

The mechanism of a sewing machine can be divided into the four areas:

1. MOTIVE SOURCE
2. STITCH FORMATION
3. FABRIC MOVEMENT
4. THREAD CONTROL

Bobbin winding is in the nature of an add-on activity, covered by its own section.

All the illustrations in this section are of a Model 66 or 99. Variations for other models are described in the sections dealing with the individual features.

1. MOTIVE SOURCE

Whether hand driven or powered by an electric motor or treadle belt, the connection to the machine is the balance wheel. This serves to even out any 'lumpiness' in the machine to give a smooth action.

2. STITCH FORMATION

Needle movement :

The rotating driveshaft in the arm of the machine connects to the needle bar through levers in the head to produce the up and down movement of the needle.

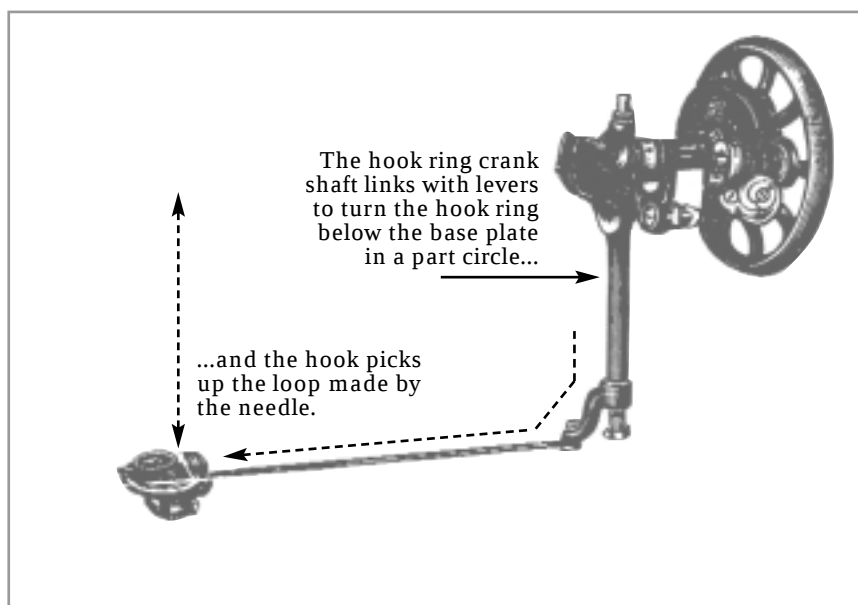
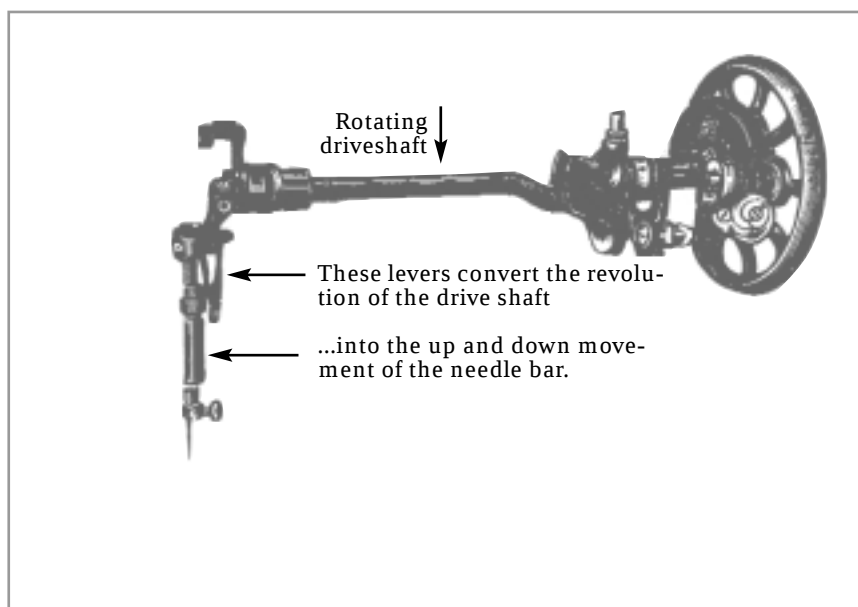
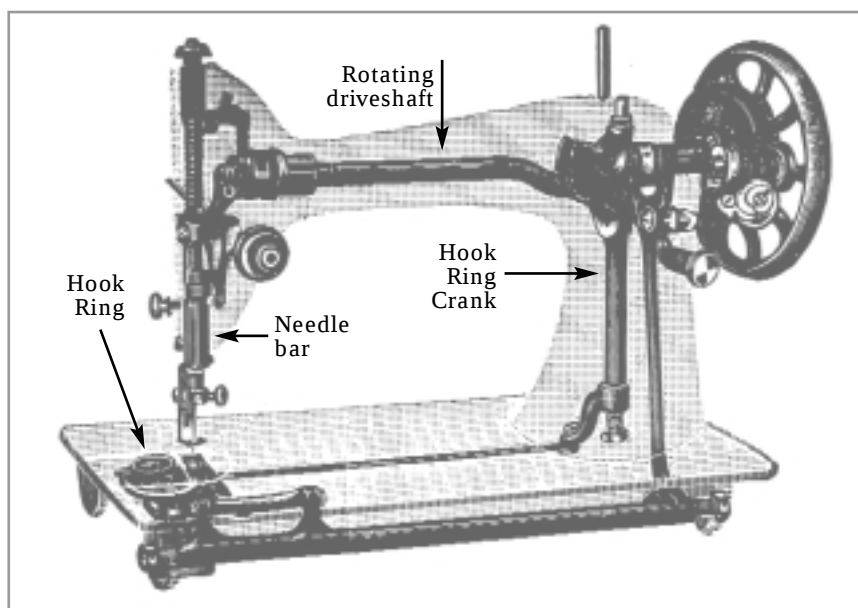
The sewing machine needle is a highly sophisticated piece of design which we look at in detail on the following page.

