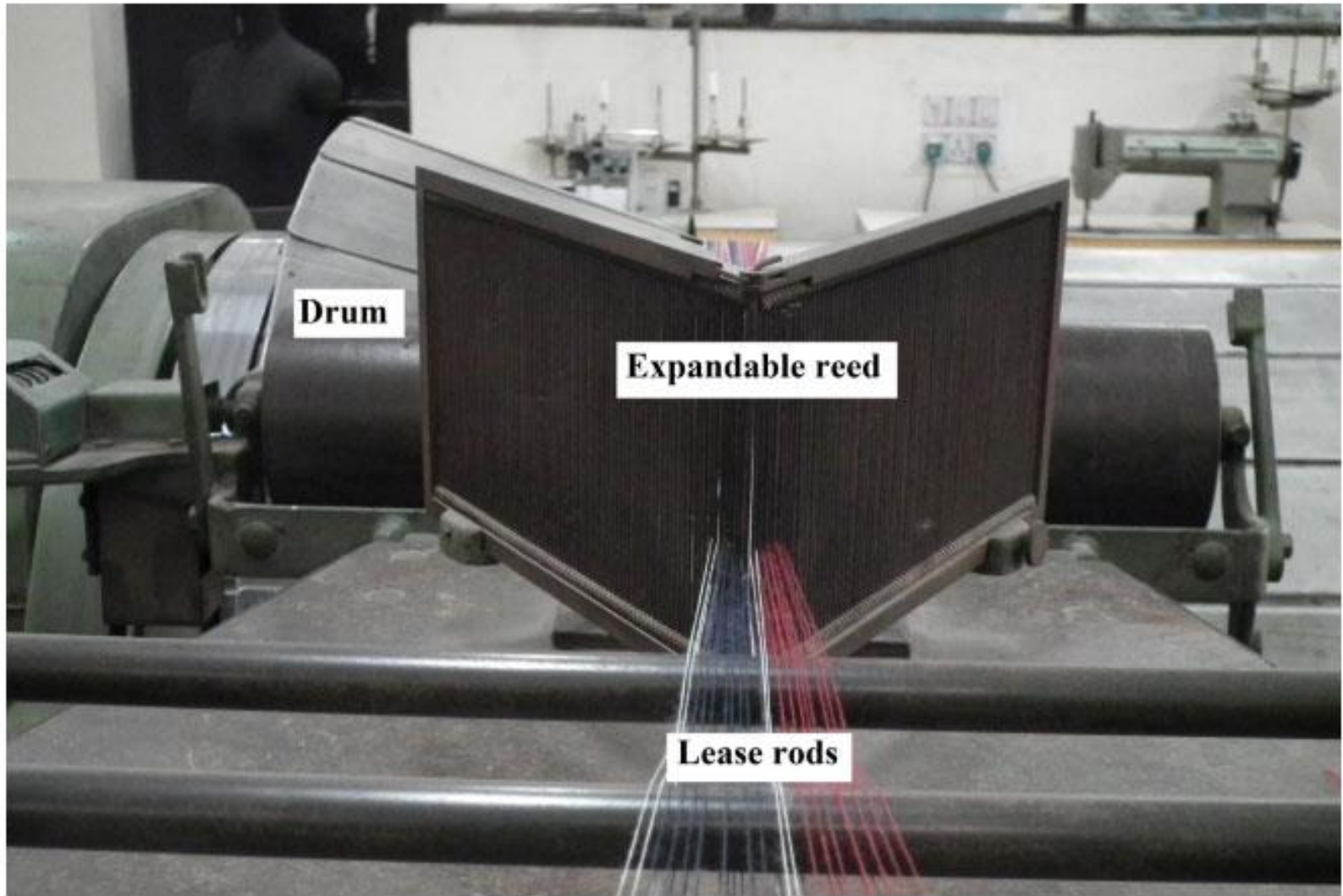
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- ❑ The yarn then goes through a stop motion device which stops the machine in the event of the end breakage in supply.
- ❑ Yarn then passes through the V-reed which enables the width of the warp through it to be adjusted according to sections.
- ❑ The yarn then passes through the measuring roller & is wound on the wooden block called Swift.
- ❑ After winding pre-determined length of yarn, leasing is carried out & next section winding is done.

