INSIDE

The Mechanic's Shop

TODAY'S SEWING MACHINE MECHANIC might be compared to the country doctor. He must be able to recognize and treat a wide variety of ailments in the shortest possible time and keep the patient smiling.

Time is the most important commodity in the plant today. To the management, it is production — to the piece worker, it is a measure of earnings. A properly equipped mechanic, over a period of months, can make money for both.

All too often, a mechanic is handicapped because he does not have suitable work space or the proper equipment required to carry out his duties quickly and efficiently.

Listed below are what might be considered the minimum repair shop requirements for a medium size plant. This equipment, along with his own hand tools, will allow the mechanic to do his work promptly and in a workmanlike manner:

- 2' x 6' Work bench in an enclosed area
- Catalog rack or cabinet
- Small parts cabinet
- Double wheel electric grinder with interchangeable buffing wheel and wire brush
- Medium size vise
- Electric soldering gun
- Claw hammer
- Brass or plastic hammer
- Vise grip pliers
- Mill file
- Half round file
- Rat tail file
- Rasp
- 6" and 10" adjustable wrenches
- ¼" electric drill and assorted drill bits and tops
- Screwdrivers — small, medium and large
- Fuse tester
- Fuse pliers
- Long nose pliers
- Hack saw
- Two triangle stones — 1 India, 1 Arkansas
- Belt pliers US #21236
- Allen wrench set US #21388 AN
- Two rolls emery cord 3/64" diameter US #21260
- Two rolls emery cord 1/32" diameter US #21260 B
- Two rolls emery tape 3/32" wide US #21260 D
- Package of emery cloth 120 grit (aluminum oxide)
- Package of emery cloth 240 grit (aluminum oxide)
- Package of crocus cloth

A larger plant will, of course, require more elaborate repair department equipment to handle the normal work load.

In the articles following we will discuss basic adjustments on a wide variety of Union Special machines. The aim will be to aid mechanics and production efficiency and quality. Knowing what's inside the machine and what makes it tick should be helpful. Plant management should consult with the mechanic to be sure that maintenance facilities—shop and equipment—are adequate to permit him to do his job effectively, efficiently, economically.

Needle Data

The most vital part of any sewing machine is the needle. Unfortunately, the needle is often overlooked when sewing difficulties are encountered and this oversight can make a major problem out of a minor one. Whenever an operator has sewing difficulties *CHECK THE NEEDLE.*

While a needle for fabric sewing may be regarded as a simple device, several characteristics in needle construction contribute to good sewing and high production. Understanding basic needle design can be very beneficial in selecting the proper needle when unusual sewing problems arise.

The *points* of most fabric needles are round or conical since this tends to spread material fibers without damage.

The point *tip* of most round point needles have a tiny blunt angle to strengthen the point against breakage or hooking. This is commonly called the *set.* If the needle point from the eye to the tip were ground at the same angle, the final tip would be an extremely long projection that would break or hook after a few penetrations of the fabric. By grinding the extreme tip at a blunt angle, hooking is minimized and there is less chance of the point catching fibers on the sewing thread which can cause thread breakage or fraying.

This blunt angle provides a serviceable needle point that will sew many thousands of stitches without hooking or blunting unless a foreign object is struck.

On many fabrics where the fibers are delicate and easily cut, a further refinement is the *ball point.* In this construction the *tip* or *set* is ground like half of a ball. This *ball point* penetrates fragile materials by moving the fibers aside rather than piercing them.

The *set* or the *ball point* are approximately 10% of the needle size diameter. This is barely visible to the naked eye but it is the difference between sewing and not sewing.

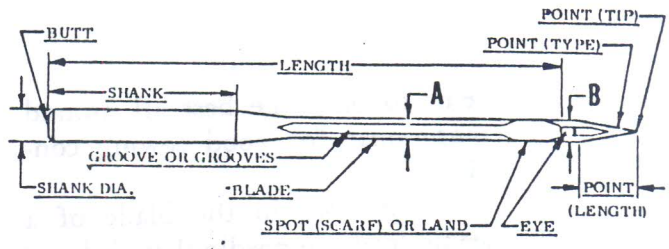
The size of the *eye* is proportional to the diameter of the needle blade. Some special needles have undersize or oversize eyes for unusual conditions. The needle thread loop should form at right angles to the hook point or looper. Too large an eye will allow an unstable loop that may be missed by the hook point or looper. Too small an eye may prevent a loop from being formed. In all cases, the needle thread should pass freely thru the eye but not loosely. The eye and the area around the eye must be very smooth and uniform in finish otherwise excessive thread breakage will occur. As of this writing, most of the major needle manufacturers in the world polish each needle eye by hand. So far no machine available does as acceptable job.

