Feed Dogs, Presser Feet and Related Problems

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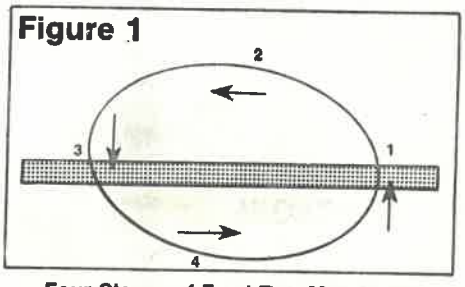
Many sewing problems, such as ply shift and seam puckering, can be overcome with an understanding of the types and functions of feed dogs and presser feet.

Sewing problems differ greatly depending on the materials. Ply shift may be encountered when sewing nylon taffeta. Seam puckering may be seen on dress shirts made of perma-press fabrics. Poor feeding may occur when sewing bulky sweaters and blankets. Damage by feed dogs and feed marking may occur on scarves and panty hose.

In order to understand ply shift, the movement of feed dogs must be examined during sewing. Basically, the movement of feed dogs is divided into four stages: (Figure 1)

Figure 1



Four Stages of Feed Dog Movement

Stage 1. Feed dogs rise and appear just above needle plate.

Stage 2. Feed dogs feed the fabric.

Stage 3. Feed dogs lower.

Stage 4. Feed dogs go down under needle plate and move forward.

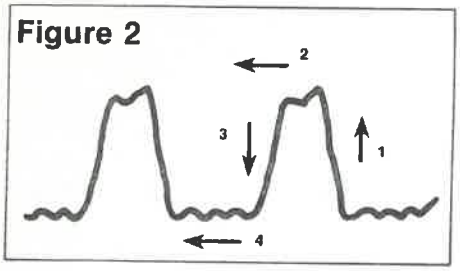
The presser foot presses the fabric, following the up and down movement of the feed dogs. When sewing two plies, the lower ply is fed by feed dogs, but the upper ply is fed less than the lower ply because of the friction with presser foot. In other words, shifting occurs between the upper ply and the lower ply. The rate of shifting per stitch may be very small, but the accumulated shift may result in significant ply shift in the sewn article.

To demonstrate the four stages of feed dog movement, the pressure of presser foot was measured by osciloscope (Figure 2).

Stage 1. The pressure is gradually increased as feed dogs raise presser foot.

Stage 2. While feeding the fabric, there is constant pressure

Figure 2



Presser Foot Pressure Closely Follows Feed Dog Movement.

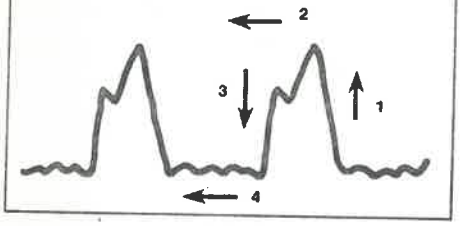
between presser foot and feed dogs.

Stage 3. As feed dogs lower, the pressure is gradually decreased.

Stage 4. Feed dogs go down under needle plate, and the pressure becomes zero.

The wave shape shown in Figure 2 occurs when the presser foot closely follows the feed dog movement. However, when the sewing speed is high or the pressure of presser foot is too low, the wave shape is as is shown in Figure 3. This situation causes various problems.

Figure 3



Presser Foot Pressure Is Not Constant at Stage 2 of Feed Dog Movement.

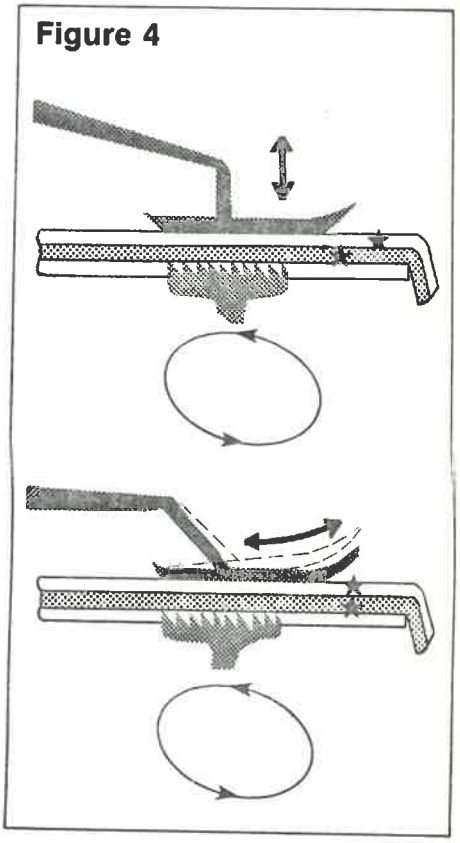
At stage two in Figure 3, there is no constant pressure. The reason for this is that the presser foot is thrown up by feed dog, and for a moment no pressure is applied. However, just after this drop, the pressure is restored. In this condition, the presser foot does not follow the feed dog movement closely, and therefore the fabric cannot be fed positively.

