3.4 The Double-lift Jacquard System

Advantages over the single-lift Jacquard

The double-lift Jacquard has the following distinctive advantages over a single-lift Jacquard.

1. It works at a greater speed than the single-lift Jacquard without increased wear and tear. A loom fitted with a single-lift jacquard inserts 120 picks per minute; but with a double-lift jacquard loom this may be around 140 to 180 picks per minute.

2. In most double-lift jacquards the moving parts work at half the speed of the crank shaft, whereas in single-lift jacquards all the moving parts work at the same speed as the crankshaft.

3. The double-lift Jacquard produces a semi-open shed, whereas the single-lift Jacquard produces a bottom-closed shed. The double-lift Jacquard, therefore, possesses all the advantages of a semi-open shed.

4. In a double-lift Jacquard loom, a greater number of picks per inch can be inserted into the cloth, also because, the weft is beaten up in a crossed-shed and it cannot recede from the fell of the cloth. In a single-lift Jacquard the weft is beaten-up in a closed shed and the weft thread, in this case, has the tendency to slip back and recede from the fell of the cloth.

5. In a double-lift Jacquard, the rising line of shed counterbalances the falling line of the shed and vice versa. Also, the distance travelled by the warp threads is equal to only one and a half times the depth of the shed. In the single-lift Jac quard, the warp must travel twice the full distance for each pick.

6. The double-lift Jacquard consumes a lower amount of power and causes less wear and tear of the machine than the single-lift Jacquard.

7. In a double-lift Jacquard, the beating up takes place in a crossed shed, so it results in a better cover of cloth than in a single-lift Jacquard, where the beat-up is achieved in a closed shed.

It is for the above reasons that double-lift Jacquard systems are used extensively in power looms.

3.4.1 Double-lift Single-cylinder Jacquard

Principle

The principle of double-lift single-cylinder Jacquard is illustrated in Figure 3.4. The two griffes of the double-lift Jacquard rise and fall alternately. One knife B is at the top and the other knife B' at the bottom. One hook A of the pair is lifted and therefore the warp threads in the maileye connected to the neck cord J will be the lifted. Suppose it is required to lift the same warp thread for the next pick, a punched card is pressed against the needles, and if there is a hole in the card opposite the needle C, it leaves the needle, so that the hook remains in the same position. When the knife B' is lifted the hook A' will be taken up and the hook already on the top will come down. The hooks will cross at about the middle of their stroke, and the weight of the ends and lingoes on the cord K will at that moment pass from the hook A to A'
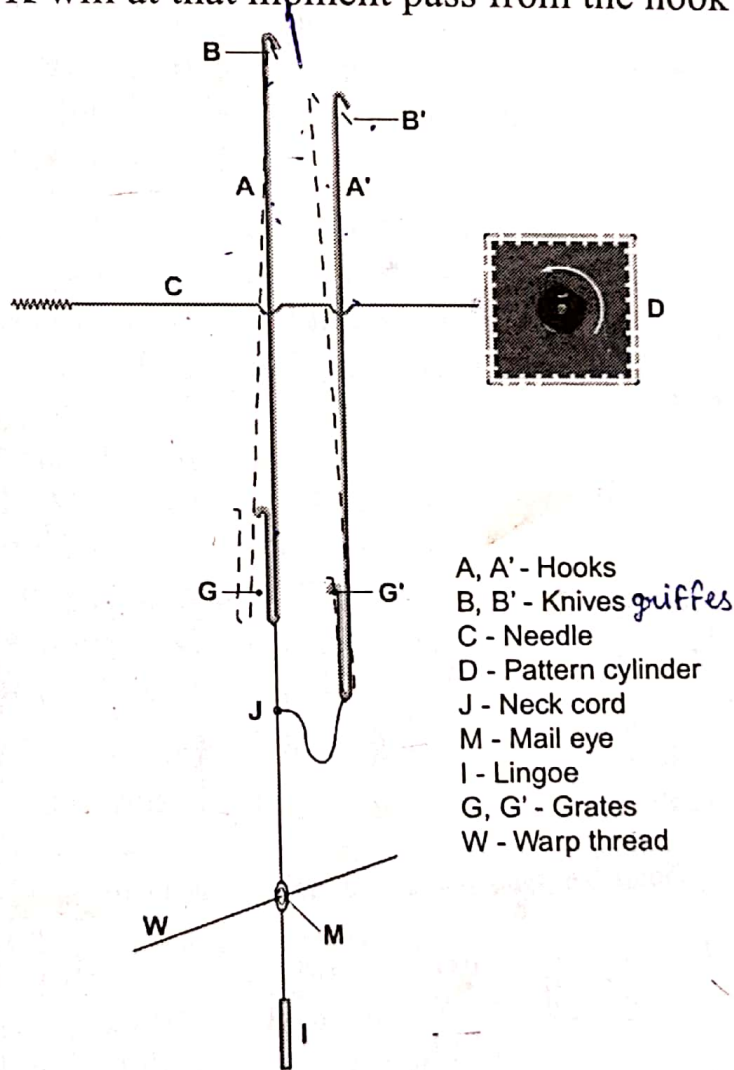
A, A' - Hooks
B, B' - Knives griffes
C - Needle
D - Pattern cylinder
J - Neck cord
M - Mail eye
I - Lingoe
G, G' - Grates
W - Warp thread