The area of the needle just above the eye on the loop taking side is

made either with a raised portion called a *land* or a notched out portion called a *spot or scarf*. In both cases, the purpose is to present a better needle loop to the hook point or the looper. The *land* has the advantage of strengthening a small diameter needle, and it forces the needle loop out for easy loop taking. The disadvantage to this construction is that on certain fabrics it causes a pinching effect on the thread as the land passes back and forth thru the material.

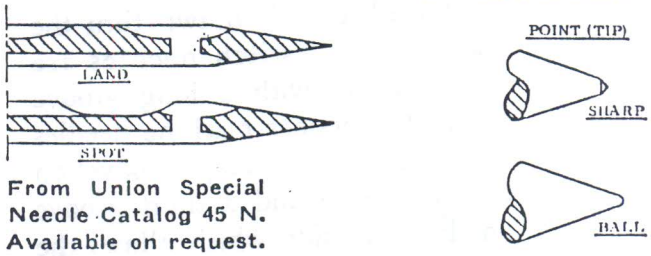
The *spot* or *scarf* allows the look point or looper to be set very close to the needle to insure proper loop taking. This construction offers more protection to the thread as it passes back and forth through the material. However, on very fine needles the removal of metal at this point usually makes a needle weaker and more subject to breakage. The major portion of needles used on fabrics are of the scarf type which

ILLUSTRATION OF NEEDLE DETAILS
(A DOUBLE GROOVE UNIFORM BLADE NEEDLE IS ILLUSTRATED.)



A—SIZE OF ALL EXCEPT "LOCKSTITCH" NEEDLES ARE MEASURED HERE

B—SIZE OF ALL "LOCKSTITCH" NEEDLES ARE MEASURED HERE.
(THESE MEASUREMENTS ARE IN THOUSANDTHS OF AN INCH.)



From Union Special Needle Catalog 45 N. Available on request.

Approximate Needle Size Designations.

BLADE DIAMETER												
INCHES	MILLIMETER	UNION SPECIAL	LEWIS	COLUMBIA	METWAR SCHMETZ	MAUSER	MERROW	PFAFF	REECE	SINGER	W & G	W & G SUPERLOCK
.019	.483	019			45	7/0				4	5/0	
.020	.508		2		50	6/0		5		5	4/0	20
.0215	.546	022			55	5/0	3/0			6	3/0	22
.023	.622				60		2/0	6		7 & 8	2/0	24
.025	.650	025	2-1/2		65	4/0				9		25
.028	.711	027			70	3/0	1	7	3/0	10	1	27
.030	.762	029	3	1	75					11		30
.032	.813	032		1-1/2	80	2/0	2	8	2/0	12	2	32
.034	.864	034		2	85					13		
.036	.914	036	3-1/2	2-1/2	90		3	9		14	3	36
.038	.965	038		3	95					15		
.040	1.016	040	4	3-1/2	100	1	4	10	1	16	4	40
.042	1.067	042			105					17		
.044	1.118	044		4	110	2	5	11	2	18	5	44
.046	1.168	046	4-1/2	4-1/2	120		6	12	3	19	6	48
.049	1.219	049	5		125	3				20		49
.052	1.295				130		7	13	4	21	7	52
.054	1.372	054	5-1/2	5-1/2	140	4		14	5	22	8	
.060	1.499	060			150	5	8	15			9	
.063	1.600				160			16	6	23	10	
.067	1.702	067			170	6	9	17				
.071	1.802				180			18	7	24		
.075	1.905				190	7		19				
.080	2.032	080			200	8	10	20		25		
.090	2.286	090			230	9		23		26		
.100	2.540	100			250	10				27		
.110	2.794				280	11				28		
.120	3.048	120			300	12				29		
.130	3.308				330	13				30		
.140	3.556	140			350	14				31		
.150	3.810				380	15				32		
.156	3.962	156			400	16				33		

seems to offer the best all around compromise for good sewing conditions.

