WEAVING TECHNOLOGY II

Secondary Motions of Weaving

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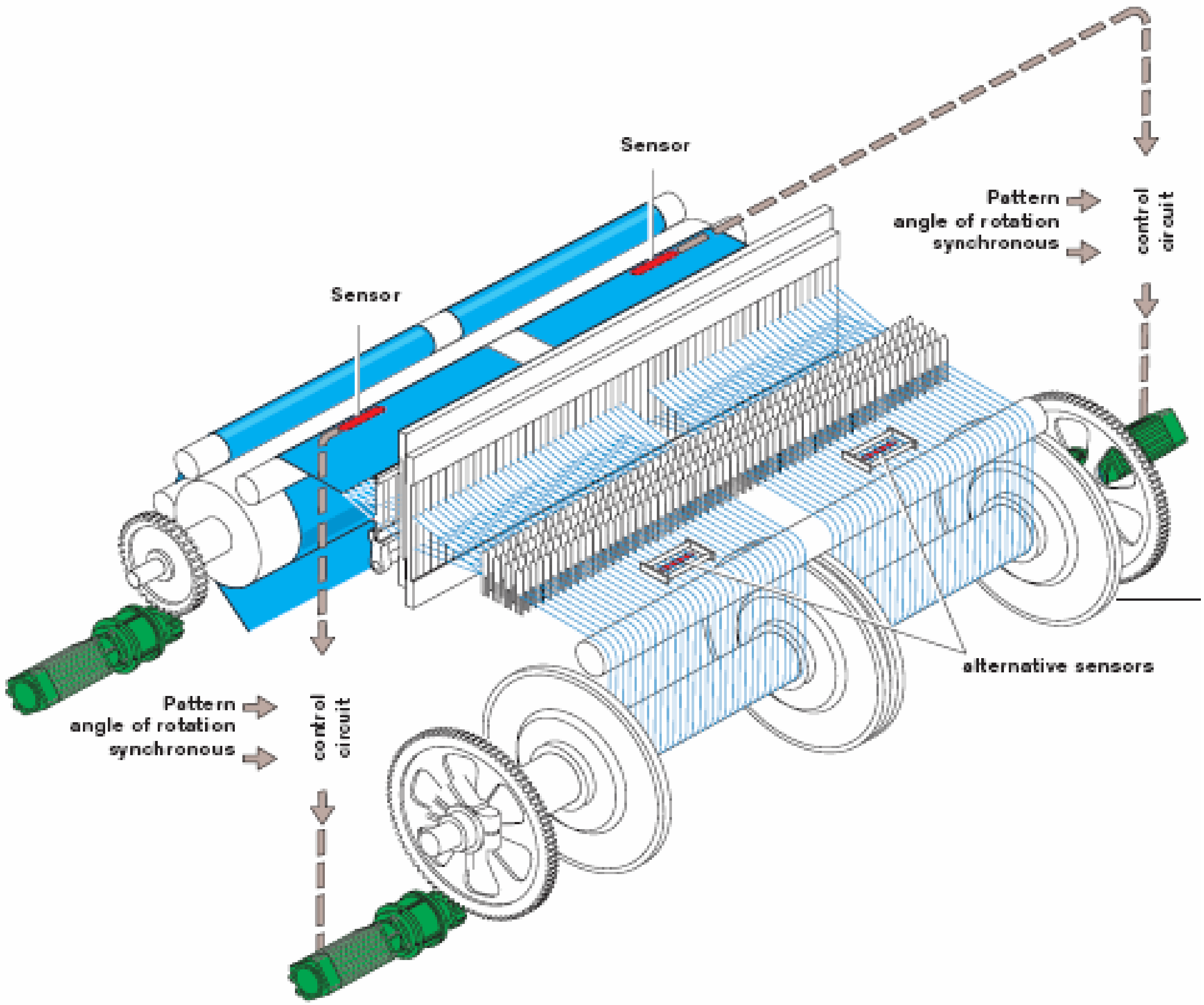

Sensor
Sensor
Pattern
angle of rotation
synchronous
control circuit
alternative sensors
Pattern
angle of rotation
synchronous
control circuit

Other Loom Mechanisms

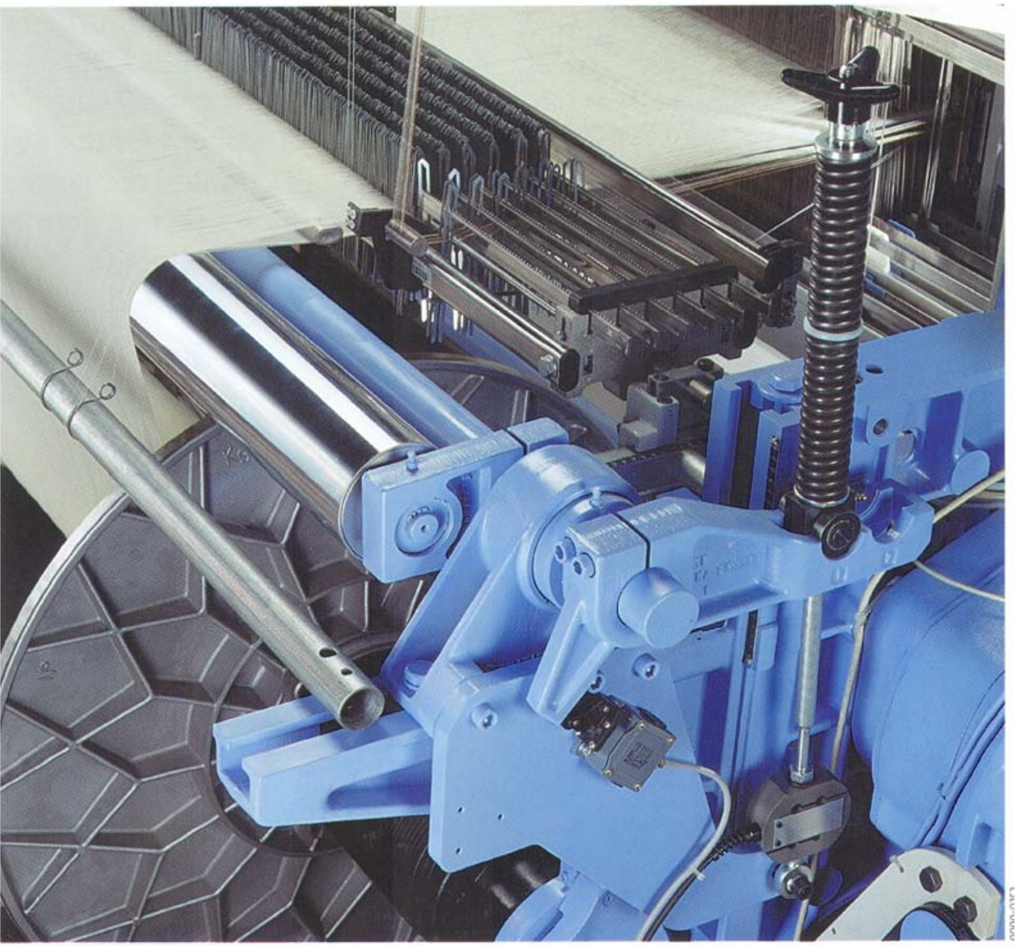
- A series of other mechanisms is used in the interest of productivity and quality.
  - Warp protector motion
  - Warp and weft stop motion
  - Weft replenishment
  - Weft patterning
  - Weft mixing
  - Weft yarn storage system
  - Selvedge formation: leno, tuck-in or dummy

