filling again.

7.7 Warp Stop Motions

The main function of a warp stop motion is to stop the loom when a warp thread breaks during the weaving process. Warp stop motions are predominantly fitted on the automatic looms and sometimes on the non-automatic looms.

7.7.1 Advantages of Warp Stop Motion

1. A large number of cloth defects, both major and minor, is due to warp breakages. A warp breakage which remains unattended for some time generally results in multiple warp breaks with serious damage to the cloth. As the warp stop motion stops the loom as soon as a warp breakage occurs, it greatly reduces any further damage to the cloth.
2. It serves as a very useful instrument in the production of superior quality fabrics.
3. As multiple warp breaks are eliminated, the time wasted in mending the cloth defects is saved.
4. Looms fitted with warp stop motions generally perform with higher efficiency.
5. The most important purpose served by a warp stop motion, especially in an automatic loom, is to relieve the weaver from the additional strain of attending to frequent warp breaks, so that he or she can concentrate on increased output and look after a greater number of looms.

7.7.2 Principle of Warp Stop Motion

In any type of warp stop motion, every warp thread is passed through and sensed by a thin strip of metal piece known as 'drop wire' or 'drop pin'. When a warp thread breaks, the drop wire it carries or supports falls by gravity on to a moving slide and the motion of the slide is arrested. When the slide stops moving, it activates a knock-off mechanism and the loom stops immediately.

Types of warp stop motion:

There are two distinct types of automatic warp stop motion.

1. Mechanical warp stop motion
2. Electrical warp stop motion.

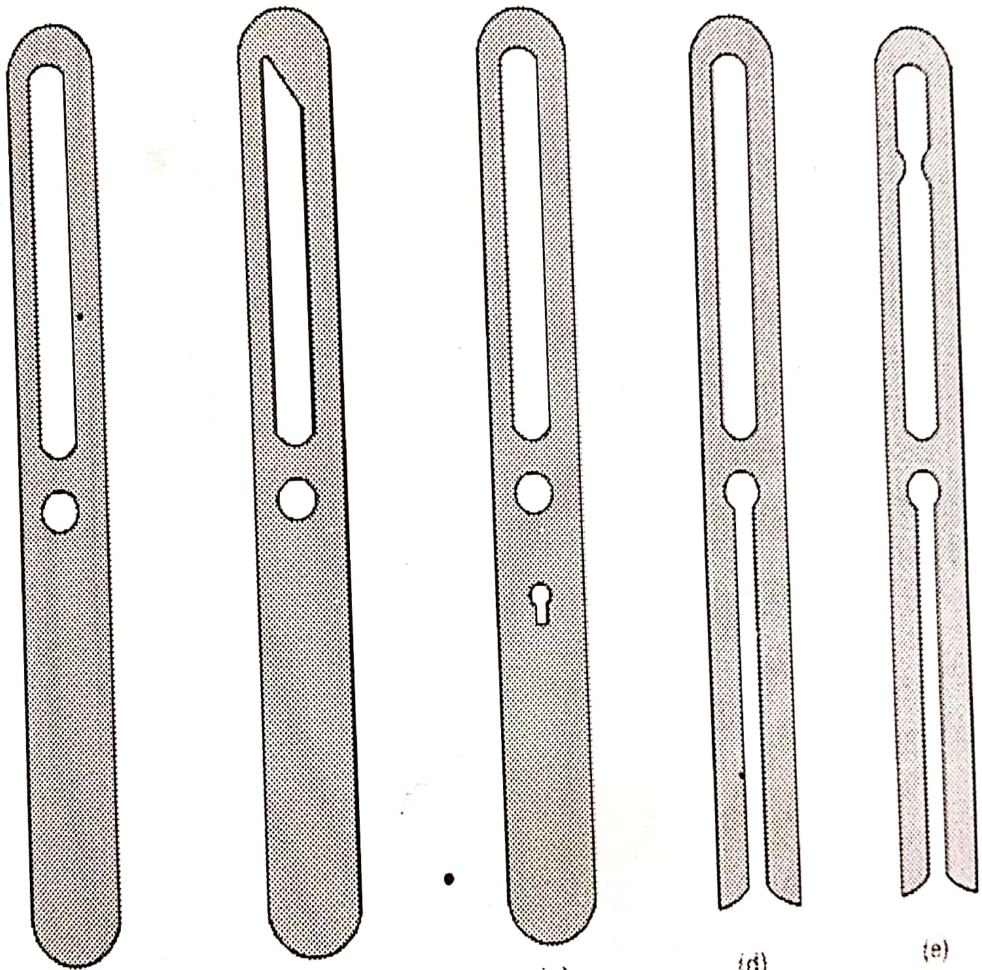


Figure 7.18 Drop wires

7.7.3 Drop wires

There are two types of drop wires namely:

1. Open type
2. Closed type.

These are shown in Figures 7.18 a), b), c), d) and e). The drop wire in figures 7.18 a), b) and c) are called open ended drop wires and these in figures d) and e) are closed ended drop wires.

The difference between the open and closed types is that the bottom end of the drop wire is open in the open type.

The drop wires in the figures a to c are suitable for mechanical type warp stop motion. In the drop wire in figure c, a key way is cut into the the drop wire which is necessary when the warp yarns are required to be threaded through Barber Colman drawing-in machine.

The drop wire in figures b and e are suitable for electrical warp stop motion. In this type, the shape of drop wire is modified slightly by having a cut-out of special profile, which is essential so that contact between the wire and an electrode used in the electrical stop motion is ensured.

The drop wires are usually made from fine quality steel, which is zinc or copper plated to resist corrosion. They vary in size and weight to suit the nature of the warp yarn.

In the case of closed type drop wires, the drawing-in procedure is made more difficult and slower. Further, a greater stock of drop wires has to be maintained. The handling of warp beams with the drop wires is inconvenient and is likely to cause damage to the warp.

In the case of open type drop wire, the 'pinning' of drop wires is done on the loom itself. The wires are more quickly placed over the threads. Also maintaining larger stocks of drop wire is not necessary.

7.7.4 Mechanical Warp Stop Motions

1. Castellated Bar Type

Principle

The movement of a reciprocating serrated bar assembly is arrested when a warp thread breaks while the loom is running. This event causes a series of parts associated with the serrated bar assembly to temporarily stop functioning. The net result is that the loom is brought to an immediate halt.

Construction

In Figure 7.19, a movable serrated bar B, in the shape of a thin metal strip, is fixed in between two outer serrated bars A. This combination of serrated bars forms an assembly. Normally two to six sets of serrated bars are used according to the density of the warp threads in process. The outer bars are secured firmly at both their ends to the loom framework.

The serrated bar assembly is passed through the oblong slot D of the drop wire or drop pin C. Each warp thread E is passed through one drop wire. The number of drop wires used depends on the number of threads in the warp sheet.

The movable serrated bar is connected to a three-armed lever F, which has its fulcrum at G. One arm of this lever is connected to the movable serrated bar. The second arm is attached sequentially to a connecting rod H, a spring I and a forked lever J. The forked lever is in contact with an eccentric K fixed to the bottom shaft L. The third arm is connected to link rod M, links N, link rods O and finally to a knock-off rod P.

The knock-off rod carries a block Q at the top. The block is inline with a knock-off lever R, which is in contact with the starting handle S. A striker T, fixed on the sley U, is in line with the block Q.