The *grooves* in the blade of a needle lead the needle thread down from the eyelets on the machine and provide protected channels for the thread as it is drawn thru the material. Lockstitch needles are usually made with a long groove only. Most looper machine needles are made with a long groove on the front side and a short groove on the scarf side which allows the stitch to be pulled up.

When sewing synthetics and heavily sized materials, excessive needle heat will cause the chemicals and sometimes particles of the material to melt and adhere to the eye, on the blade, and in the needle grooves. This will cause skipping or thread breakage which can be cured only by replacing the needles and reducing the heat or friction on the needle. Some remedies are helpful when used alone, but more often than not a combination is the most effective.

Here are a few remedies:

1. **Ball eye or oversize ball eye needles in chrome finish. The ball eye makes a larger opening in the fabric reducing friction on the needle blade.**
2. **Lo-Temp Finish which is a chemical finish that is often more effective than chrome where heating is a problem.**
3. **Check needle setting and avoid excessive deflection that is heat producing.**
4. **Lubricate the needle thread with a silicone or other thread lubricant.**
5. **On looper machines lubricate the looper thread which wraps around the needle blade on every stitch.**
6. **Use a needle cooler.**
7. **Reduce machine speed. This is usually a last resort since reduced speed can affect production. Repeated tests have shown in many cases reducing the pulley diameter only one or two sizes may reduce needle heat sufficiently to avoid thread breakage or skips.**

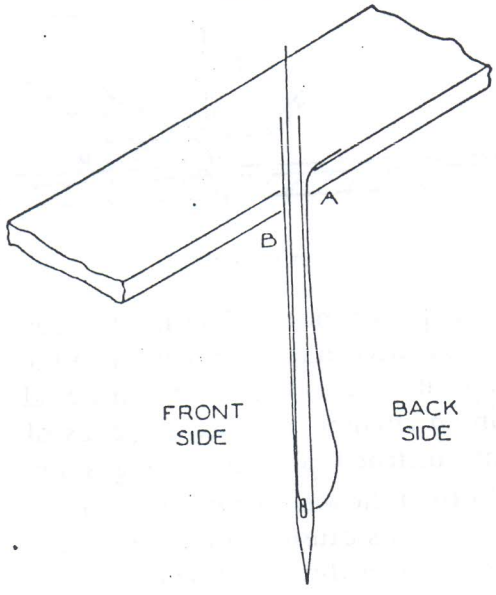
Take several different types of needles and examine them under a magnifying glass. The more that is known and understood about needles, the easier a mechanic's work will become. Included in this article is a chart indicating Union Special and other comparable needle sizes. If more detailed needle information is desired, Needle Catalog 45N is available on request.

Needle Loop Failures And Their Causes

SKIPPED stitches on a 401 stitch machine are the result of the looper missing the needle loop or the needle missing the triangle formed by the looper thread and the needle loop. In this article we will discuss the formation of the needle loop only.

As the needle rises from the bottom of its stroke, a loop is formed on the backside of the needle because the thread on the front of the needle's eye moves up with the needle, but the thread at the material on the backside does not. This creates slack which forms a loop. *See Figure 1.* The thread must have body or stiffness to form the loop instead of just collapsing or falling against the needle. If the thread on the front side of the needle moves up with the needle, no loop will be formed on the front side of the needle; however, if the thread at the material does not move up quite as fast as the needle, a small loop may also form on the front side of the needle.

