7.1 Objects of Auxilliary Mechanisms

To get higher productivity and good quality of cloth some additional mechanisms are added to the plain power loom. These are known as auxilliary mechanisms.

Auxilliary mechanisms are the following:

1. Warp-protector mechanism
2. Weft stop motion
3. Temples
4. Brake
5. Warp stop motion.

7.2. Warp-Protector Mechanisms

Object

The object of a warp-protector mechanism is to stop the loom immediately when the shuttle is trapped in the shed and thereby to avoid warp breakages and shuttle and reed wire damages.

Necessity of warp-protector mechanism in a loom

During picking, the shuttle may sometimes fail to reach the opposite box due to either a fault in the picking mechanism or due to a defective shed. In such situations, if the sley comes to the front while the shuttle is lying in between the bottom and top layers of the warp, the shuttle or reed wires will be damaged. Many warp threads too will be broken.

To avoid the above defects warp-protector mechanisms are provided in power looms.

Types of warp-protector mechanism

There are two types of warp-protector mechanism. These are:

1. Loose-reed mechanism
2. Fast-reed mechanism.

7.2.1 Loose-Reed Mechanism

Description

The parts of a loose-reed mechanism are shown in Figure 7.1. The reed A is fixed at the top by means of a reed cap and at the bottom it is loosely mounted in between the reed case and the race board M. The reed cap acts as a pivot for the reed to swing up on. The reed case C is a strip of wood and extends across the loom. It is supported by a series of arms N which are fixed to a cross rod D. The following parts are connected to the cross rod.

1. An arm of a hook carries a spring, known as reed case spring J. This regulates the pressure on the reed during normal working and at top and bottom centres.
2. Two or three curved levers known as duck bill H are also connected to the cross rod. These are used to make the reed fast when the crank comes to the front centre by having a contact with frog G and frog spring P. During beat-up the reed's movement is fast. So the weft is beaten up with the correct force.
3. A dagger E is also connected to the cross rod outside the loom frame. This also moves with the sley and goes below a corrugated plate F during normal working. The setting between the dagger and the corrugated plate is 8 to 10 mm for light fabrics and 12-15 mm for heavy fabrics.
4. An anti-friction bowl is also connected to the cross rod. When the crank is at back centre, the anti-friction bowl K rides on a bow spring L which is fitted to the