Warp protector motion

- The warp protector motion will stop the loom to prevent excessive damage to the warp threads, cloth, and reed if the weft carrier becomes trapped between the top and bottom shed lines and the reed by failing the complete its traverse.

Normal weaving conditions

Warp and weft stop motion



Warp stop motion

- Warp and weft stop motions will stop the loom almost immediately when an warp end or a pick breaks off.
- to avoid the faults disturbing the fabric surface
- not to degrade the fabric quality
- not to decrease the weaving efficiency

The broken end is repaired and handled by the operator.

Weft replenishment

Pirn transfer mechanism

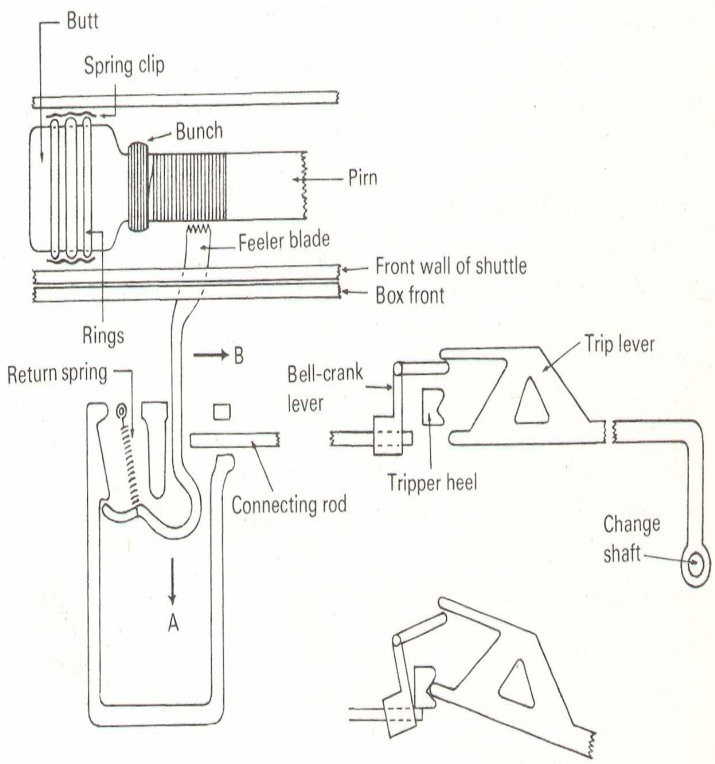


Fig. 9.3 A side-sweep feeler

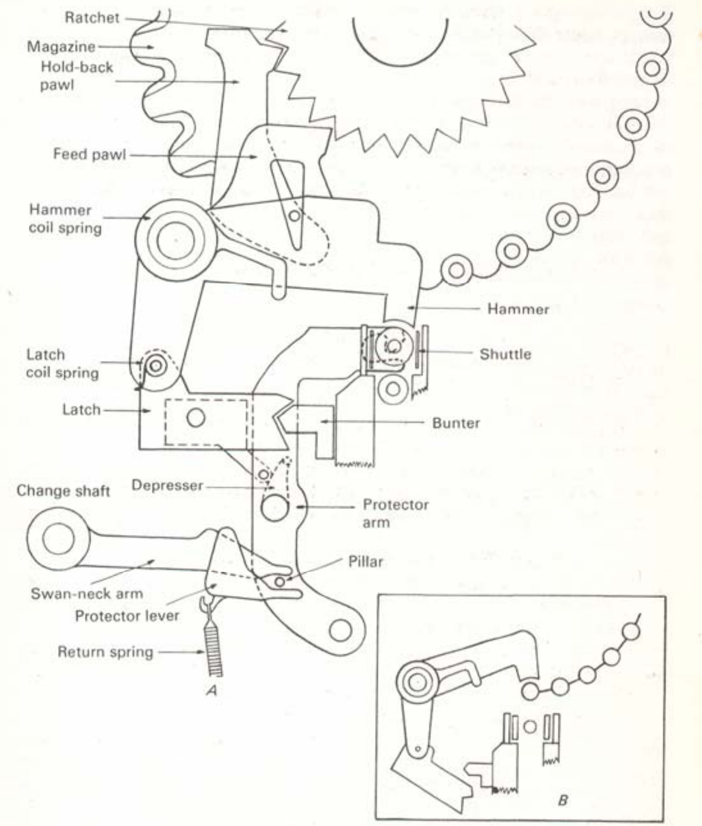
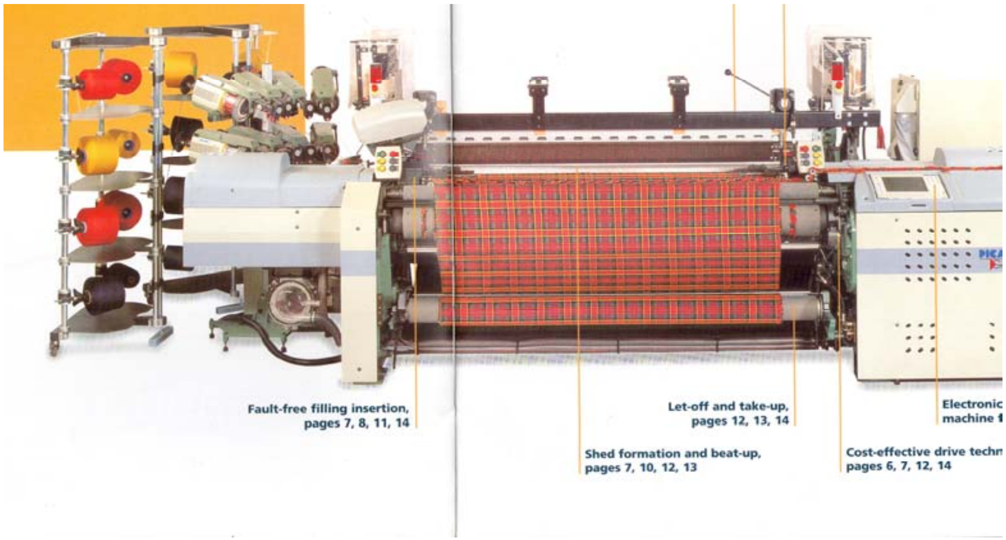