Figure 1



When the machine is turned over by hand, the needle loop should form somewhat as shown at "A" in *Figure 2.* If the needle loop forms as at "B" it is too small, and if it forms as at "C", the needle loop is too large. Too small a needle loop may be caused by any of the following conditions:

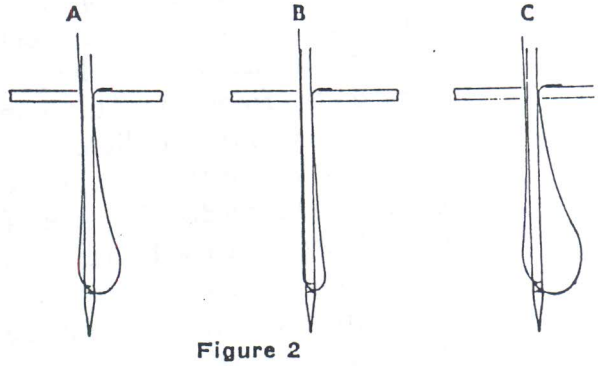


Figure 2

1. **The needle does not rise enough to form a good loop.**
2. **The length of the needle eye may be too long so that the opening of the needle loop is delayed because the bottom of the needle eye does not contact thread quickly enough to form a good needle loop.**
3. **The needle thread may be stretched at the bottom of the stroke so that the needle loop will not form until the stretch is relieved on the up-stroke. This often happens with synthetic threads.**
4. **The needle loop may collapse and fall back through the needle eye as shown in *Figure 3*. This usually happens when the needle thread is creased by the needle eye. The thread is creased because it is tight at the bottom of the stroke and the needle is hot thereby pressing the crease into the thread.**

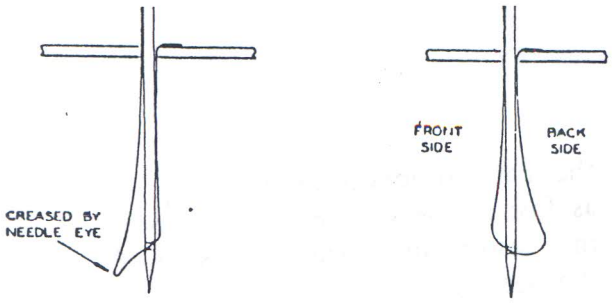


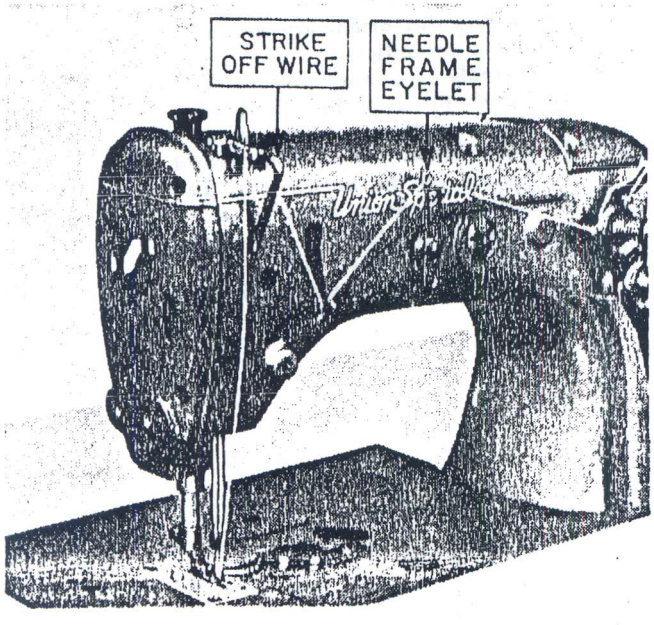
Figure 3

5. Sometimes the needle thread sticks in the needle grooves and does not form a loop. This is again a heat problem and can be relieved by using an over-size ball eye needle that reduces friction.

The size of the needle loop is usually increased by raising the strike-off wire. *See Figure 4.* This creates slack thread on the front side of the needle so that a loop is formed on the front side. This loop will slip through the needle eye increasing the size of the loop on the backside of the needle. The size of the needle loop can also be increased by increasing the rise of the needle in forming the loop. This can be done by increasing the looper gauge approximately 1/64 to 1/32 of an inch.

The looper may miss the needle loop just as the presser foot is coming off a thick seam even though the machine is adjusted properly. The material in front of the seam may not be held down by the ordinary type of presser foot when the

Figure 4



presser foot is on the seam, therefore, when the needle rises in the first needle hole after the seam, the needle carries the material upward since it is not being held down and this delays the formation of the needle loop. *See Figure 5.* This action is call flagging and its effect is to steal the needle loop. If a tractor or a tumbler type foot is used, the material in front of the seam is held down as the needle rises and no flagging or skipped stitches occur.