# Sequence of Sectional Warping

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# Sequence of Sectional Warping

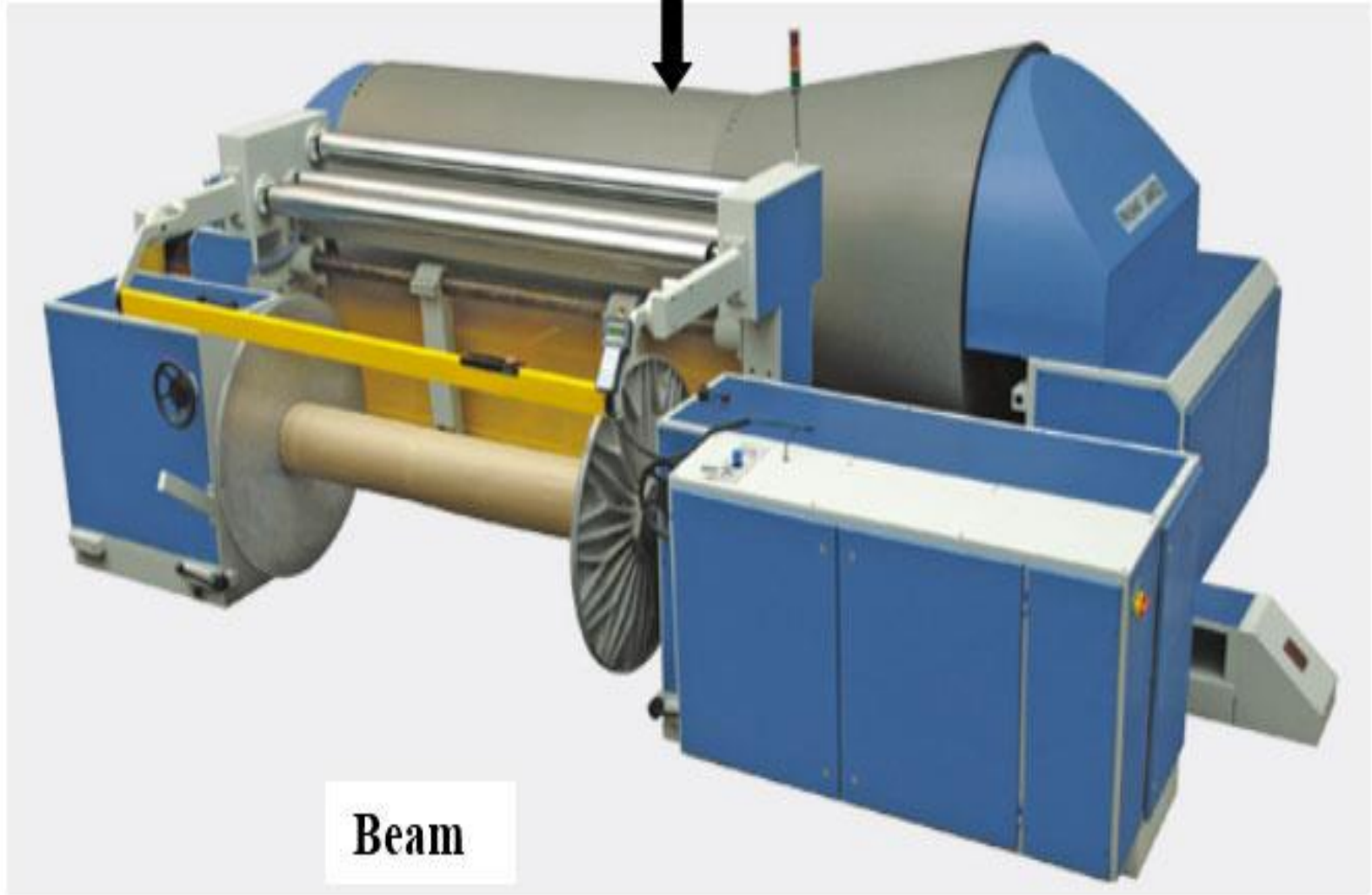
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**Leasing:** It is a system by which the position of the ends is maintained in the warp sheet. Generally it is done by grouping the ends in two groups (odd and even). If odd ends are passing over the lease rods then the even ends will pass below the rod. The relative positions of the ends will reverse in case of second lease rod.