Fig. 9.6 A bobbin-change mechanism

Detecting feeler motion

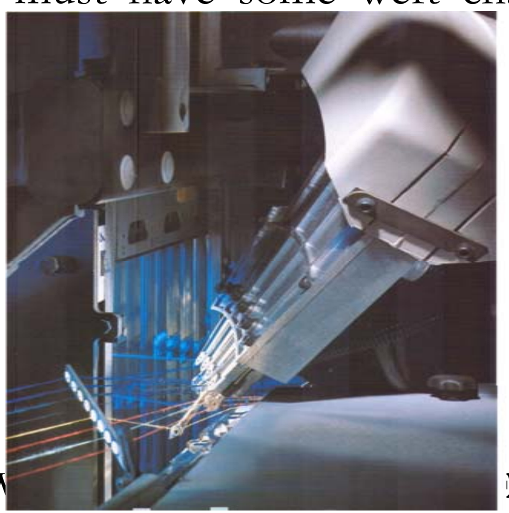
Weft patterning

- Widthwise variations in woven fabric's appearance are accomplished by using yarns of different fibers, counts, twists, and/or colors.
- If the changes are in the filling (weft-patterning), different yarns are introduced across the fabric.
- **Each variation** in the weft requires a **separate source of supply** and **a yarn feeding mechanism** which are activated by a selection mechanism available on the weaving machine.
- On shuttleless weaving machines the weft supply packages are mounted stationary on the frames.

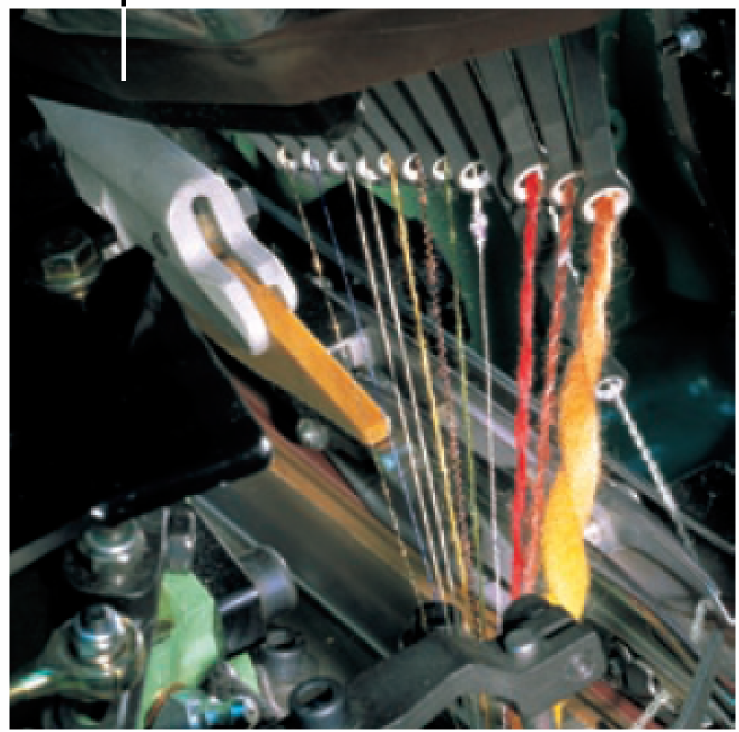


Weft patterning

- During picking, the individual weft thread is fed to the weft carrier.
- Thus, to change the weft color, only the weft feeder, whose weight is few grams, is displayed over a distance of millimeters.
- The color weft change motion does not, in effect, limit the speed of the weaving machine.
- All shuttleless weaving machines equipped with one-sided picking motions must have some weft change motion.

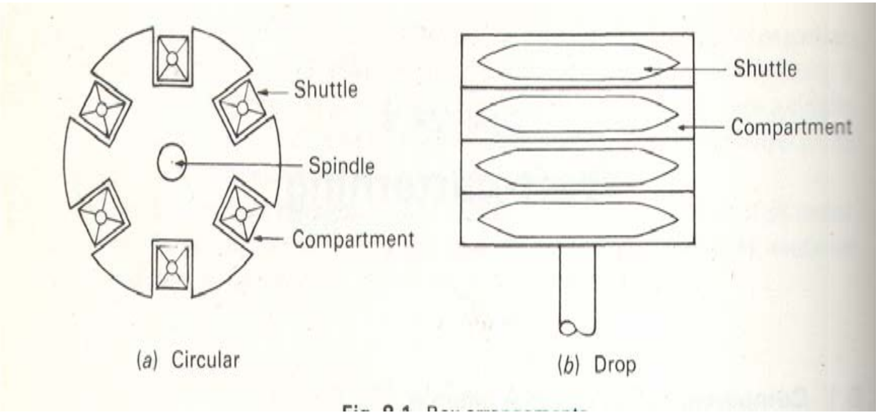


The filling insertion system, with positive control in
every phase, facilitates the processing of the wides
range of yarn types and counts – from fine silk yarn
through glass rovings to the coarsest effect yarns.
The count range lies between 0.77 tex and 3333 tex