Figure 5

Another common cause of needle loop failure is needle deflection. *See Figure 6.* Notice that when the presser foot comes off a seam, the needle may deflect toward the operator as it glances off the edge of the seam. Then, when the looper moves in to pick up the needle loop, the needle is away from the looper and

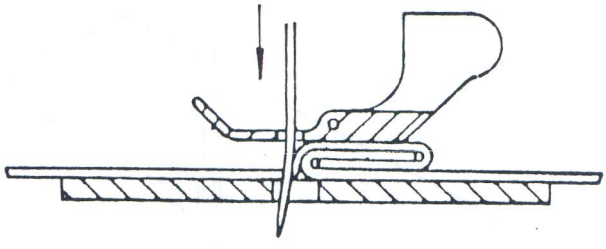


Figure 6

a skip may occur. The needle may also deflect in this manner when the operator holds back on the material in an attempt to match the ends of mis-matched plies in a long seam. In the following article we will discuss skips caused by failure to control looper thread properly.

Looper Thread Skips And Their Causes

IN THE FORMATION of the 401 stitch, a triangle must momentarily be formed below the throat plate in order to make a stitch. *See Shadowed Area, Figure 1.*

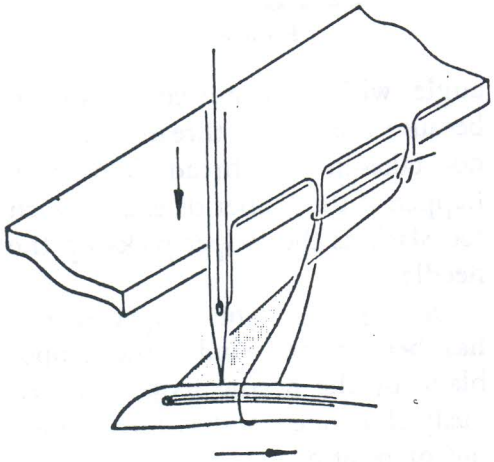


Figure 1

This triangle is formed as follows: The left side is the looper thread running from the eye of the looper to the previously made stitches. The right side is the needle loop around the looper from the last stitch being formed. The base or front side of the triangle is formed by the blade of the looper. The needle must descend within this triangle if a stitch is to be properly formed.

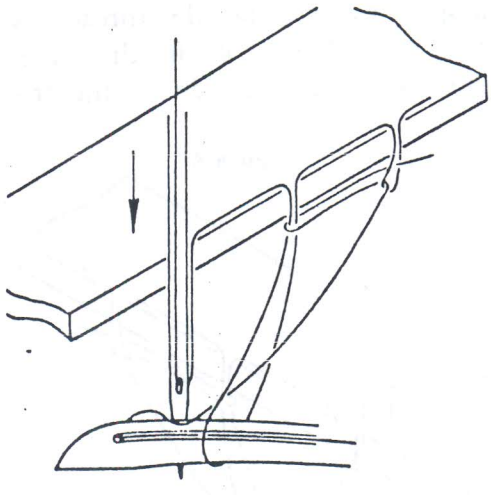
The needle thread loop around the looper must be retained or held to the right of the needle until after the needle enters the triangle. The needle thread loop is kept snug by the needle thread tension and controls. It is momentarily retained or held back by the shape of the front and underside of the looper blade, as these surfaces create drag on the needle loop as the looper moves to the right on a looper across the line of feed machine.

The looper thread side of the triangle should remain straight. This is accomplished by the looper thread take-up cam which takes up the looper thread at just the proper rate to keep it taut. The triangle is opened by the feeding of the material and the avoiding action of the looper or base of the triangle. *See Figure 1.*

The actual forming of a stitch beneath the throat plate can be viewed with a dental mirror or any other type of small mirror, preferably one that magnifies.

Normally, the triangle should remain stable until the point of the needle has descended even with, or slightly below the bottom edge of the looper blade. Only then

Figure 2



LOOPER THREAD SIDE OF TRIANGLE COLLAPSED

should the looper thread take-up, release or "cast-off" the looper thread.