**Expandable reed:** It is used to control the spacing between consecutive ends. The two limbs of V shaped expandable reed can be expanded or collapsed as per the required spacing of ends.

**Beaming system:** In the beaming process, all the sections are simultaneously transferred to the flanged warper's beam. The drum is rotated by the tension of warp sheet where as positive drives are given to the warper's beam. The speed of beaming process in sectional warping is quite slow (around 300 m/min).

**Drum**



**Beam**

# Comparison between Beam & Sectional Warping

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<b>Beam warping</b>	<b>Sectional warping</b>
Used for high volume production	Used for small volume and customised production (stripes and specialised yarns)
One step process	Two step process
High creel capacity is required	Low creel capacity is sufficient
Comparatively less expensive	Comparatively more expensive
Beaming speed is high	Beaming speed is low
Better control over the tension of individual yarns	Lesser control over the tension of individual yarns
More popular	Less popular



# Warper Beam Defects

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❖ **Sunken Ends** : Some of the warp ends of a layer can get submerged in the next inner layers.

■ **Cause :**

- Flanges get damaged due to improper handling of the beam & unsatisfactory storage condition and hence unwinding becomes difficult.

■ **Remedies:**

- Care should be taken of the beam & it should be stored in beam racks. Preferably cushioning seats between beams.

# Warper Beam Defects

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## ❖ Lapped end

### **Cause:**

The broken end of yarn is not tied to the end on the warp beam & overlaps the adjoining yarn. The beam is not properly brake & the signal hook fails to operate.

### **Remedies:**

Tying the broken end to the end on the warp beam.

Proper signal hook.

## ❖ Piecing

### **Cause:**

One broken end is pieced to another yarn end on the warping beam.

### **Remedies:**

By proper joining.

# Warper Beam Defects

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## ❖ **Soft ends on the warping beam**

### **Cause:**

Breakage of a group of ends & piecing them in bundle or by lapping. This defect is caused by the carelessness of the operator.

### **Remedies:**

Careful operation.

Broken end should be pieced up properly.

## ❖ **Incorrect form of build**

### **Cause:**

Caused by non uniform spreading of ends in the guide reed & its improper setting & conical winding in case of non uniform pressure of the warping beam.

### **Remedies:**

Uniform spreading of ends.

Appropriate setting.

# Warper Beam Defects

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## ❖ **Slacks & irregular yarn tension**

### **Cause:**

It happens due to any one of these reasons- improper threading of the yarn into the tension devices, ejection of yarn from under the disc of the yarn tensioning device, or yarn tension devices of poor quality.

### **Remedies:**

Proper threading of tension device.

Good quality of tension device.

## ❖ **Broken ends on the beam**

### **Cause:**

A group of ends is broken & tied as a bunch or worked-in with overlapping.

### **Remedies:**

Broken ends should be removed.

# Warper Beam Defects

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## ❖ Conical winding on the beam

### **Cause:**

It occurs due to incorrect load applied by the pressure roller.

### **Remedies:**

Correct load applied.

## ❖ Improper length of warping

### **Cause:**

It is due to malfunction of the counter & the brakes of the measuring device & warp beams.

### **Remedies:**

Good measuring device