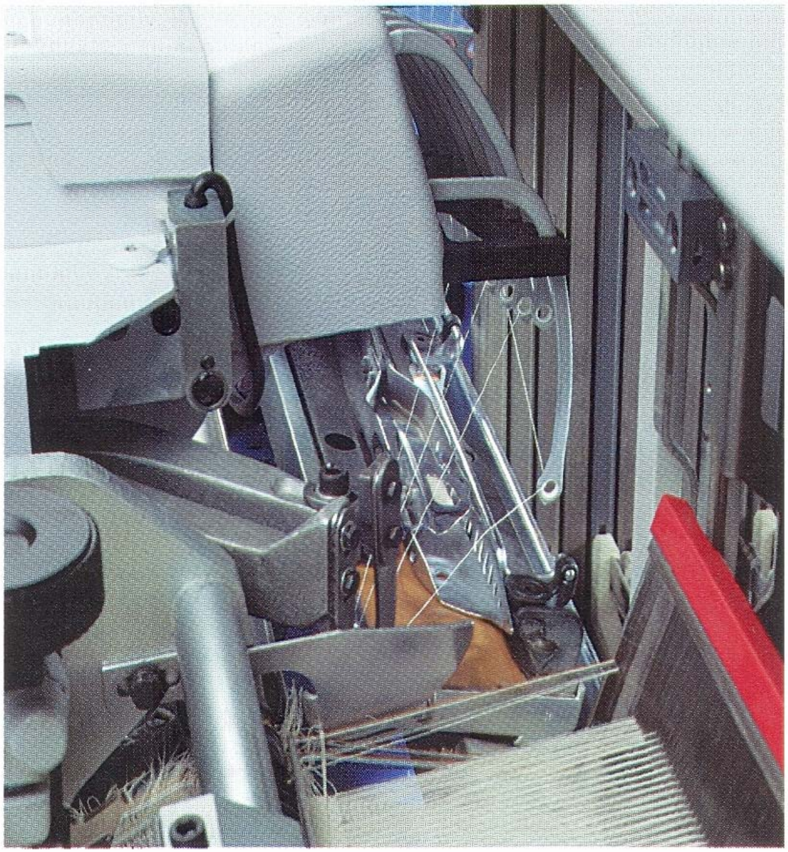


Weft patterning

- On a shuttle loom, it is necessary to have a separate shuttle and shuttle box or for each variation.
- Each shuttle of a different yarn is in its own “box”.
- Looms are designed to control two or four shuttle boxes by the action of selection mechanism.
- To change the color, the position of the shuttle box is changed.



Weft mixing

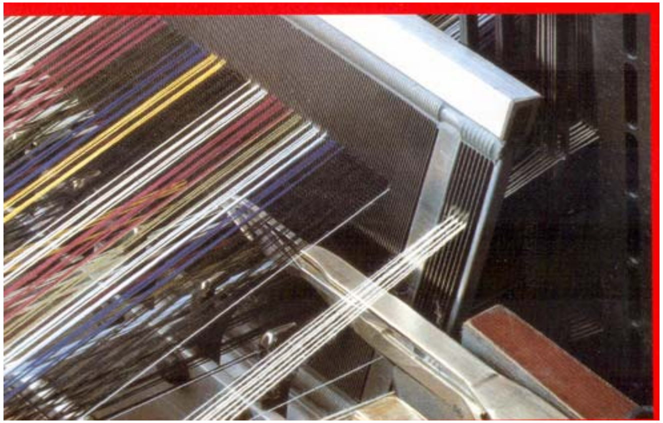


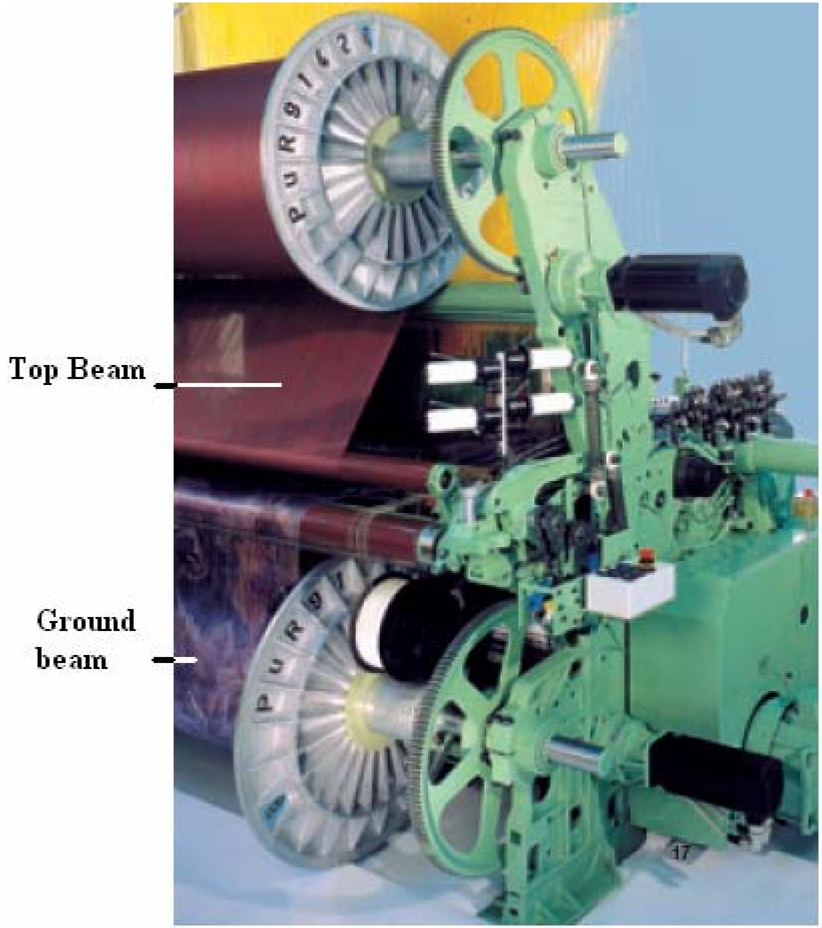
- When a uni-color yarn, made of wool, silk and filament fibers is fed from a single package, more or less apparent weft barriness are produced on the fabric surface.
- This is due to the variations in yarn count, color, tension or weft density.
- In uni-color weaving, filling is supplied from at least two or more packages for the production of some plain fabrics.
- The individual picks are regularly alternated.
- A two-package **weft-mixing** is generally sufficient to avoid the trouble.

Warp patterning

- If the changes in the yarn occur in the warp (warp patterning), the introduction of yarn of different color, linear density or character into the warp of a fabric this is relatively easy to achieve by pre-planning the position of warp yarns at the warping stage before weaving.
- Note:
- Large differences in yarn linear density or crimp will generally require that the warp yarn should be supplied from more than one beam.
- If more than three beams are required simultaneously on one loom, problems arise with regard to accommodation and accessibility, and it may be even necessary in some cases to supply the warp yarn from individual packages in a creel as in carpet or velvet weaving.