In order to avoid this uneven feeding, higher presser foot pressure is required. However, higher pressure increases the friction between the upper ply and the presser foot and thus tends to cause ply shift. To prevent this shift, the pressure of presser foot on the fabric should be decreased as much as possible.

Various methods have been developed to overcome this problem. For lockstitch machines, a walking foot mechanism in which presser foot moves simultaneously with feed dogs, and needle feed mechanisms in which the needle also moves simultaneously with the feed dogs have been developed. Recently, top feed mechanisms have been used in some overedgers or safety-stitch machines.

A special presser foot called Floating Foot has now been developed. The Floating Foot follows not only the up and down movement of feed dogs but, because it also has back and forth freedom of movement, it is able to follow the movement of the feed dogs more closely (Figure 4). For this reason, the resistance of the presser foot on the fabric is decreased, and the feed of the upper ply is aided by the back and forth movement of the foot.

Figure 4



Therefore ply shift can be minimized. This presser foot is very effective, especially when sewing lightweight fabrics, such as georgette and perma-press.

The Floating Foot, however, is not suitable for sewing thick, elastic fabrics, such as bulky sweaters, because the effect of feed dog on the fabric is absorbed by the fabric elasticity and is not delivered to presser foot.

Seam puckering is another problem often associated with feeding fabric. Although there are many factors that cause seam puckering, feed dogs are focused on here.

On feed dogs where the teeth are too coarse for the thickness of the fabric, the fabric tends to sag between the teeth and follow the contours of the teeth becoming wave-shaped (Figure 5). When the fabric is sewn in this condition, seam puckering occurs.

On the other hand, fine toothed feed dogs decrease the sagging of the fabric between the teeth, and seam puckering is prevented (Figure 6). Recommended for such purposes are feed dogs of 1.0mm and 1.25mm tooth pitch in addition to standard 1.6mm tooth pitch feed dogs.

Figure 5

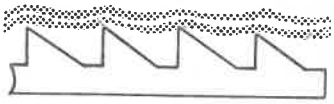


Figure 6

Although sagging of the fabric between the teeth should be avoided on lightweight fabrics to prevent seam puckering, such sagging is required for correct feeding of heavyweight or extra-heavyweight fabrics. If the tooth pitch is short, only the lower ply sags between the teeth, and the upper ply is not fed smoothly (Figure 7). Therefore the sagging of not only the lower ply but also the upper ply is required for sewing heavyweight fabrics (Figure 8). Feed dogs of 2.5mm tooth pitch are recommended for blankets, bulky sweaters and jeans.

Feed marking is another problem that can be avoided. Extra-light and soft fabrics, such as panty hose, may be damaged or marked by the feed dog teeth when gripped by the presser foot. When ordinary feed dogs are used and sufficient pressure is applied to the presser foot to feed the fabric properly, such damage or feed marking cannot be avoided. For this reason, rubber-coated feed dogs (no jagged teeth) are used for extra-light and soft fabrics.

Generally, feed dogs of 1.6mm

Figure 7

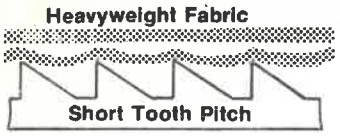
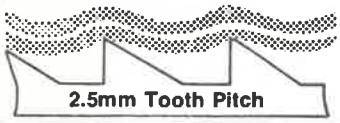


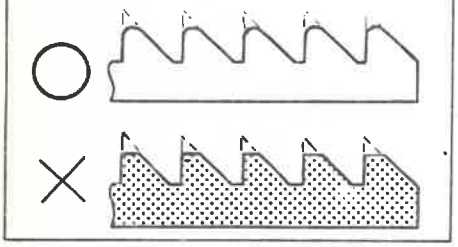
Figure 8



Sagging of both plies is required for proper feeding of heavyweight fabrics.

tooth pitch are standard for sewing lightweight to medium-weight fabrics. If these feed dogs damage knitted fabrics, the problem may be remedied by rounding the tooth tops. However, tooth tops should not be made flat (Figure 9). Flat tooth tops may cause sidewise sliding of the fabric while feeding.