Stitch making :

The drive shaft has a vertical crank attached to it, going down under the base plate. Again, by a series of levers, this connects to a hook ring.

The hook ring picks up the upper thread and guides it round the bobbin holding the lower thread.

Using the up and down movement of the needle and the rotation of the hook ring the two threads are looped together to form the stitch.



2. STITCH FORMATION

(Continued)

The Needle :

The needle used in most of the domestic machines we handle has the following features:

- * A flat side at the top end to secure it to the needle bar.
- * On the same side of the needle, a thinning of the needle just above the eye.
- * On the opposite side of the needle, a groove runs from near the top, down to the eye.

When the needle pierces the fabric on the down stroke, the thread on one side will lie in the groove.

When the needle starts to rise again, the thread in the groove rises with it, but on the other side, the thread is pinched between the cloth and the side of the needle

This friction against the fabric causes the thread to be retarded and a loop is formed just above the eye of the needle.

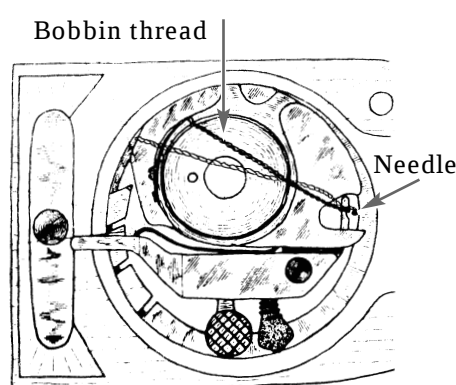
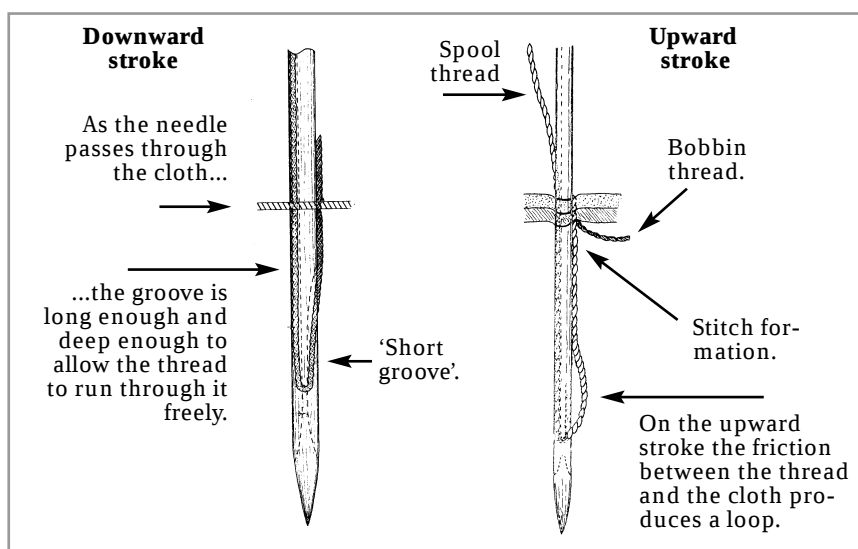
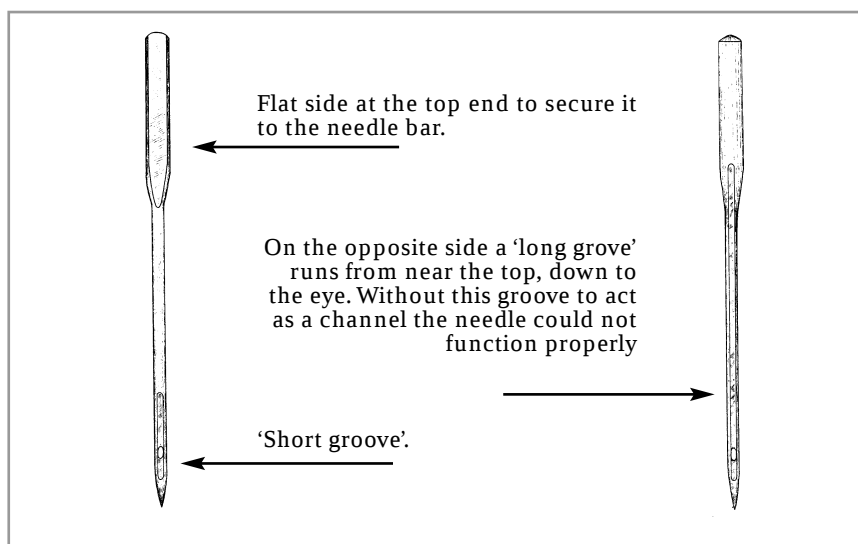