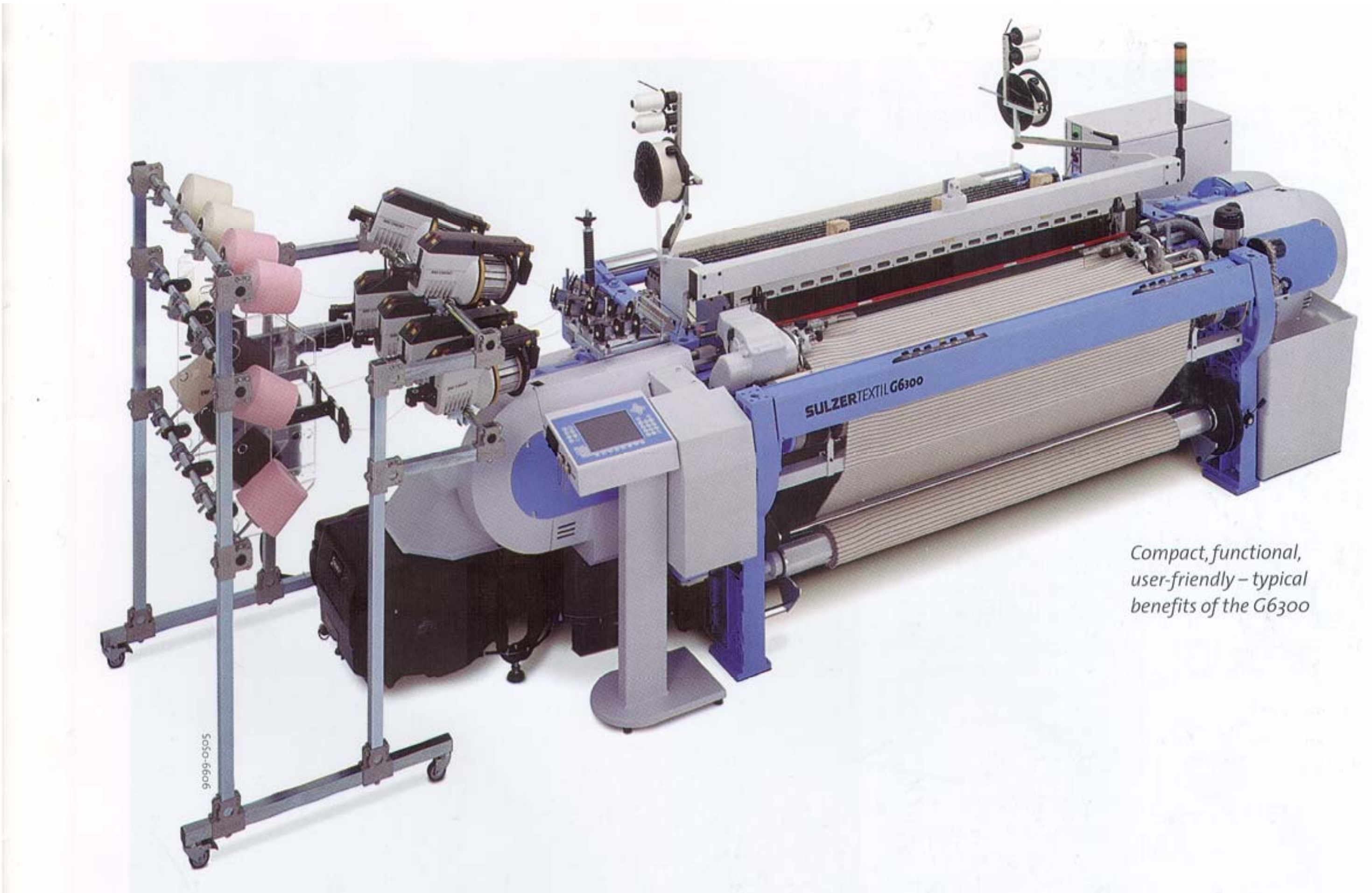
Warp patterning






VAN DE WIELE
CRT

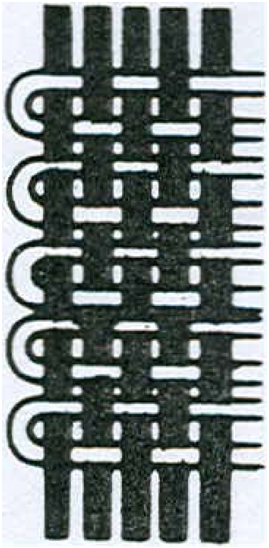
Weft yarn storage system



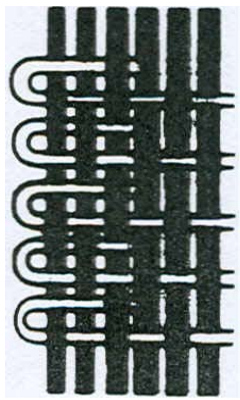
Selvedge formation

- The basic function of any **selvedge** is to lock the outside warp threads of a piece of cloth and so prevent fraying.
- It extends for only 1-2 cm into the fabric.
- The selvedge should be strong enough to withstand the strains of the stenter in the finishing process.
- The selvedge should have a neat and uniform appearance. This is most desirable from an aesthetic point of view.
- The uniformity is also essential to allow the garment manufacturer to line-up one edge of the fabric, layer upon layer, so that many layers can be cut simultaneously and accurately.