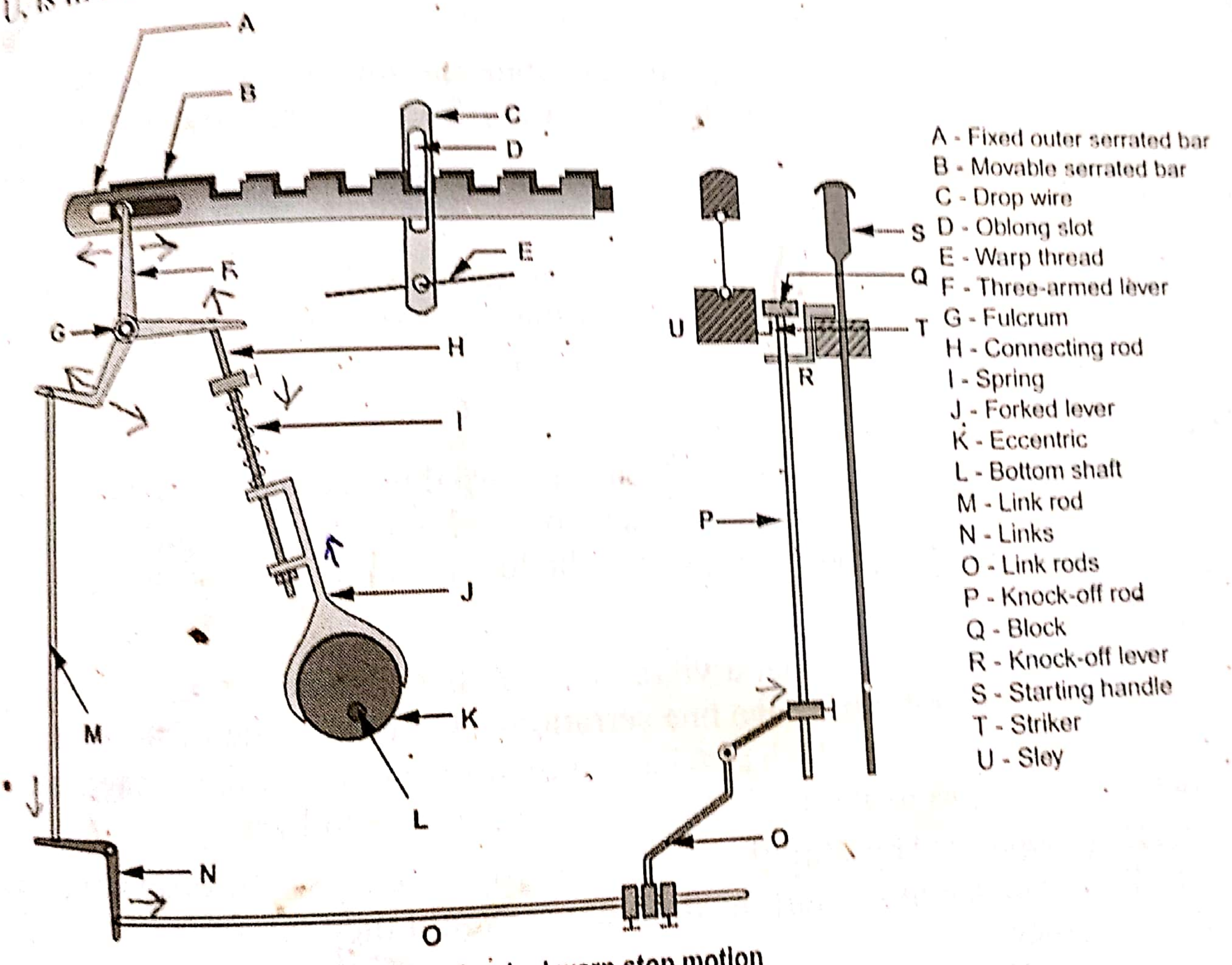


Figure 7.19 Mechanical warp stop motion

In the CD-ROM, Watch Animation No. WFP - 17.9

Working

As the bottom shaft rotates, the eccentric causes the connecting rod to move up and down. This vertical reciprocating movement is transmitted to the three-armed lever which oscillates. As a result, the serrated bar moves to and fro. Next, the link rods and links oscillate and the knock-off rod (and the block) move up and down.

During normal working, the warp threads support the drop wires and the movement of the serrated bars is not prevented. The knock-off rod and the block move up and down freely and the loom keeps running.

When a warp thread breaks, the drop wire it supports falls down on the serrated bar assembly and prevents it from moving. The link rod, the links and the knock-off rod in turn stop oscillating. The movement of the block on the knock-off rod is also thereby arrested. The block is now exactly in line with the striker T on the sley. In this situation, when the sley comes forward, the striker hits the block, so the knock-off lever of the starting handle is pushed back and it releases the starting handle off its notch, thereby stopping the loom. Thus, when a warp thread breaks when the weaving process is on, the warp stop motion causes the loom to stop.

When the oscillation of the serrated bars is arrested, the spring attached to the connecting rod retracts and raises the forked lever away from the eccentric and thereby smoothens the working of the whole mechanism.

2. Vibrator bar type

The vibrator bar type of warp stop motion is nowadays used more extensively than the castellated bar warp stop motion. Some of the Japanese looms, Toyoda, Hirano etc. are installed with this type of warp stop motion.