The upward stroke of the needle creates the crucial moment in the sewing cycle and, as you can see from the illustration, the action takes place beneath the cloth.

The Hook Ring :

As the hook ring turns in its part circle, the hook picks up the loop made by the needle and drags it round the lower bobbin.

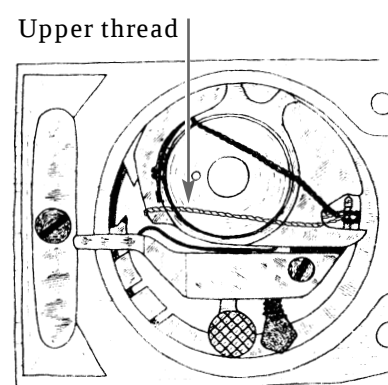
The thread then slips off the hook and, as the needle bar rises, is pulled round the lower bobbin to make the stitch.

On the far right, you can see that the bobbin thread has been encircled by the stitch loop formed by the top thread.



This action in the stitch cycle is the most important combination of movements performed by the machine.

And yet, at normal sewing speed, it only takes about a fifth of a second to complete, which is approximately the time required to wink your eye.

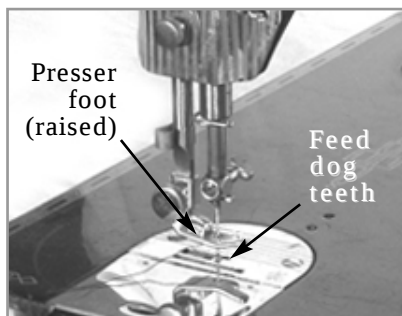


Accurate synchronisation (or timing) between the simultaneous tasks of stitch formation is essential for the machine to work.

If you thread up a machine, and sew a few stitches slowly on the edge of a piece of cloth with the cover plate open, you can see this stitch formation for yourself.

3. FABRIC MOVEMENT

At each revolution of the machine the teeth of the feed dog rise slightly above the base plate.