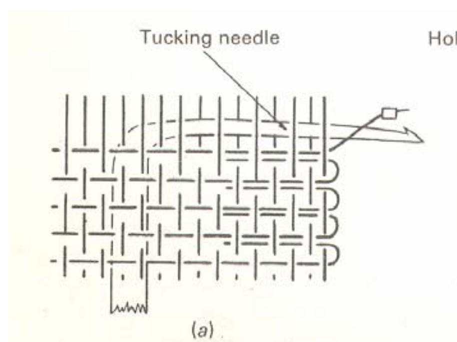
Selvedge formation

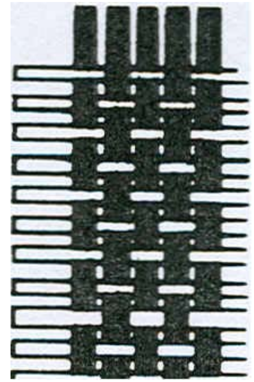


NORMAL
SELVAGE

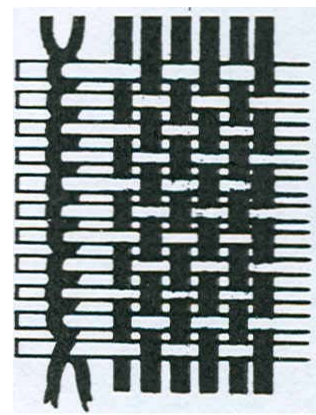


TUCKED
SELVAGE

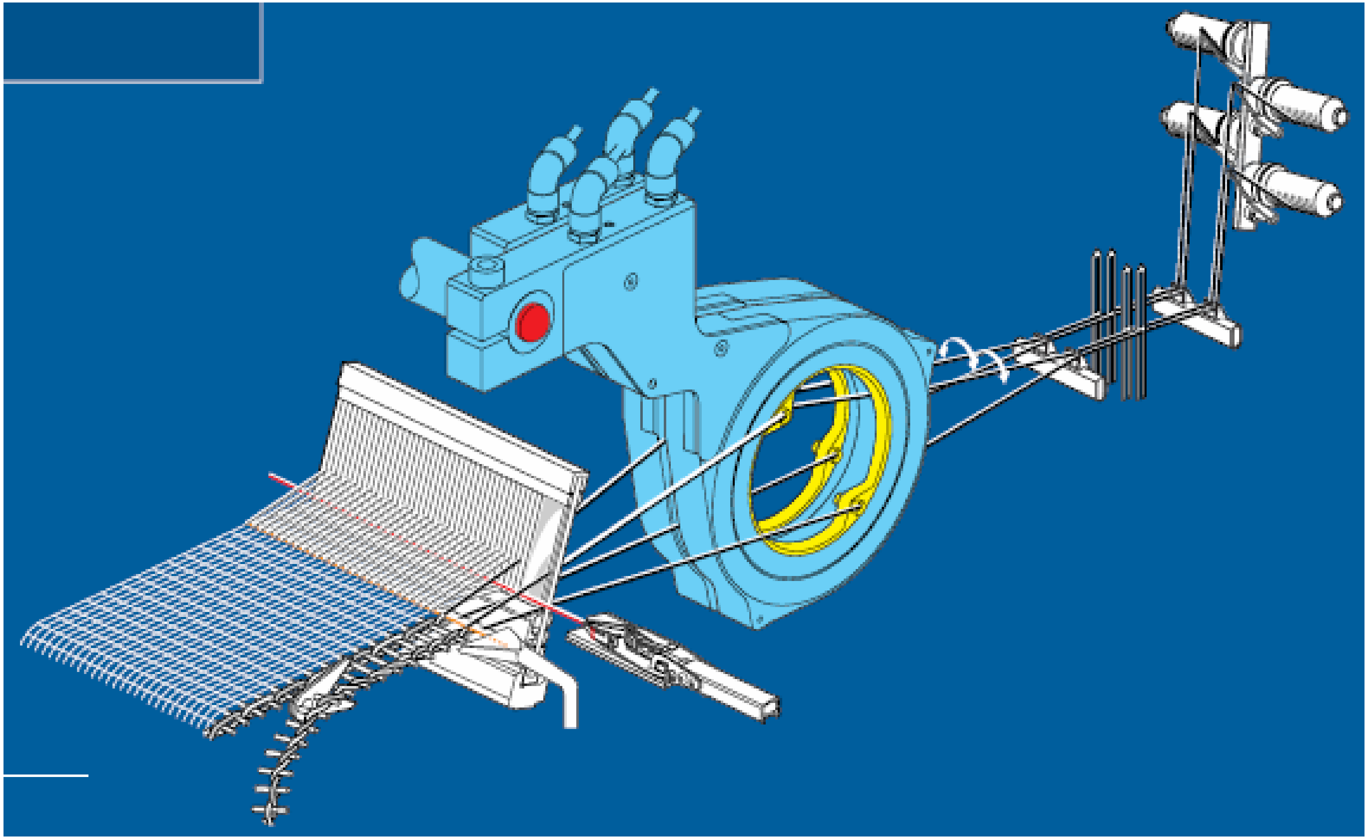




FRINGED
SELVAGE



LENO
SELVAGE



Leno creates the fabric selvedge.