If the looper thread side of the triangle is too loose it may collapse as shown in *Figure 2*. This produces a skip on the looper thread side. It can be caused by the looper thread being cast-off too soon by the take-up. This type of skip can also occur if the needle is deflected to the rear so that it misses the triangle. *See Figure 3*. Triangle skips

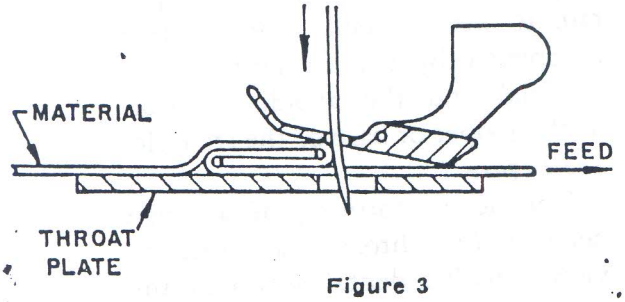


Figure 3

may occur when feeding up on a seam, but needle loop skips may occur when coming off a seam due to the forward deflection of the needle.

Sometimes the looper thread may get out of the front groove of the looper and be pinched against the looper by the needle thread as shown in *Figure 4*. In this case, the looper thread side of the triangle will be distorted as shown because the looper thread cam cannot take-up the thread. This may happen if the looper thread is much too slack as the looper picks up the needle.

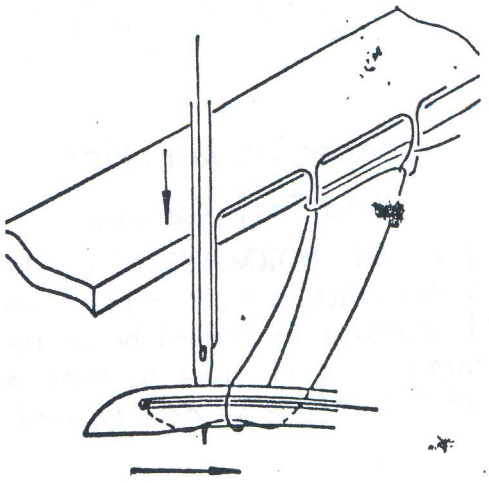


Figure 5

In Figure 5, the looper thread has been wiped under the looper blade by the needle loop as previously illustrated and is now pulled out of position.

If the needle misses the top and bottom of the needle thread side of the triangle as shown in *Figure 6*, a triangle skip on the needle thread side occurs. This happens because the needle thread side of the triangle is not held back enough by the backward motion of the looper. Sometimes the hump on the

Figure 4

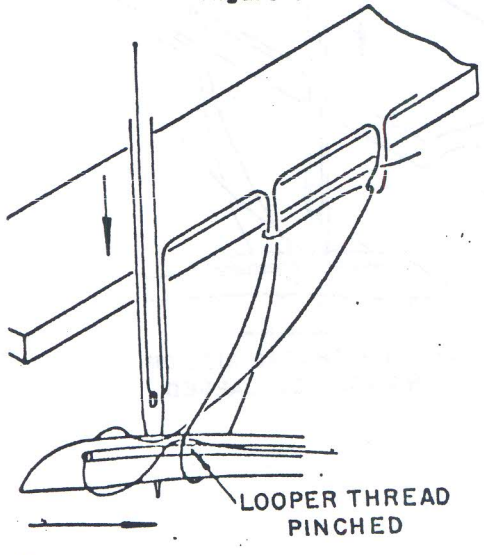
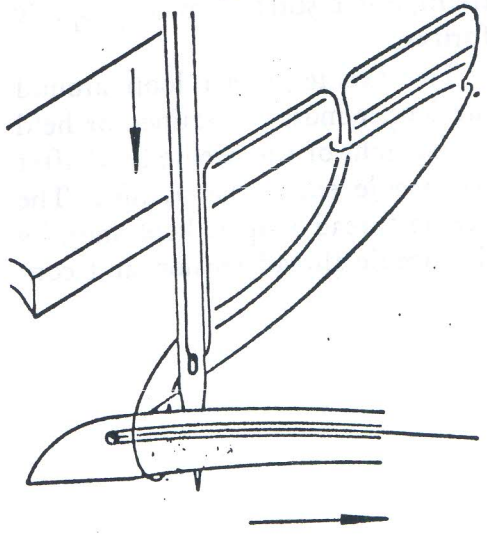