Figure 3.4 Principle of Double-lift single-cylinder Jacquard

The neck cord attached to hook A' is slack. When hook A' is lifted, the entire load on the neck cord connected to hook A will be transferred to the neck cord connected to

the hook A' and the cord will gradually tighten.

In the position shown in the Figure 3.4, when one knife is up and the other is down, the needles will be pressed back by the cylinder for the next pick and the hook A will also be pressed back, as shown by the dotted line. The bend of the hook over the knife must therefore be sufficient to prevent the hook from being pushed off the knife. The hooks rest on the grate, and the shape of the hook at this point acts as a spring to straighten the lifted hooks after the pressure of the card has been taken off the needles.

Construction and Working

A double-lift single cylinder 400 hooks Jacquard has 800 hooks and 400 needles. Each needle is bent round two hooks, as shown in Figure 3.5.

A, A1 - Hooks
B, B1 - Griffes
C - Needles
D - Bend in the needles
E - Spring box
F - Needle box
G - Pattern cylinder
H - Grid
I - Double ended hook
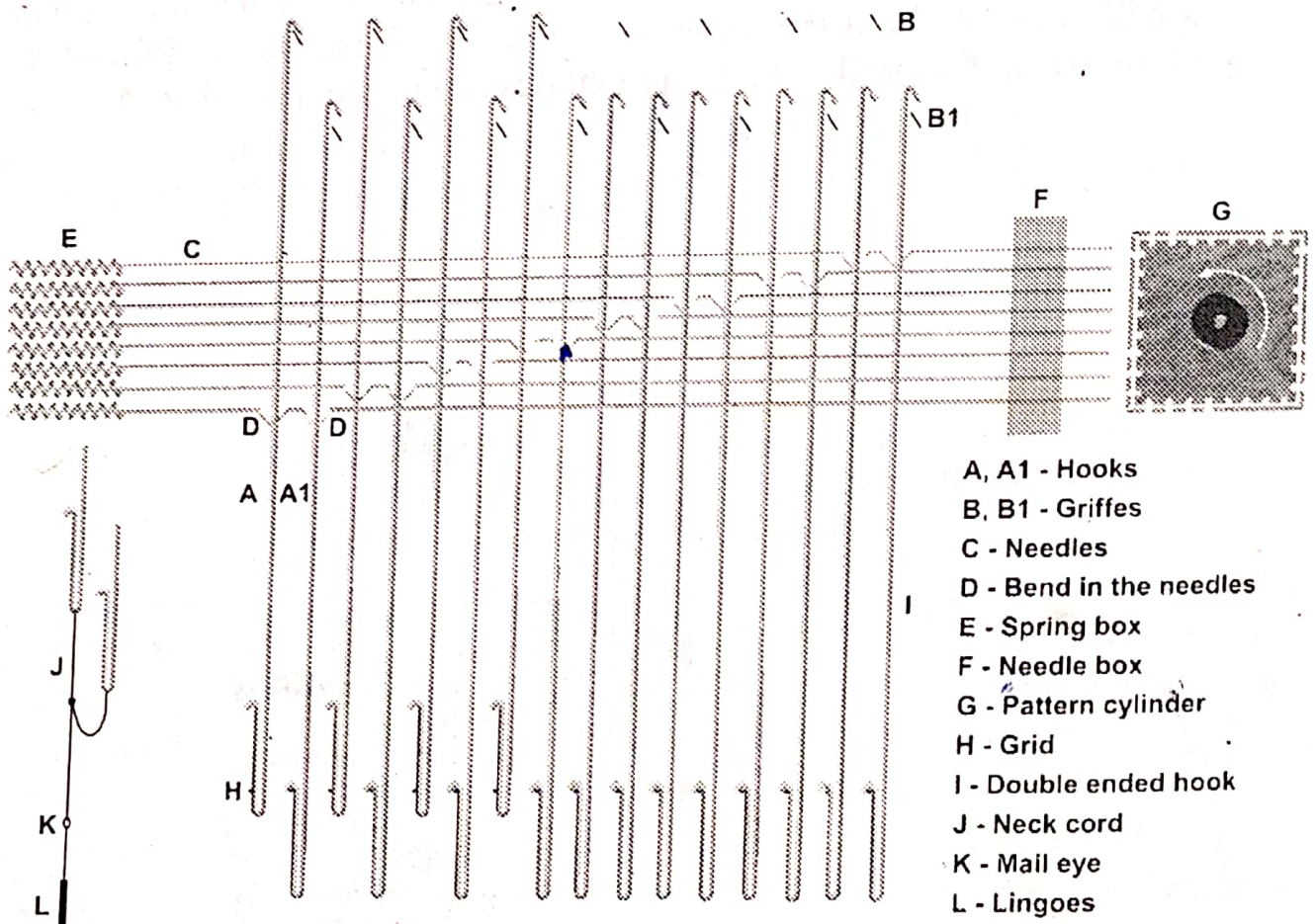J - Neck cord
K - Mail eye
L - Lingoes