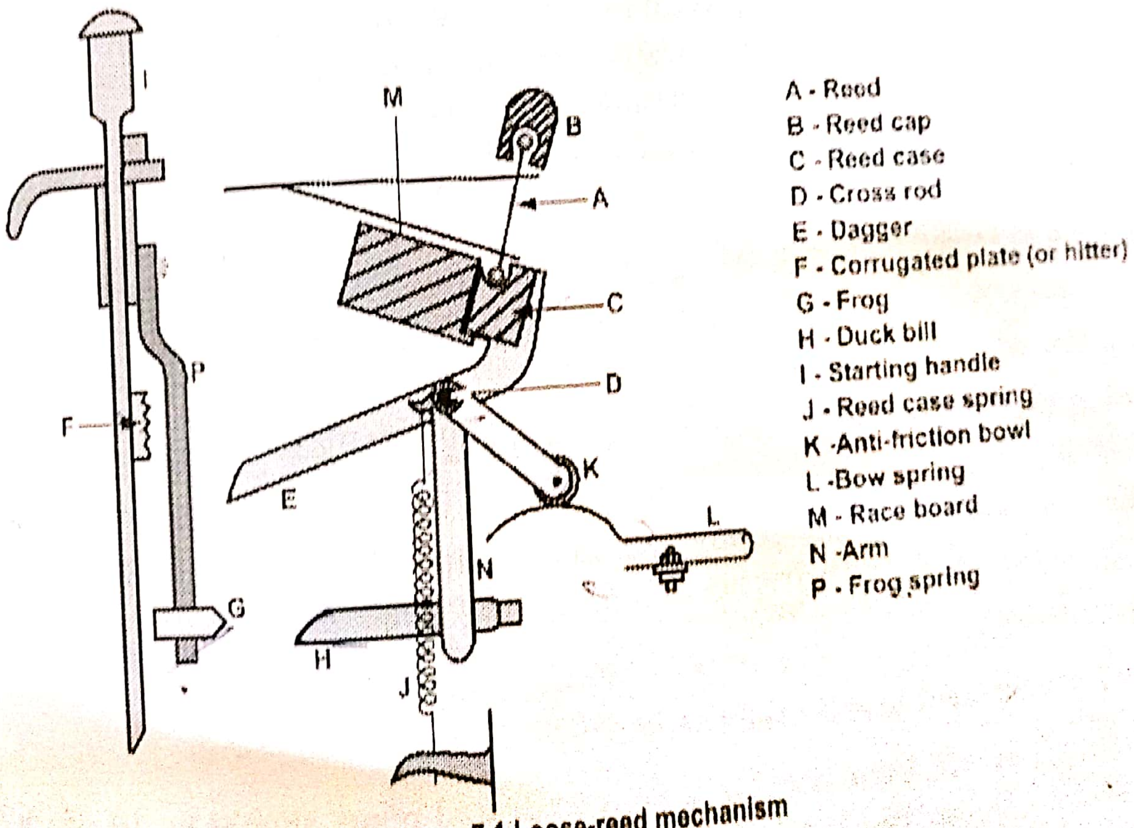

Figure 7.1 Loose-reed mechanism

In the CD-ROM, watch Animation No. WFP - 17.1

loom frame. The purpose is to have a fast reed when the shuttle moves from one box to the other.

Normal working

The dagger goes below the corrugated plate during normal working i.e. there is no shuttle-trap. The loom thus works continuously.

Shuttle-trap

Shuttle-trap may occur in a loom due to the following reasons:

1. Weak pick
2. Parts worn out in the picking mechanism
3. Loose parts in the picking mechanism
4. Shuttle rebounding
5. Entangled warp ends
6. Irregular running of loom.

When a shuttle-trap occurs, the shuttle is trapped in between the reed and the fell of the cloth. When the sley moves forward with the shuttle in this position, the weight of the shuttle against the fell of the cloth creates a pressure. This pressure causes the reed to swing backward. So a partial rotation is given to the cross rod and to the reed case. The dagger is now raised. With this, the sley's forward motion continues. So the dagger advances and when it comes against the hitter or corrugated plate, it hits the hitter. The hitter is on the starting handle, which is thus released from the notch of the loom frame. The driving belt is then shifted from the fast pulley to the loose pulley and the loom stops.

Points to be observed

1. The setting between the dagger and the hitter should be such that the dagger hits the hitter when shuttle-trap occurs.
2. During beat-up, the reed should be a fast reed, by the action of the duck bill and the frog.
3. When the shuttle is traversing the race board, the reed should be a fast one by the action of the anti-friction bowl and bow spring.

Timings and settings

i) When the loom crank is at the front centre

The setting between the dagger and the corrugated plate, should be 10 mm for light fabric and 12 to 15 mm for heavy fabric. The duck-bill rides below the frog. See Figure 7.2.