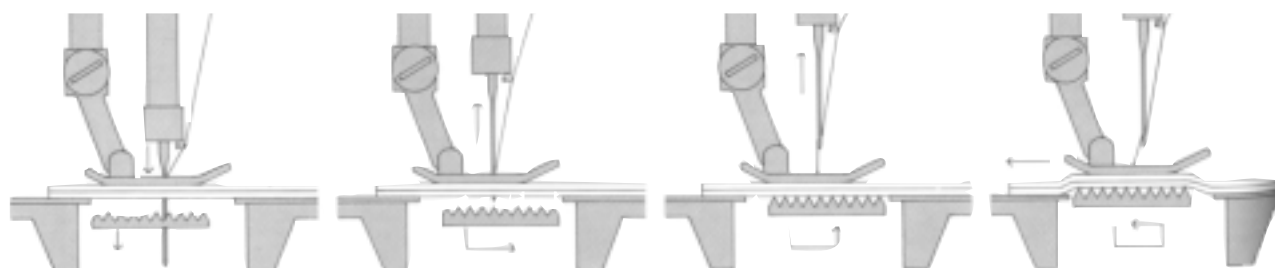
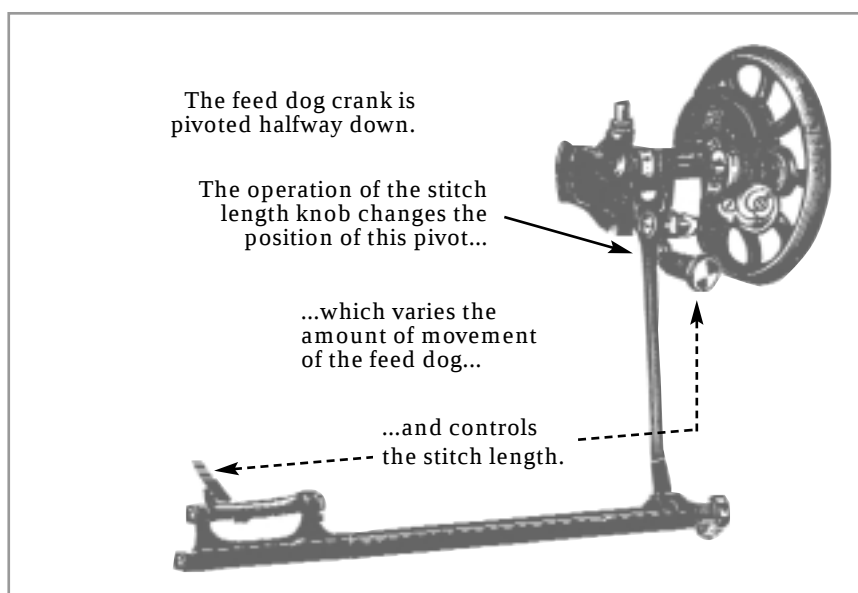
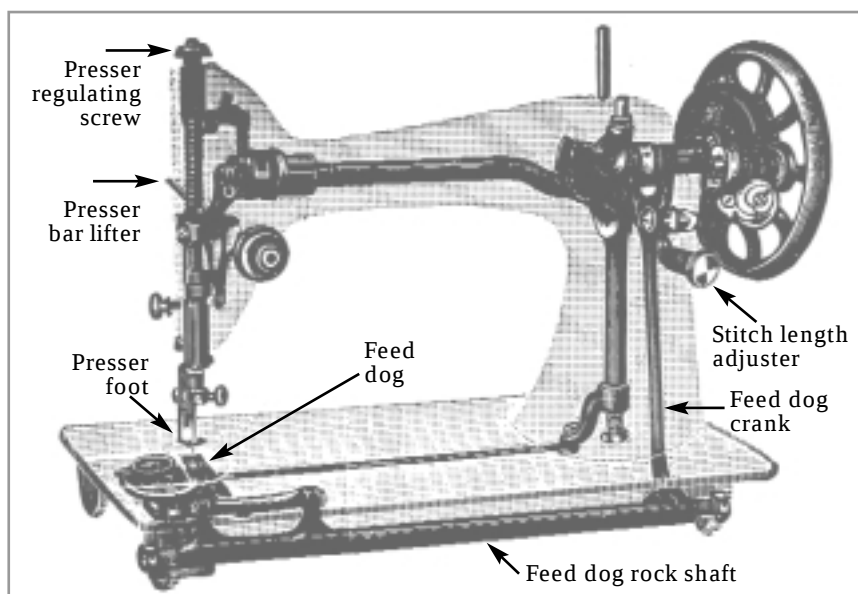
The teeth grip the underside of the cloth and feed it forward a tiny measured amount determined by the setting of the stitch length regulator.