Temples

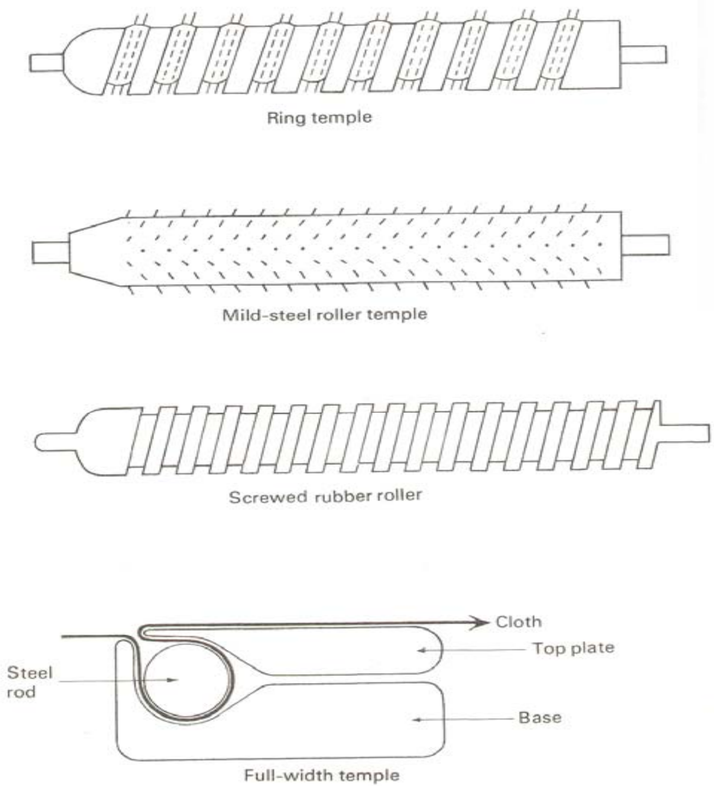


Fig. 6.24 Temples

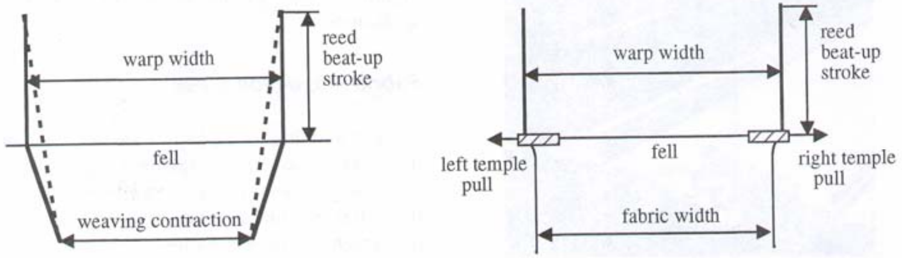
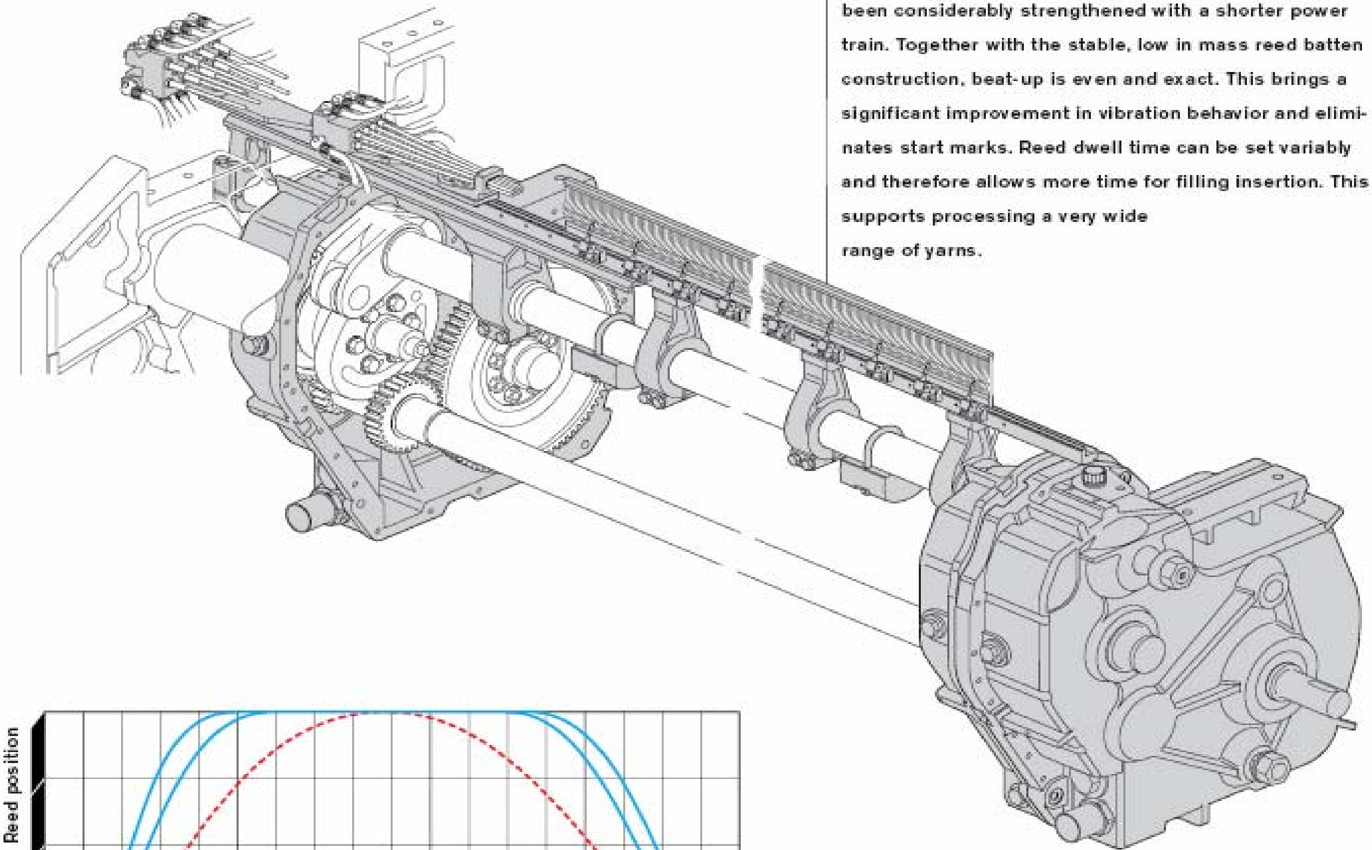


FIGURE 5.31 Temple function in weaving.

Loom drive

- The mechanisms of a power-driven loom receive their motion from shafts that traverse from side to side in the loom and are driven from a motor.
- **The main shaft** (or **crank shaft**) operates the sley mechanism
- **The bottom shaft**; it operates the picking mechanism
- **The cam shaft** operates the shedding mechanism.
- Each **weaving cycle** is completed **in one revolution of the main shaft**, and thus the **loom speed** is expressed in terms of the **number of revolutions of the main shaft per minute**, namely, 650 r.p.m. etc

Bilateral reed drive with large, fast running connection shaft between the gears. In the AS-type these have been considerably strengthened with a shorter power train. Together with the stable, low in mass reed batten construction, beat-up is even and exact. This brings a significant improvement in vibration behavior and eliminates start marks. Reed dwell time can be set variably and therefore allows more time for filling insertion. This supports processing a very wide range of yarns.

