Object

The object of a weft stop motion is to stop the loom as soon as the weft being inserted breaks in transit or when there is no weft in the shuttle. This motion helps to avoid the formation of "cracks" in the fabric. The motion is therefore a must for high speed looms, especially if they are also producing expensive fabric.

Types

There are two distinct types of weft stop motion. These are:

1. Side weft-fork motion
2. Centre weft-fork motion.

7.3.1 Side Weft-fork Motion

Description

As the name indicates, the side weft-fork motion is fitted to one side of the loom i.e. near the starting handle. In Figure 7.8 a cam B is fixed to the bottom shaft A. The cam touches a hammer lever C. The lever is connected to a hammer D. A weft-fork E made of light metal, usually having three prongs bent at right angles, is fulcrumed at its front end F by a screwed spindle G. The spindle is coupled to a weft-fork lever I which is always in contact with the starting handle J. A channel or groove K is cut into the race board L to guide the fork when the sley comes forward to beat up the weft. However, the fork is undisturbed so long as it is touched by the weft lying across the channel from the selvedge to the shuttle in the box. Between the end of the reed and the mouth of the box is a grid, which acts as a support for the weft H and enables it to raise the weft fork.

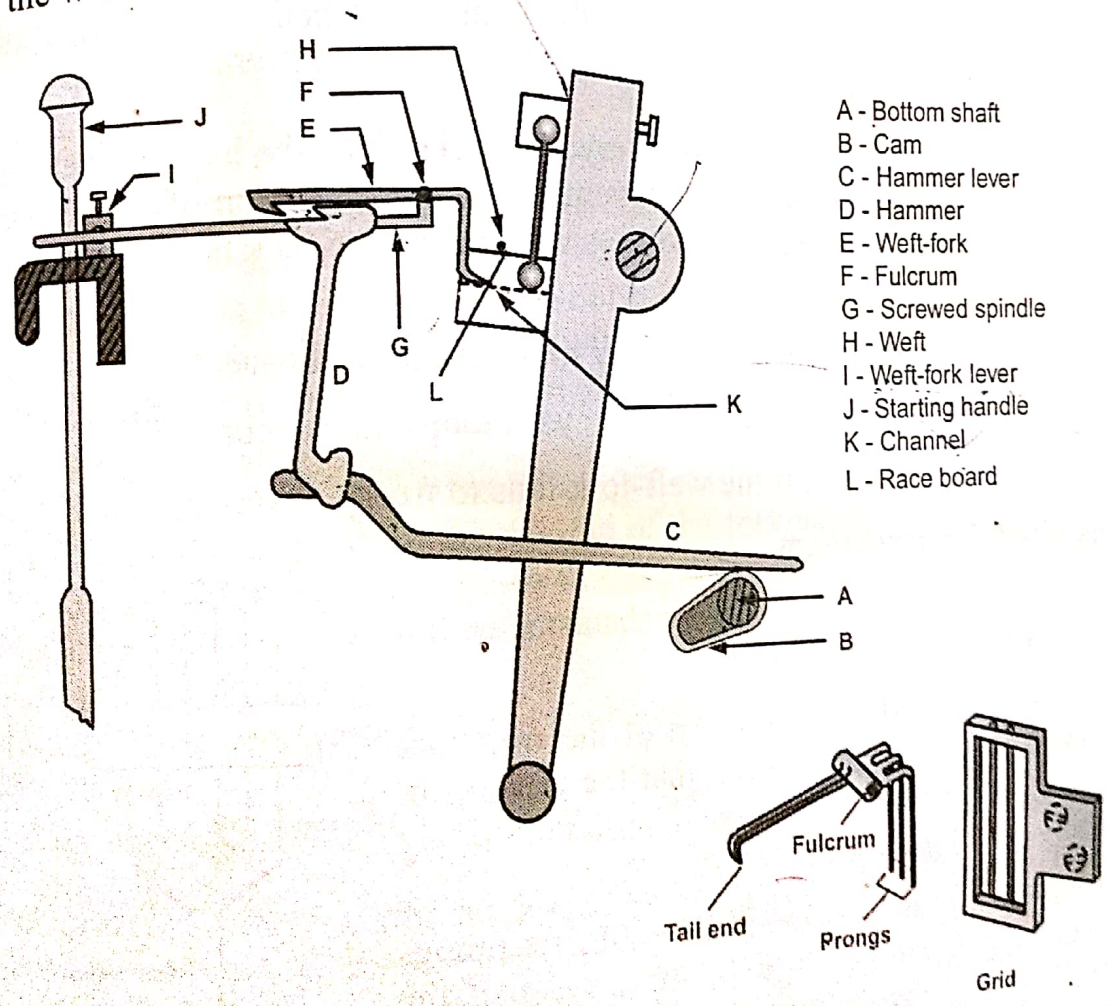


Figure 7.8 Side weft-fork motion

In the CD-ROM, watch Animation No. WFP - I 7.4

Working

When the bottom shaft rotates, the cam also rotates. The hammer lever moves up and down and the hammer is therefore moved forward and backward. Since the hammer gets its motion from the bottom shaft it will get only one forward and one backward movement for every two picks.

Presence of weft

When the loom is running, the weft lies in between the fork and the grid. Therefore the fork tilts and the hooked tail end is raised. When the hooked tail end is raised it will be clear of the hammer and the loom continues to run.

Absence of weft