The movement of the feed dog is generated through yet more levers, from another vertical shaft working from the drive shaft.

Fabric control:

The fabric is held tight during stitching by the presser foot squeezing the fabric against the teeth of the feed dog or the throat plate while the feed dog is below the plate.

The amount of pressure can be regulated by the presser regulating screw on top of the head and released completely by raising the presser bar lifter.



While the needle and thread penetrate the fabric, the feed dog is still and the fabric is held between the presser foot and the throat plate, keeping it taut.

As the needle descends, so does the feed dog.

As the needle is coming up out of the fabric, the feed dog is moving back.

The fabric is still held between the presser foot and the throat plate.

As the needle continues to move up, and to bring the stitch with it, the feed dog is also moving up towards the fabric.

The fabric is still held between the presser foot and the throat plate.

As the stitch is being set, the feed dog rises above the throat plate, and its teeth move the fabric forward by one stitch length.

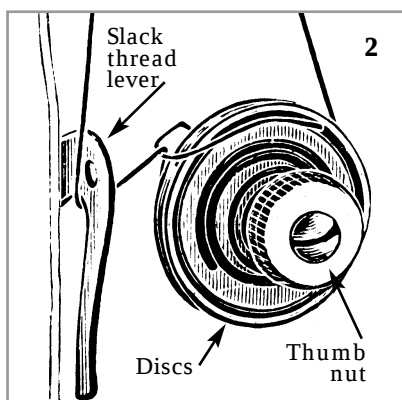
4. THREAD CONTROL

Stitch tension:

The tightness of the stitch is controlled by two different tension mechanisms:

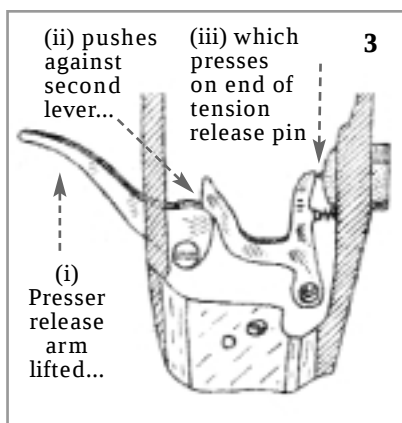


(1) The bobbin has a small spring on its case, which delivers the thread under a slight tension.



(2) The main tension mechanism is on the upper thread, on the head of the machine.

The thread passes between two saucer shaped discs. The pressure between the discs can be varied by the tension regulating thumb nut

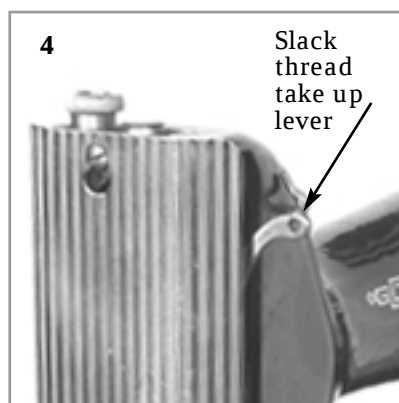


(3) The upper tension is released completely when the presser bar lifter is raised. The lifter presses on a pin which in turn pushes the discs apart.

When the tension is released the fabric can be removed easily.

Slack thread lever:

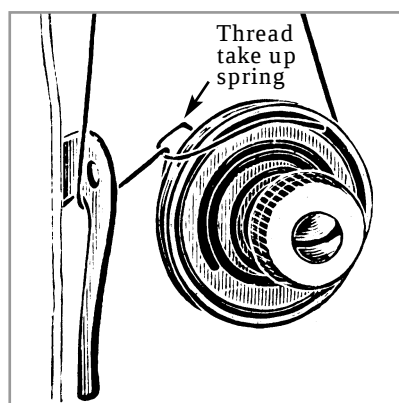
While the upper thread is being taken round the lower bobbin it is making a large loop.



(4) To provide sufficient thread for this loop (not under tension) the thread take up lever on the head travels downwards, rising again to pull the stitch tight.

Thread take up spring:

As the slack thread lever reaches the top of its travel, the feed dog is also moving forward to make the stitch.



At this point the thread is under extra tension and - to avoid snapping the thread at long stitch lengths - it is passed through the thread take up spring in the tension mechanism which cushions the strain.