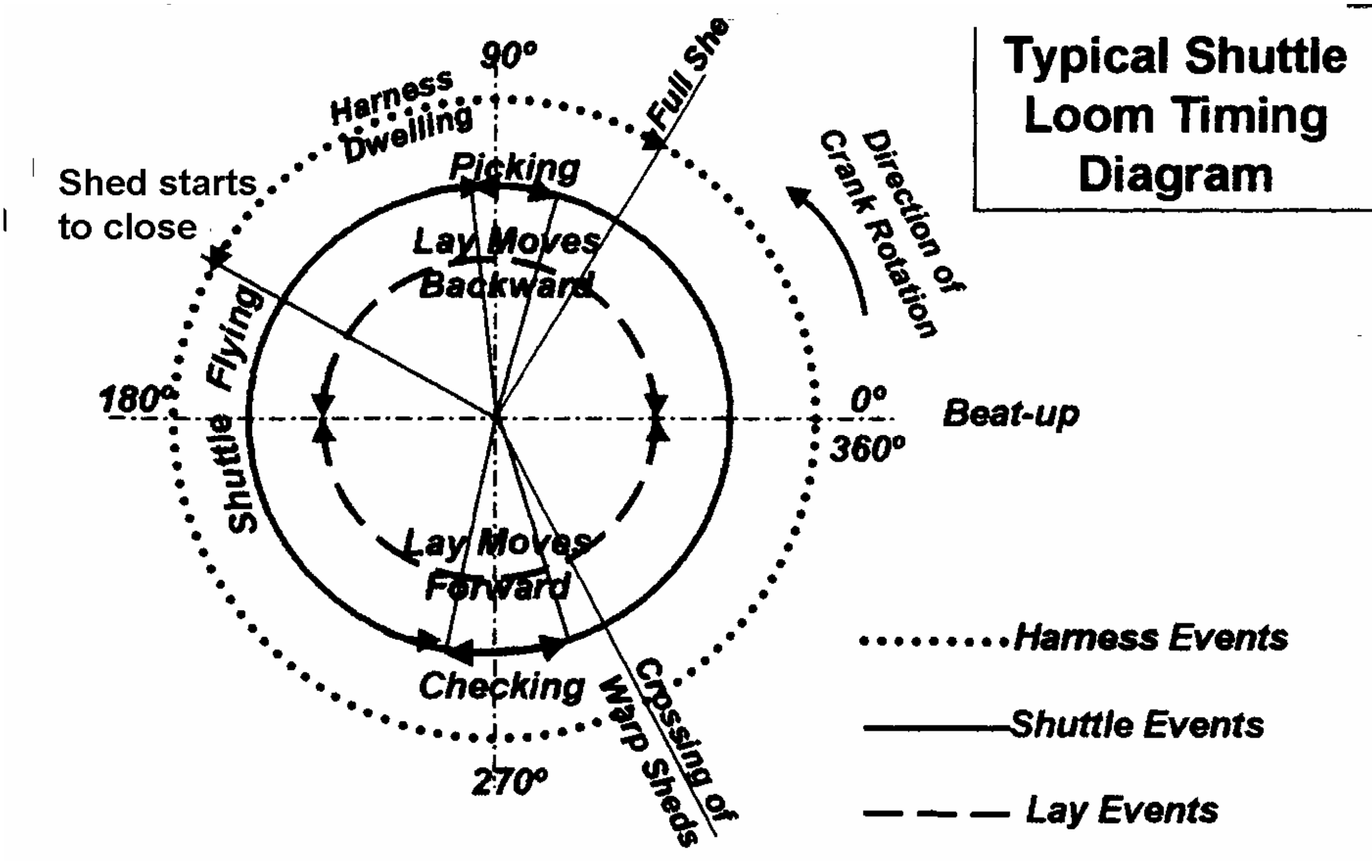


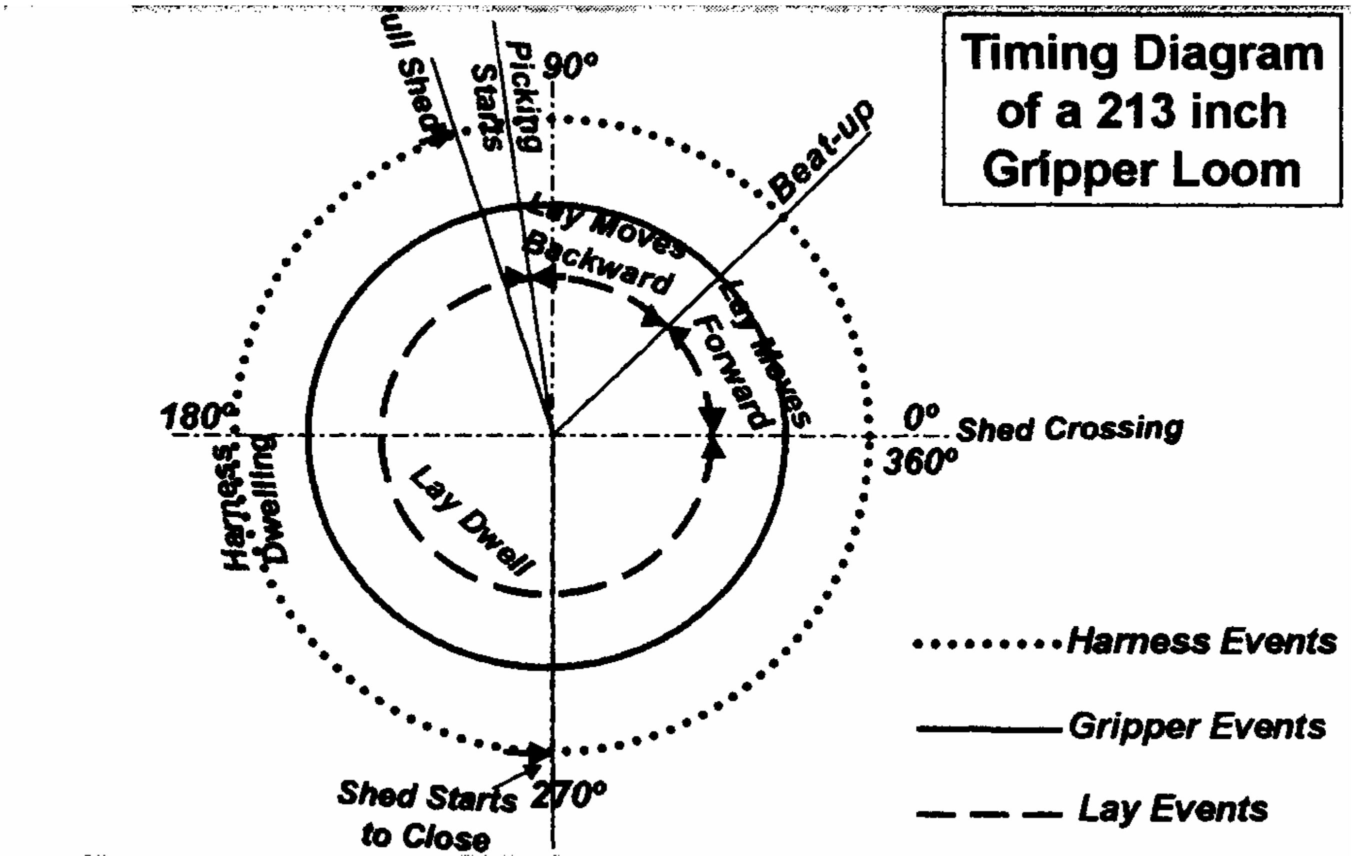
Loom Timing

- Synchronization between the timing of different events of weaving actions is a must to ensure proper operation of the loom.
- The loom timing is usually based on the position of the crank in a weaving cycle (one pick).
- The position of the crank is measured by the crank angle in degrees. During one cycle the crank (main shaft) rotates one revolution (0^0 - 360^0)

Loom Timing

- The loom timing is presented by a diagram termed “Loom Timing Diagram”. The diagram depicts the start and end of each primary event of different weaving motions. The start and end of events are influenced by loom type, fabric width, and fabric type.


Typical Shuttle Loom Timing Diagram
90°
Harness Dwelling
Full She
Shed starts to close
Picking
Direction of Crank Rotation
Lay Moves Backward
Shuttle Flying
180°
0°
360°
Beat-up
Lay Moves Forward
Checking
Crossing of Warp Sheds
270°
Harness Events
Shuttle Events
Lay Events



Timing Diagram of a 213 inch Gripper Loom
90°
Picking Starts
Full Shed
Beat-up
Lay Moves Backward
Lay Moves Forward
180°
0° Shed Crossing
360°
Harness Dwelling
Lay Dwell
Shed Starts to Close
270°
Harness Events
Gripper Events
Lay Events