In case weft is absent, the prongs of the fork will pass through the grid freely and remain horizontal. This leaves the fork in the position shown in the figure. When the hammer moves forward it carries the fork with it. The fork in turn moves the weft fork lever which therefore knocks off the starting handle. The driving belt is shifted from the fast pulley to the loose one and the loom is stopped.

Defects in side weft-fork motion

1. This motion works only once for every two picks since the hammer gets only one forward and only one backward movement for every rotation of the bottom shaft. Therefore it is suitable only for weaves where a broken pick is not a serious defect in the finished fabric.
2. If the prongs are not correctly set, they may cut the weft yarn.
3. If there is irregular tension in the weft, weft loops may occur.
4. Broken picks may result if the weft-fork fails to work.

Settings of weft-fork mechanism

For good working of the weft-fork mechanism, the following points are to be observed.

1. The position of the fulcrum pin of the weft-fork lever should be adjusted such that the traverse of the weft-fork lever is sufficient to push the starting handle out of its notch.
2. At the front centre position, the weft-fork prongs should not touch the grid or the groove of the raceboard. At the front centre, the prongs should project through the grid by at least 5 to 6 mm (1/4″) so that there will be a proper throw and play of the fork. (Figure 7.9)

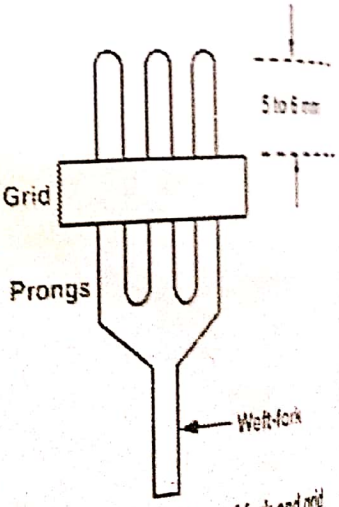


Figure 7.9 Setting of fork and grid

3. The surfaces of the grid must be smooth.
4. The weft-fork prongs protrude neither too less nor too far through the grid.
5. The setting between the tail end of the fork and the notch of the weft-fork hammer is very important. There should be a clearance of 3 to 5 mm between the tail end

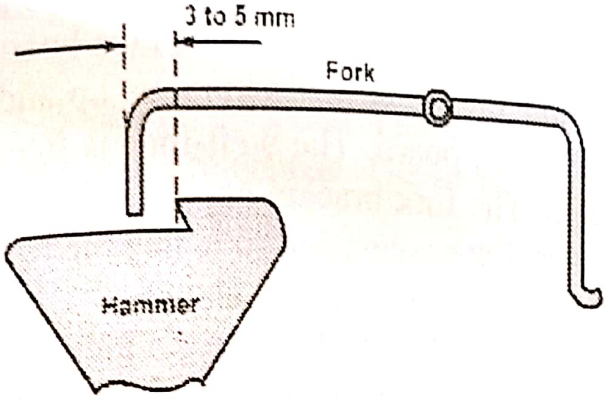


Figure 7.10 Setting of the weft-fork and hammer

of the weft-fork and the hammer at the front centre. (Figure 7.10). If the weft-fork protrudes too far through the weft-fork grid then there are chances of weft breakages.