Figure 3.5 Double-lift single-cylinder Jacquard

A, A1 are the hooks, B, B1 are the griffes and C, the needles. As each needle controls two hooks, they are both affected by movement of the needle, as at D. The spring box is at E, and F is the needle board. The square cylinder G is the pattern cylinder. H is a slotted grid and I the doubled end of the hooks. J is the neck cord that connects each pair of hooks. The harness cord is tied to this neck cord . It will be seen that the bottom needle is bent round the back pair of hooks, the needle next at is bent round

the adjacent of pair of hooks, and so on. Each needle has a spring attached to one end as in a single-lift Jacquard.

A double-lift single cylinder Jacquard produces a semi-open shed in which the bottom line remains stationary, whereas all the threads of the top line come down midway if they are required to be lifted for the next pick. The griffes of a double-lift Jacquard are usually actuated by a double throw crank fixed on the bottom shaft. From the cranks, the motion is conveyed by two rods to two lifting levers, placed above the griffes. The motion of the cylinder G is independent of the griffes B, B1 and is derived from a crank or an eccentric wheel on the loom shaft. When the griffes are either on the top or bottom centres, the cylinder should be nearer to the needles.

In a double-lift single-cylinder Jacquard, the warp threads form the bottom line, and according to the design the warp threads are raised upward and form the top line. After insertion of a pick the threads from the top line begin to move down and come to the center of the shed. At the same time the ends which are required by the design to move up for the next pick will again be raised upward. The other threads are arrested by the rising threads of the bottom line in the centre of the shed and the downward movement of the top line threads is converted into an upward movement. Thus a semi-open shed is produced.

The principle of working of a double-lift single-cylinder Jacquard is shown in Figure 3.5. The two griffes of the Jacquard rise and fall alternatively. One knife B is at the top and the knife B1 is at the bottom. One hook of the pair is lifted and therefore the ends connected to that hook is lifted. Suppose it is required to lift the same ends of the warp for the next pick, the next card is presented with a hole against the same needle, so that the needle and the hook will be left as it is. When the knife B1 moves up, it lifts the hook A1. At the same time, hook A that was lifted for the previous pick comes down. These hooks will cross at the middle of the stroke. The weight of the ends and the lingoes on the cord K will at that movement pass from hook A to hook A1. That is, from this point the responsibility of lifting a particular warp thread is transferred from the hook A to A1.

In Figure 3.5, the cords attached to hook A1 are slack. But when hook A1 is lifted the cord will gradually become taut until it bears all the weight, and then cause the cord from hook A to become slack. In this Jacquard the working speed is increased in both the griffes and the cylinders. When one knife is up and the other is down, the needles will be pressed back by the cylinder for the next pick and hook A will also be pressed back. The bend of the hook over the knife must therefore be sufficient to prevent the hook from being pushed off the knife. The hooks rest on the grate, and the shape of the hook at this point acts as a spring to straighten the lifting hooks after the pressure of the card has been removed from the needles. This type of machine can run at a speed of about 160 or 170 picks per minute as compared to the 120 or 130 picks per minute of a single lift Jacquard.