Figure 9



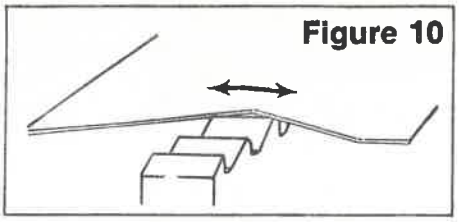
Tooth tops may be rounded, not flattened.

Rows of Feed Dogs

One-row and curved seaming: The size of presser foot is one of the factors that determine how easily curved seams can be sewn. The number of feed dog rows also affects curved seaming. A one-row feed dog has only a small area where the fabric is gripped by presser foot, and therefore it is effective for sewing the corners of handkerchiefs and toes of panty hose where the curved seaming is required.

Two-row and sidewise sliding of the fabric: In the case of one-row feed dogs, the fabric tends to slide to the right and left when being fed (Figure 10). The reason for this is that the teeth of feed dogs are cut in a sidewise direction only. In other words, the

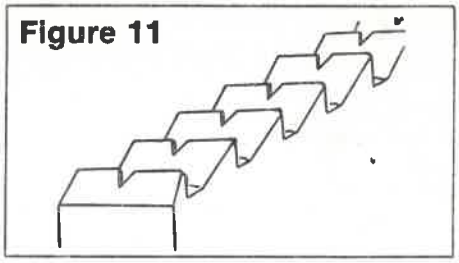
Figure 10



One-Row Feed Dogs and Sidewise Sliding

fabric has no sidewise resistance when being fed, and therefore sidewise sliding sometimes occurs. This phenomenon more often occurs on woven fabrics.

Figure 11



Center grooves prevent sidewise sliding.

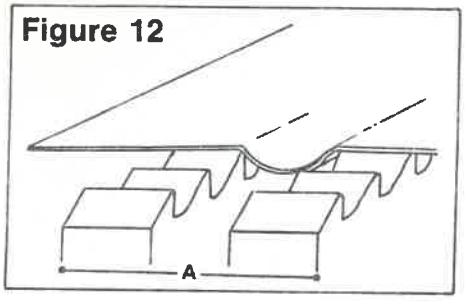


Figure 12

Two-Row Feed Dogs

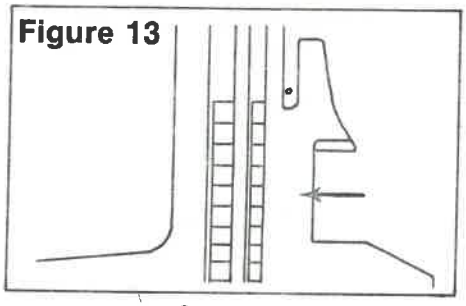


Figure 13

Overedger

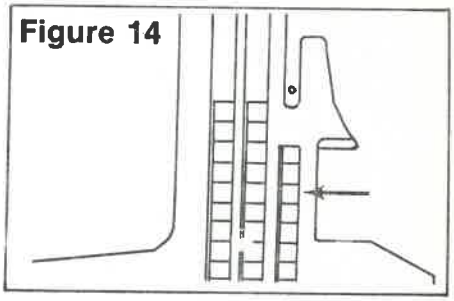


Figure 14

Three-Row Feed Dog

One solution is to cut a groove in the center of the feed row (Figure 11).

Two-row feed dogs prevent this sidewise sliding more than one-row feed dogs because two-row feed dog have a wide groove between the rows (Figure 12). Because of this groove, sidewise sliding differs greatly between one-row feed dogs and two-row feed dogs, even if width 'A' shown in Figure 12 is the same. As the number of rows increases, sidewise sliding decreases.

Three-row and uneven feeding of fabric: A lockstitch machine has feed dogs that are located both on the right and left sides of the needle drop point. This feature ensures that the fabric is fed in a straight line. However, an overedger has feed dogs sitting mainly on the left side of the needle drop point because it cuts and sews the fabric edge and the needle plate has a chaining-off finger to produce the seam. Therefore, the fabric tends to be guided to the left (Figure 13).

However, a three-row feed dog has one row in front of the needle drop point (Figure 14), which feeds the part of the fabric to be sewn in a straight line and thus helps to prevent the fabric from being fed sidewise.

This discussion about feed dogs illustrates the complex relationship between the material to be sewn, the operation being performed and the feed dogs themselves. To ensure attractive, high quality seams and to optimize ease of handling, all sewing parts should be chosen only after similar, detailed considerations. ■