(i) If the setting is too wide then the weft thread may not keep the tail raised till it is clear of the weft-fork hammer notch. This will result in unnecessary stoppages of the loom even though no weft has broken.

(ii) If the setting is too close, the notch of the hammer might prevent the tail end of the fork from lifting when the weft thread applies pressure on the prongs.

6. The fork must be properly balanced so that its tail end is slightly heavier than the forked end.
7. Any fluff accumulated at the base of the grid will unnecessarily press the prongs of the fork, and thereby raise the tail end of the fork when no weft is present. In such a case the loom would continue to run even in the absence of weft.
8. Inadequate weft yarn tension would cause the weft thread to get caught in the prongs of the fork.
9. A worn out fork, bent prongs, rust in the fork, etc. will affect the good working of the mechanism.
10. If the timing of the hammer lever is not correct, the loom may run even when the weft is absent.
11. Weak or late picking from the off side of the loom may cause the shuttle to strike the prongs and damage it.
12. Insufficient tension in the weft will fail to lift the fork sufficiently and the loom

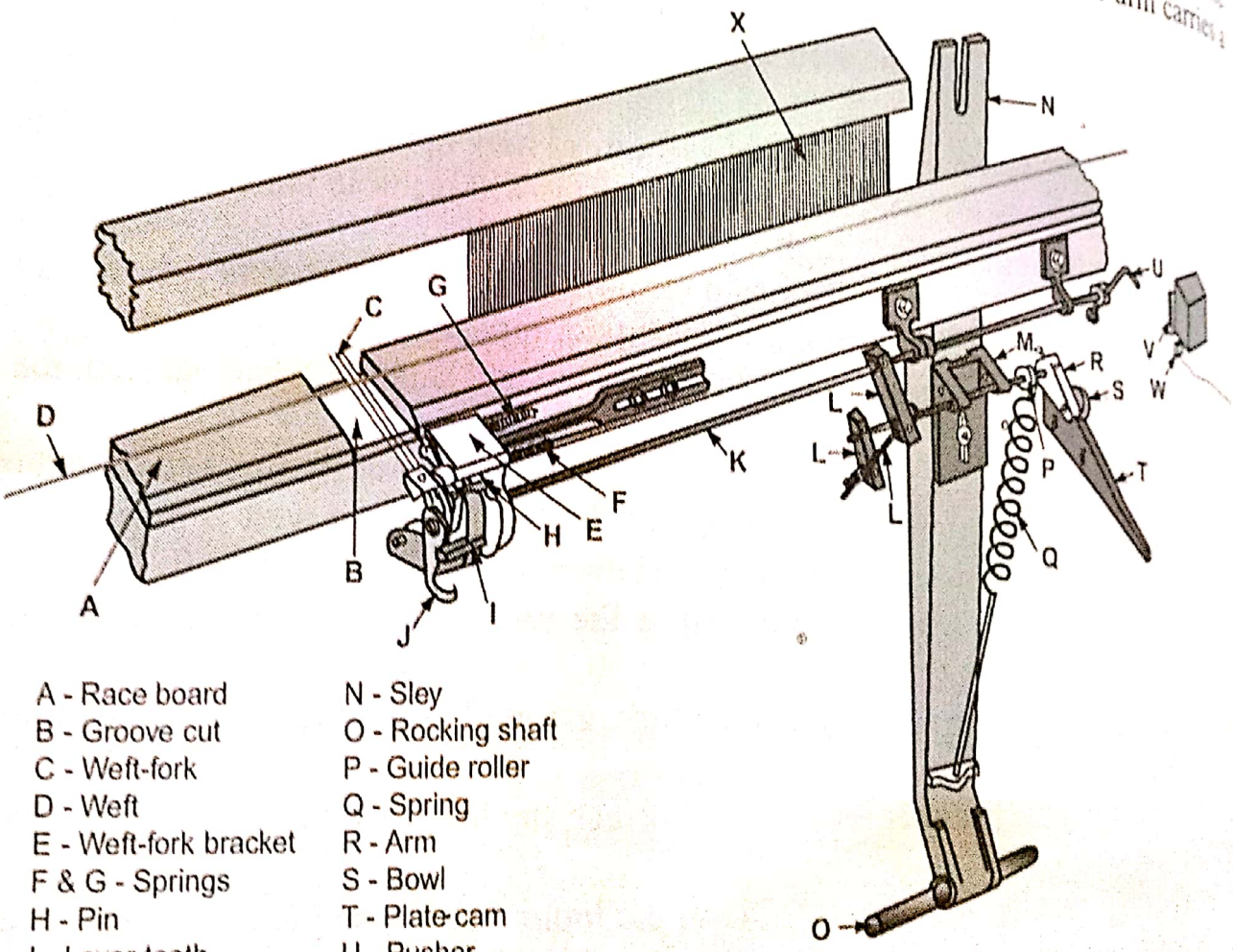
will therefore stop.