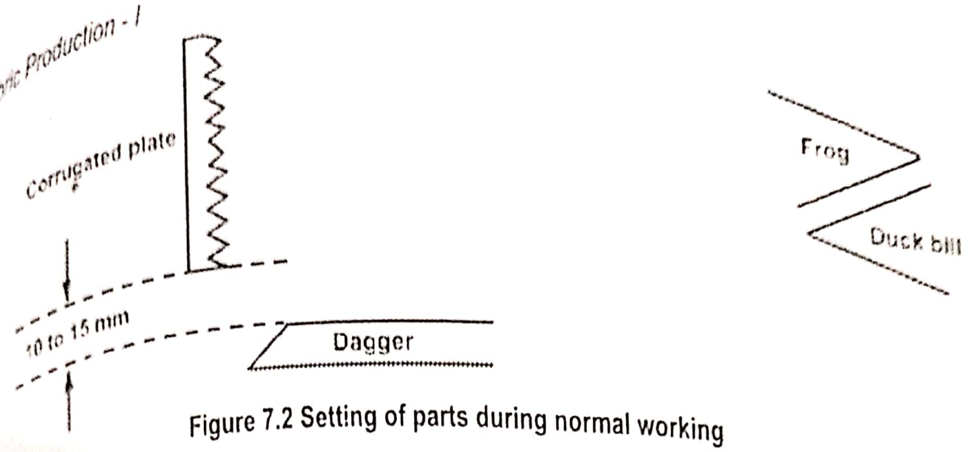

Figure 7.2 Setting of parts during normal working

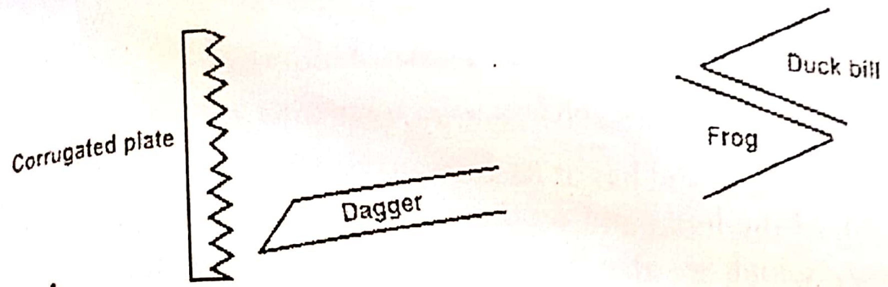

Figure 7.3 Setting of parts during shuttle-trap

When a shuttle-trap occurs the dagger should hit the corrugated plate and the duck bill should go over the frog by 10 to 15 mm. See Figure 7.3.

ii) When the loom crank is at the back centre

1. The anti-friction bowl should ride on the bowl spring so that the reed is fast during the passage of the shuttle.
2. The reed-case spring should not be too strong. For fine cloth, lighter springs should be used. The tension in the spring is so adjusted that the shuttle pressure should be able to overcome the strength of the spring.
3. The reed should be properly fixed in the reed cap and reed case.

7.2.2. Fast-Reed Mechanism

Introduction

This mechanism is used for heavy fabrics. e.g. satin duck and canvas type fabrics. In this mechanism, the reed is always held firmly and so it is known as fast-reed mechanism. Figure 7.4 shows the fast-reed mechanism.

Construction

The mechanism consists of a swell A, which protrudes from the shuttle box B. A knock-off finger C touches the swell at the back of the shuttle box. The finger is co