Principle

The movement of a vibrator bar is arrested when a warp thread breaks while the loom is running. This event causes a series of parts associated with the vibrator bar to temporarily stop functioning. The net result is that the loom is immediately stopped.

Construction

It can be seen from Figure 7.20 that a vibrator bar A is connected to an oscillating shaft B. The sides of vibrator bar have fine serrations. On either side of the vibrator bar, there are two fixed bars C, which also have similar serrations on their inner faces. The vibrator bar oscillates to and fro in between these two fixed bars.

Drop wires D are supported by warp threads E and drop wire bars. The drop wire bars are fixed and are intended to support the drop wires should they fall in the event of a warp thread breakage.

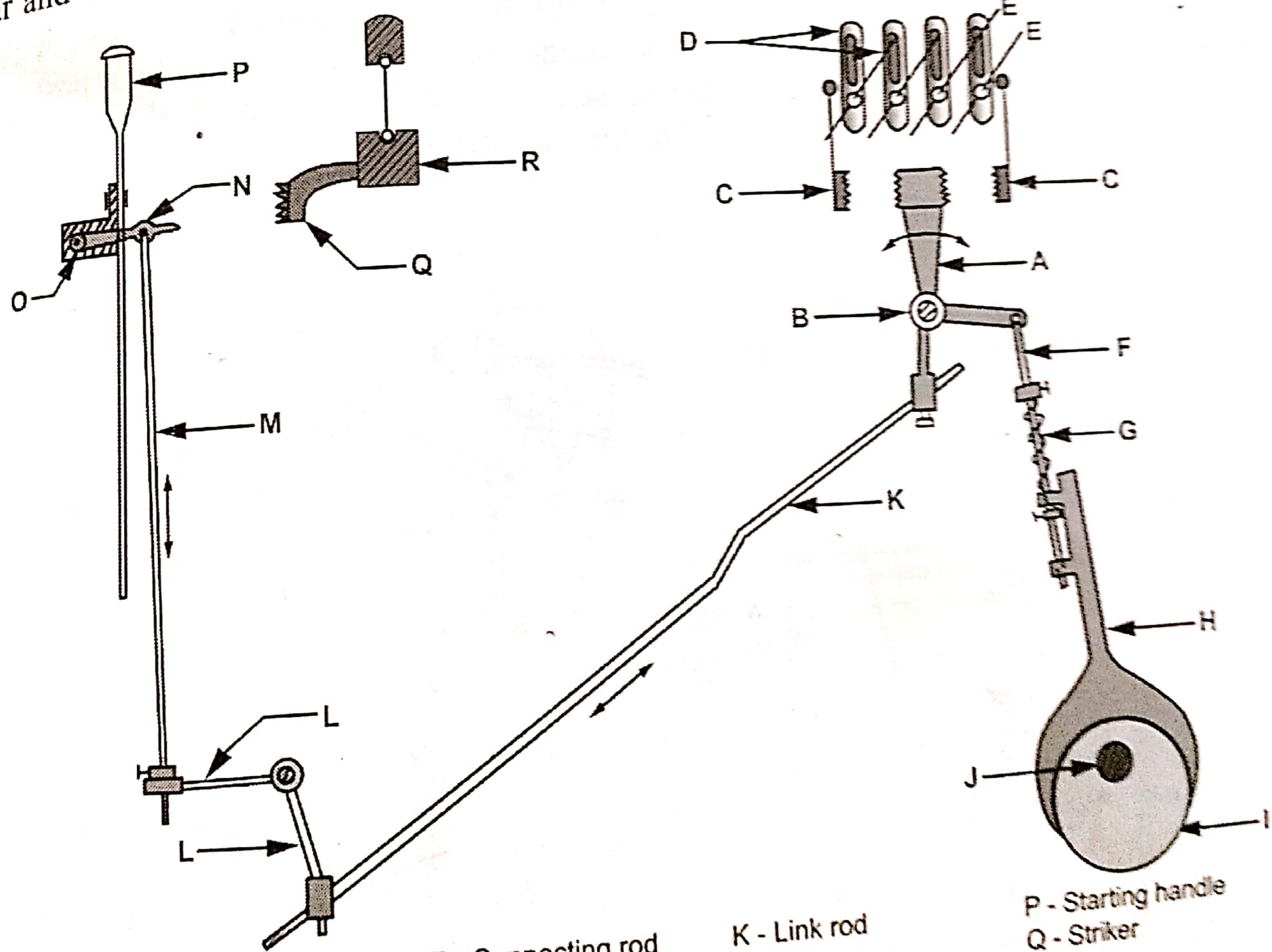
One arm of the oscillating shaft is connected to a connecting rod F, a spring G and a forked lever H. The lever touches an eccentric I fixed to the bottom shaft J. The other arm of the oscillating shaft is connected to link rod K, links L and finally to a knock-off rod M. The knock-off rod carries a block N at its upper end. The block is fulcrummed at O and is connected to the starting handle P. A striker Q, fixed on the sley R, is situated opposite to the block.