Figure 6



underside of the looper is too small to hold the needle thread back, or the undersurface of the looper may become very slippery or polished due to use, and it may be necessary to remove the glazed finish on the looper by slightly roughening the surface with very fine emery cloth to help to hold the needle loop back. Triangle skips on the needle thread side occur frequently when sharp turns to the left are made by the operator, because the material in back of the needle carries the needle thread side of the triangle to the left and into the path of the descending needle. Triangle skips of both types, that is, on the looper thread side as well as the needle thread side, are more frequent at short stitch lengths than long because the triangle is much smaller.

Occasionally the needle descends on the correct side of the top of the needle loop but not on the bottom as shown in *Figure 7*. The needle enters the needle loop around the looper and a malformed stitch is made. This is not considered a skip because the stitch is not open so that it will not ravel or leave a gap in the seam.

If the needle descends on the wrong side of the top of the needle loop and the correct side of the bottom, 101 stitching will occur. This is easily recognized since it will usually be a group of 101 or chain stitches with the looper thread laying in a single strand alongside the stitching on the bottom side of the material.

This can usually be corrected by changing the angle of the looper in its holder to cause more drag on the needle loop or again by removing the glazed finish on the under and front surfaces of the looper blade as previously described.

The reason practically all throat plate needle holes are strung out on the bottom right side as shown in *Figure 8*, is so that the looper can carry the needle thread side of the triangle back to the right and pull the top of the needle thread side of the triangle away from the descending needle to prevent skipped stitches.

Figure 7

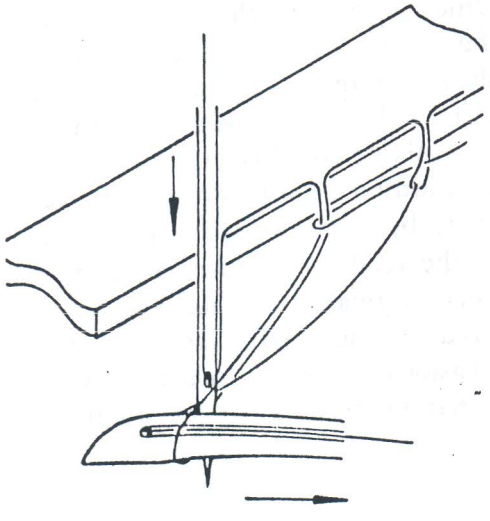
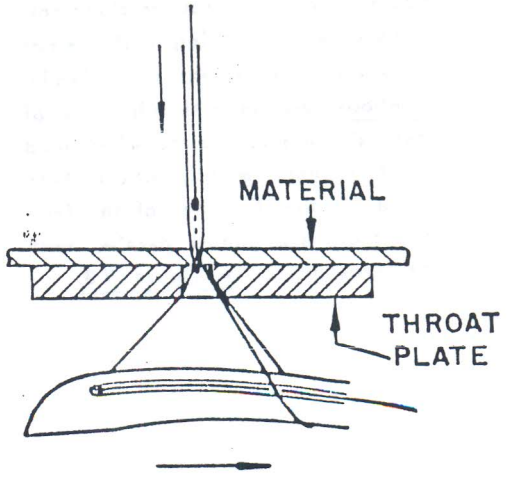


Figure 8



Feed Adjustments for Drop Feed Machines

Proper feeding on any sewing machine is necessary for a properly finished seam.

Due to the wide variety of fabrics and finishes used today, plus the fact that many seams are made on the bias to some degree, it is necessary that the sewing machine be designed so that its feed mechanism can be adjusted easily to compensate for these variations. Union Special machines are designed to allow these adjustments to be made quickly.

If a machine is equipped with a single drop feed only, the following adjustments can be made on most Union Specials to help the mechanic cure, or at least improve the following conditions:

1. **Seam is wavy or stretched.**
   Solution—Raise front of feed at slight angle to gather in material at point of stitching. See Figure #1.