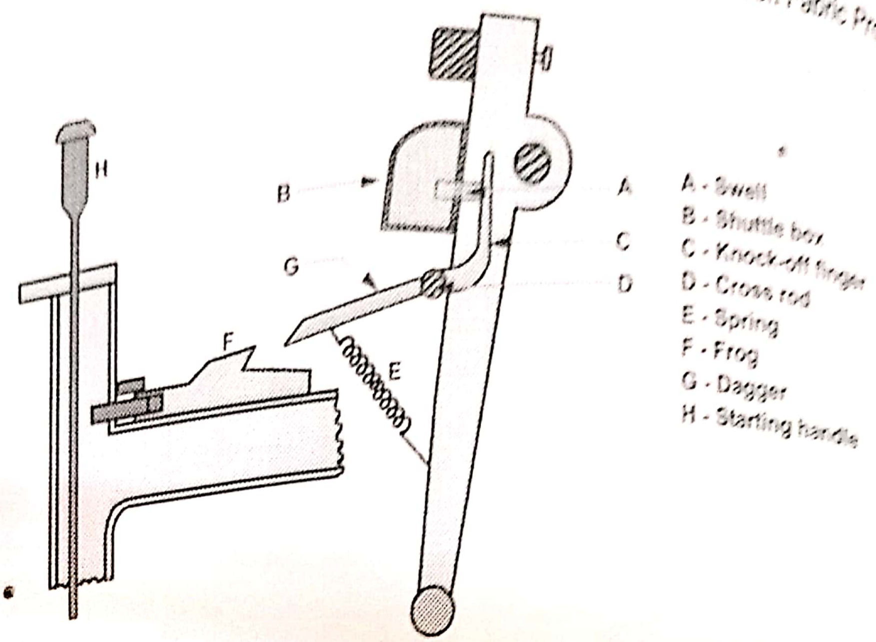

Figure 7.4 Fast-reed mechanism

In the CD-ROM, watch Animation No. WFP - 17.2

nnected to a cross rod D and has at its forward end a dagger G. The cross rod extends the entire width of the loom and on the opposite side, there is another dagger and a knock-off finger, which are also in contact with the swell in the opposite box. A frog F is connected to a small rod and H is the starting handle. A spring E is connected to the dagger and the sley sword. A similar arrangement is fitted on the other side of the loom.

Working

The mechanism is initiated by the swell with the shuttle in its box.

Presence of shuttle in the box

If the picking mechanism is perfect in action the shuttle reaches the opposite box safely, without any difficulty.

When the shuttle moves fully into the box it pushes the swell away. The swell in turn pushes the knock-off finger backward. The cross rod rotates partially and rises the front end of dagger. As the dagger rises, it moves freely over the frog when the sley comes to the front centre. The loom keeps running.

Absence of the shuttle in the box

Due to faults in the shedding or picking mechanism, the shuttle may not reach the opposite box safely.

The absence of shuttle in the box prevents the swell from being pushed back and it will be idle. Similarly, the knock-off finger, cross rod and dagger will also be inactive. When the sley comes to the front centre to beat up the weft, the dagger will also be inactive. The frog being connected to a small rod pushes the starting handle. The driving belt is thus shifted from the fast pulley to the loose pulley and the loom stops. The loom is stopped at the top centre itself. The sudden stoppage of the loom makes a sound known as "banging-off".

In fast reed looms, some strain is put on the swell and considerable strain on many parts of the looms. But due to the rigidity of the reed in this loom, this mechanism is recommended for weaving heavy fabrics.

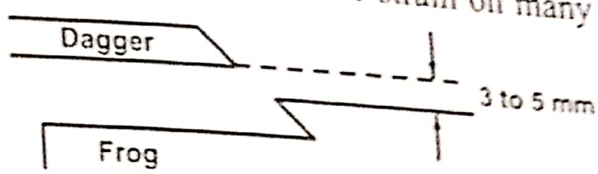

Figure 7.5 Setting of parts during normal working

Timings and settings

i. With the shuttle in its box when the crank is at the top centre, there should be a clearance of 3 to 5 mm between the dagger and the frog. This setting should be done on both sides of the loom. See Figure 7.5.

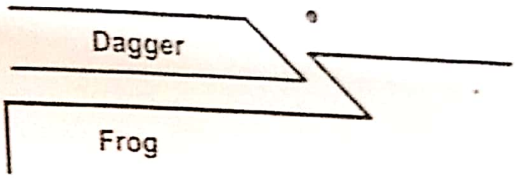

Figure 7.6 Setting of parts during shuttle-trap

ii. Without a shuttle in the box for the same position of the crank, the dagger should make perfect contact with the frog to stop the loom. The setting should be correct on both sides of the loom. See Figure 7.6.