Working

As the bottom shaft rotates, the connecting rod moves up and down due to motion of the eccentric. This up-and-down motion is transmitted to the oscillating shaft and the vibrator bar too oscillates to and fro. Eventually the block moves up and down via the movements of the link rods, links and the knock-off rod.

During normal working of the loom, the drop wires are supported by the warp threads. So the movement of the vibrator bar is not prevented. The lower ends of the drop wires, supported by the warp threads, are clear of the path of the oscillating vibrator bar, which keeps going to and fro between the fixed serrated bars. The knock-off rod moves freely up and down as a result. The block at the top of the knock-off rod is thus kept clear of the striker on the sley every time it comes forward for the beat-up.

Now, when a warp thread breaks, the drop wire it supports falls down on the fixed bar and comes in the path of the serrated bar and thus arrests its movement at the



A - Vibrator bar
B - Oscillating shaft
C - Fixed bars
D - Drop wires
E - Warp threads

F - Connecting rod
G - Spring
H - Forked lever
I - Eccentric
J - Bottom shaft

K - Link rod
L - Links
M - Knock off-rod
N - Block
O - Fulcrum

P - Starting handle
Q - Striker
R - Sley

Figure 7.20 Vibrator bar type warp stop motion

centre of its throw. With the arrest of the to-and-fro motion of the serrated bar, the movement of the knock off rod and the block on top of it is also arrested. The static block is now exactly in line with the striker on the sley. In this situation, when the sley comes forward, the striker hits the block, so the knock-off lever of the starting handle is pushed back, resulting in the release of the starting handle from its rest notch. The loom is thus brought to an immediate stop.

During the arrested motion of the serrated bars, the spring attached to the connecting rod is released and it raises the forked lever away from the eccentric to enable a smooth functioning of the mechanism.

The open type of drop wires cannot be used in this type of warp stop motion and hence pinning on the loom is consequently not possible. More than four drop-wire bars cannot be conveniently accommodated in this type of warp stop motion.

7.7.5 Electrical Warp Stop Motions

1. Carver type

An electrical warp stop motion is illustrated in Figures 7.21 a and b. A spring wire A is mounted in between the crossing of two adjacent warp threads B, which pass over and under two lease rods C. The bigger lease rod has a contact bar D close to it. The bottom of the spring wire is connected to the bar fittings E.