13. If the hammer lever begins to move too soon, before the weft has had time to [illegible] the fork tail clear of it, the loom will stop running.

7.3.2 Centre Weft-fork Motion

Description

Figure 7.11 shows the centre weft-fork motion. The race board A has a groove B [illegible] weft-fork C with two or three prongs is made to move up and down in this groove. Weft thread D lies over the race board. The weft-fork is fixed by a bracket E with springs F and G at the right. The fork bracket has a pin H at the left. A lever tooth I below the fork and a catch J are connected to a stopper rod or long rod K which extends up to the extreme right. The long rod K is also connected by links L to a [illegible] bracket M which is on the sley N. The links L are in turn connected to guide roller P by a rod which also carries an arm R. One end of a spring Q is connected at the top to the guide roller P and at the bottom to a bracket in the sley. The arm carries a



A - Race board
B - Groove cut
C - Weft-fork
D - Weft
E - Weft-fork bracket
F & G - Springs
H - Pin
I - Lever tooth
J - Catch
K - Lengthy rod
L - Links
M - Bracket
N - Sley
O - Rocking shaft
P - Guide roller
Q - Spring
R - Arm
S - Bowl
T - Plate cam
U - Pusher
V - Stopper bracket
W - Electric cable
X - Reed

Figure 7.11 Centre weft-fork motion

bowl S which rests on a plate cam T. The extreme right end of the stopper rod carries a pusher U which is opposite to a stopper bracket V. The stopper bracket is connected to an electric cable W in the main switch box unit.

Working

When the sley moves forward and backward, the sley bracket also moves with it. So the bowl which is connected to the sley bracket and arm rides over the plate cam.

When the sley moves backward, the bowl is raised on to the cam. So the links and the long rod turn in the anti-clockwise direction. This causes the toothed lever to push the fork bracket and hence the fork prongs rise. The springs are compressed.

When the sley moves forward, the bowl is lowered on the cam, and the links and the stopper rod turn in the clockwise direction. This causes the springs to be released and hence the fork bracket and fork descend to the sley bracket and the arm rides over the plate cam.

Sley's backward movement

When the sley moves backward:

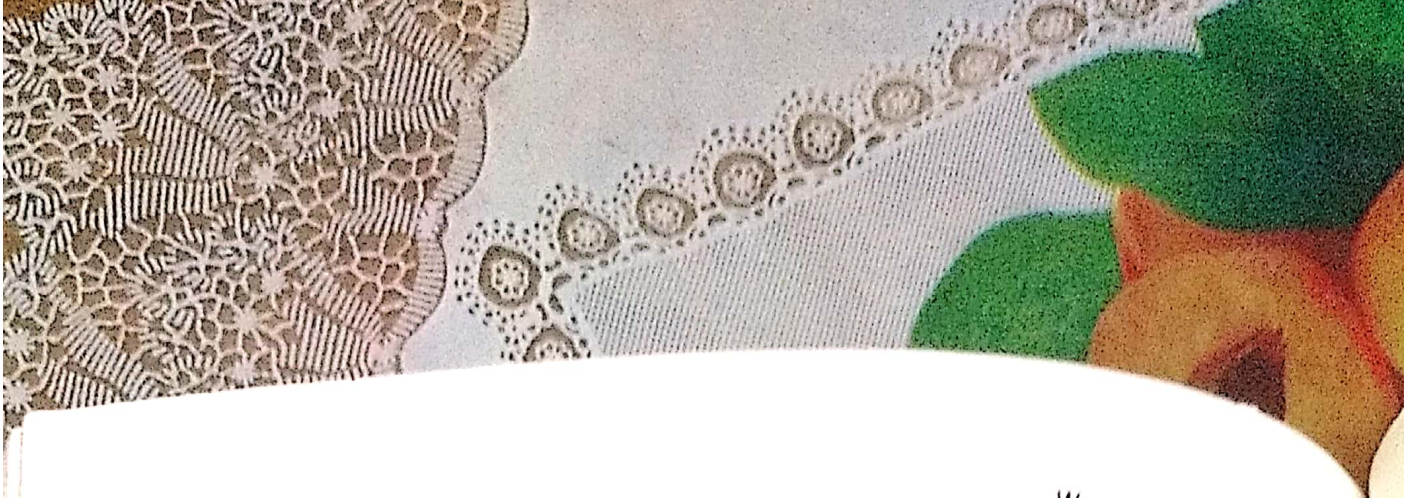
1. The bowl is raised gradually according to the shape of the plate cam.
2. The arm connected to the bowl is raised.
3. The stopper rod turns in the anti-clockwise direction through the links (looking towards the right from the weft-fork).
4. The lever tooth pushes the pin.
5. The fork bracket rises.
6. The two springs in the weft-fork bracket are compressed.
7. The fork is raised.
8. The spring connected to the sley is extended.
9. The pusher at the extreme right end of the stopper rod is raised.

So, during the backward movement of the sley, the weft thread is inserted.

Sley's forward movement

When the sley moves forward:

1. The bowl is lowered gradually.
2. The arm connected to the bowl is lowered.
3. Through the links, the stopper rod turns in the clockwise direction (looking toward the right from the weft-fork).
4. The springs in the weft-fork bracket are released gradually.



5. The fork bracket and fork are lowered.
6. The spring connected to the sley is released.
7. The pusher goes below the stopper bracket.

So, during the forward movement of the sley, the weft thread is beaten up by the reed.

Presence of weft yarn

During the forward movement of the sley, if the weft yarn is present, the fork prongs will descend to feel the weft yarn. Due to tension in the weft yarn, the catch and the lever tooth will not touch each other. The pusher passes below the stopper bracket and the loom continues to run.

Absence of weft yarn

During the forward movement of the sley, if the weft is absent, the fork prongs will descend right up to the bottom end of the groove. So the catch engages the lever tooth. This causes the stopper rod and the bowl to be arrested. Hence the bowl is now above the plate cam even when the sley moves forward. The pusher is also arrested in its position. In this situation, as the sley moves forward, the pusher pushes the stopper bracket and the loom stops instantaneously.

7.3.3 Comparison between Side Weft-fork and Centre Weft-fork Motions

S.No	Side weft-fork motion	Centre weft-fork motion
1.	This motion is fitted on one side of the loom.	This is fitted almost at the centre of the loom.
2.	It can be brought into action only once for every two picks.	It acts for every pick.
3.	It is suitable for cotton fabric.	It is suitable for silk, rayon, nylon, polyester and fine quality fabric.
4.	As the fork feels the picks at the side of the loom, it is not suitable for pick-at-will loom having multiple boxes at both the ends of the loom.	As the fork feels each pick at the centre, it is suitable for all types of looms.
5.	There is a risk of getting broken picks.	It reduces the risk of broken picks.