7.2.3 Comparison between Loose Reed and Fast-Reed Mechanisms

S.No	Loose-reed mechanism	Fast-reed mechanism
1.	This mechanism acts on the loose reed principle.	This mechanism acts due to the swell in the box.
2.	The reed is firm or rigid only at the front and back centre.	The reed is always firm or rigid.
3.	When loose reed acts, the loom comes to stop only after one or two revolutions.	Loom stops immediately at the top centre itself.
4.	It is not suitable for heavy fabric.	It is suitable for all types of fabrics particularly for canvas fabric.
5.	When the loom stops, there is a little vibration of the parts.	When the loom stops, there is a greater vibration of the parts.
6.	Wear and tear of the moving parts is low.	Wear and tear of the moving parts is relatively more.

7.2.4 Electro-magnetic Warp-Protector Mechanism

This mechanism is found in modern automatic looms and not in plain power looms.

Principle of working

As shown in Figure 7.7, a magnet is fixed at the bottom of the shuttle. A pick-up coil is fixed in the sley. The position of the coil in the sley must be set off from the centre of the sley because it is only possible to carry the magnet at the end of the shuttle opposite to the shuttle eye. An electrical control unit with a solenoid is connected to a

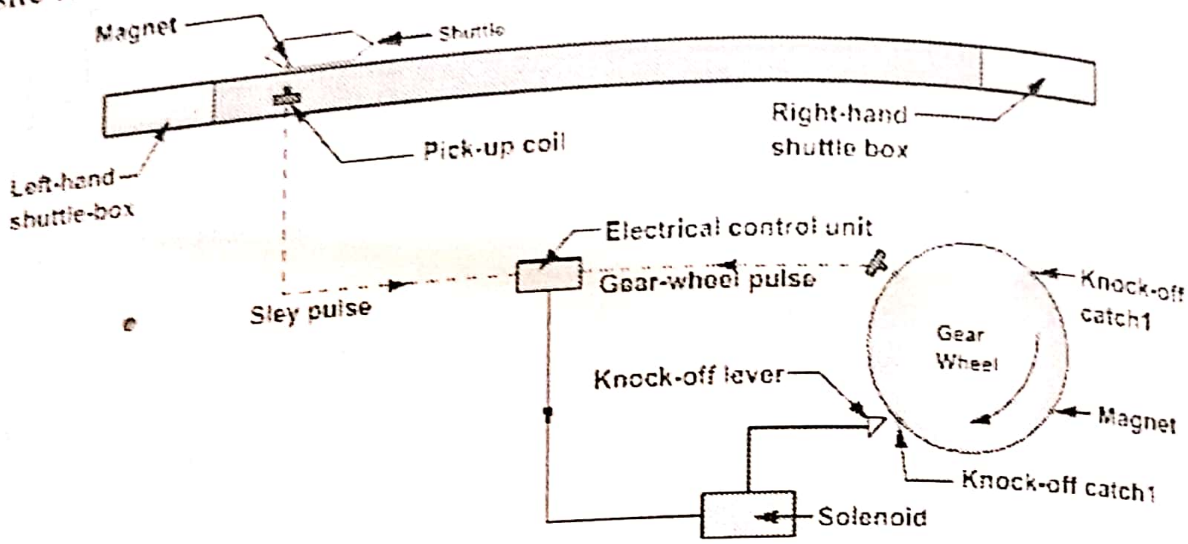

Figure 7.7 Electromagnetic warp-protector mechanism

In the CD-ROM, watch Animation No. WFP - I 7.3

knock-off lever. The gear wheel driven unit carries two knock-off catches 1 and two magnets diagonally opposite to each other . Another pick-up coil is placed above the surface of the gear wheel driving unit.

The passage of the shuttle over the coil causes a pulse to be fed to the electrical control unit. This pulse must alternate with a second pulse, generated by a magnet mounted on the loom-shaft gear wheel and occurring at a fixed time in each loom cycle. Any break in the sequence of these pulses caused by a late passage or non-passage of the shuttle will activate the solenoid, so that the knock-off lever is positioned in the path of the knock-off catch, and the loom will be brought to a stop.