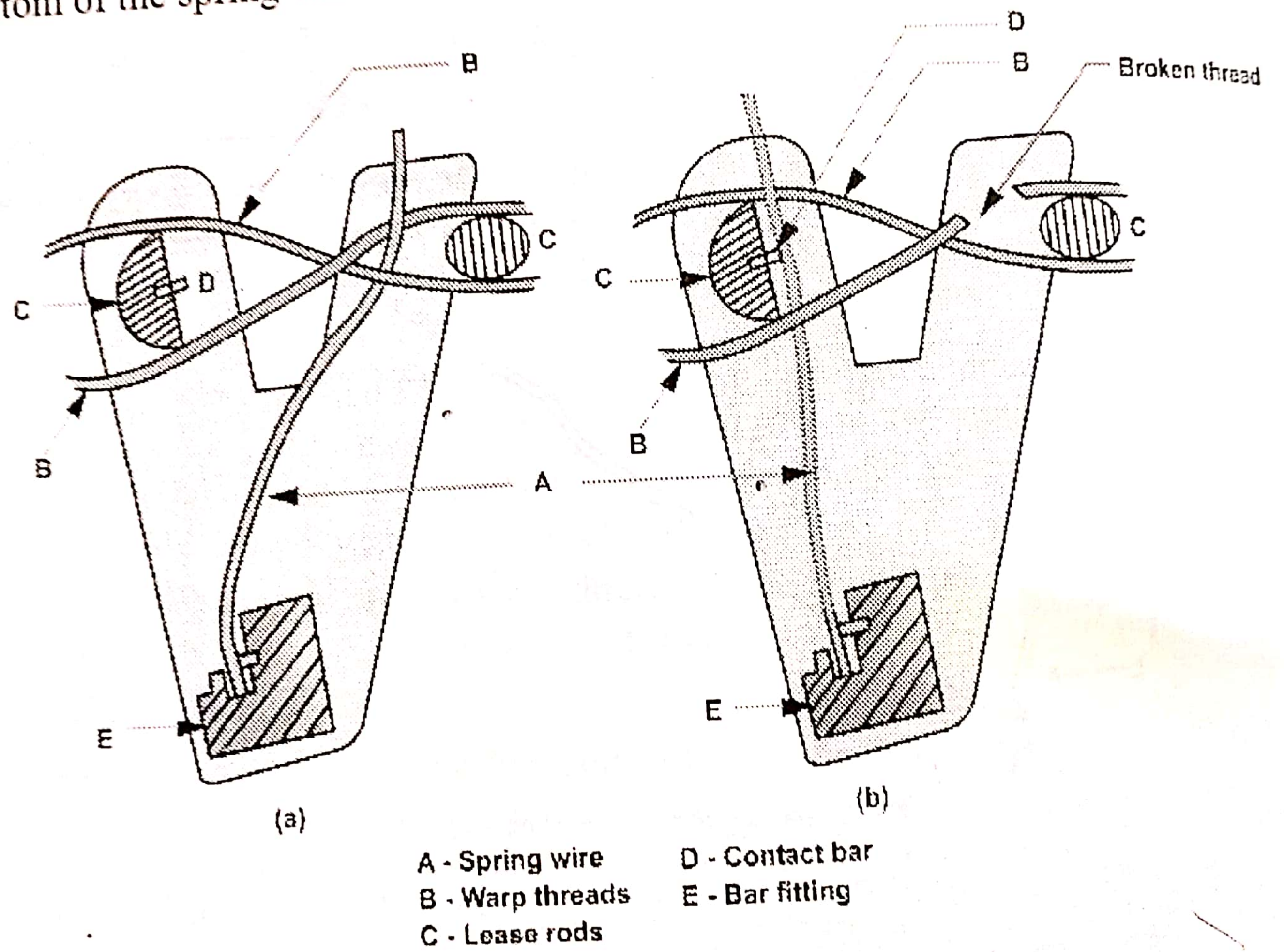


Figure 7.21 Carver type

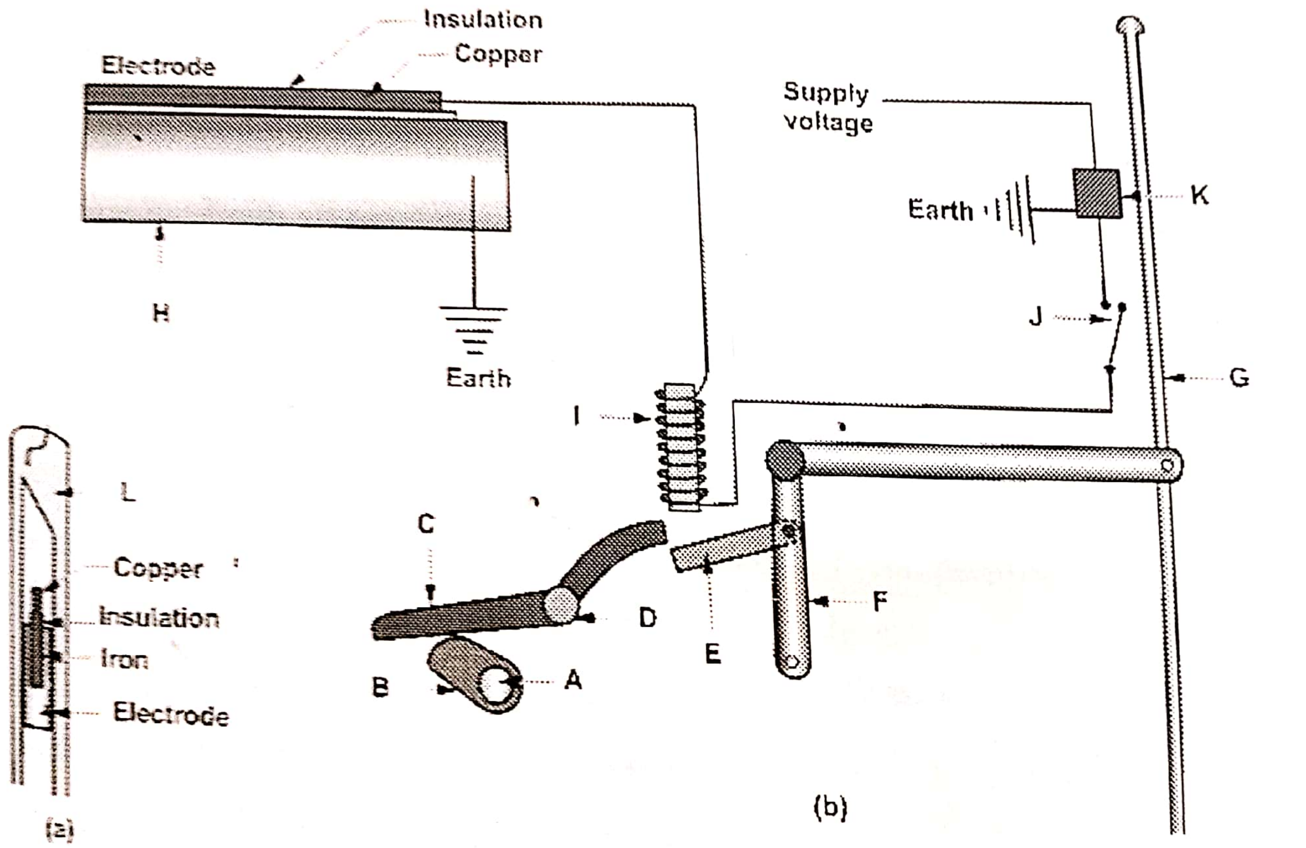
During normal working of the loom, the crossing of two adjacent warp threads prevents the spring wire from touching the contact bar at the larger lease rod. When a warp thread breaks, the spring wire jumps back and touches the contact bar. This results in closing the electrical circuit between the brass fittings and the contact bar. An electro-mechanical motion is thereby initiated, which displaces the starting handle of the loom to the 'off' position and the loom stops instantaneously.

In the electrical type warp stop motion only a weak electric current is sufficient. The popularity of this type of motion is due to its quick and efficient action.

2. Modern type of electrical warp stop motion

Construction

Another type of electrical warp stop motion is shown in Figures7.22 a and b. The first figure shows a drop wire with an iron bar and an electrode for the electrical warp stop motion. In the second figure, a cam B is fixed to a bottom shaft A. A knock-off lever C rests on the cam and is fulcrummed at D. A bar E is connected to a push rod F which in turn is connected to the starting handle G. A serrated iron metal bar H has a copper strip fixed at its top. The copper strip is connected to a solenoid I. A switch J and a step-down transformer K are also provided. A number of serrated iron metal



A - Bottom shaft
B - Cam
C - Knock-off lever
D - Fulcrum
E - Bar
F - Push rod
G - Starting handle
H - Iron bar
I - Solenoid
J - Switch
K - Transformer
L - Drop wire

Figure 7.22 Modern type

J and a step-down transformer K are also provided. A number of serrated iron metal bars H are placed across the loom width, the exact number of bars depending upon the number of threads in the warp sheet. Each warp thread is passed through a drop wire.

Working

During normal working, the drop wires stand vertically because of the tension in the warp threads. The knock-off lever moves up and down due to the rotation of the cam and the loom keeps running smoothly.

If a warp thread breaks, the drop wire it supports falls on the serrated iron metal bar. The specially inclined shape of the drop wire causes it to tilt and come in contact with the bar. The electric circuit is now complete and the solenoid is magnetised. The bar is therefore attracted upward and comes in the path of the knock-off lever. The lever pushes the bar and the starting handle is pushed off its notch and the loom is stopped. The stoppage is a result of the switch in the electric circuit being put off to cut off the main supply. The step-down transformer is used to reduce the voltage to 12, 14 or 24 V, which is a very safe voltage for practical purposes.