2. **Seam is tight or gathered.**
   Solution—Raise back of feed at slight angle to be sure material is being fed as stitch is pulled up. See Figure #2.

3. **Machine does not feed or chain correctly because feed dog teeth are not contacting material and chain firmly.**
   Solution—Raise feed to full depth of teeth above throat plate when feed is at highest point. Adjust feed holder so that the tops of the feed dog teeth are almost parallel with the throat plate. See Figure #3.

The illustrations on the next page show where these adjustments are made on Union Special *Class 51500* and *61400* machines. *See Figures #1, #4 and #5.*

To change the angle of the feed dog on the *50000* series machines, loosen the feed dog clamp and height adjusting screw. *See Figure #1.*

Then loosen the feed dog holder clamp nut. *See Figure #4.*

It is then possible to adjust the angle by turning the angle adjusting screw. *See Figure #4.*

When the desired condition is obtained, tighten the clamp nut and then the feed dog clamp and height adjusting screw, being sure to adjust the feed dog height properly.

Figure #5 illustrates the same type of adjustment on *Class 61400* machines.

These are representative, similar adjustments can be made on other Union Special machines in these and similar classes.

In general, most plain drop feed Union Special machines use one of the feed dog adjusting systems shown. A quick glance at your machine will tell you what adjustment is available for this purpose.

Additional adjustment can be made by front to back positioning of the feed dog in the throat plate slots. Normally, the feed dog is centered in the feed slots. However, occasionally when a machine is adjusted to make a longer stitch the

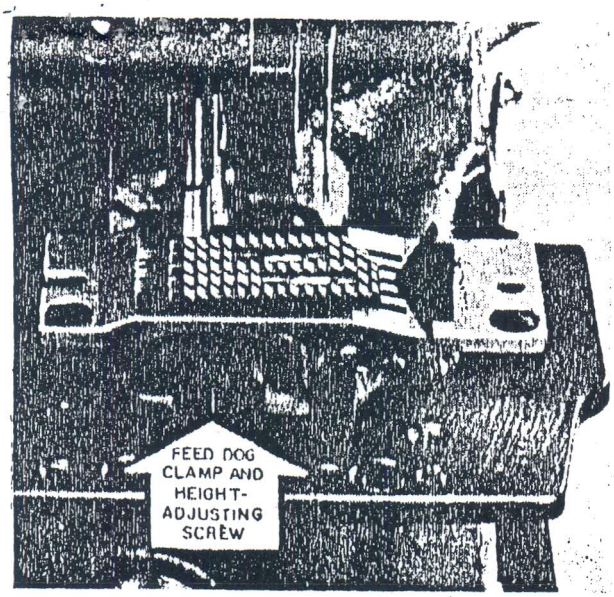


Figure #1

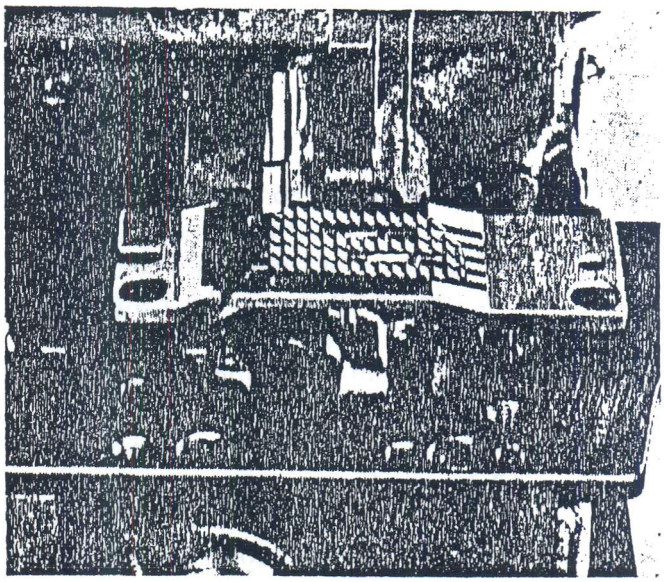


Figure #2

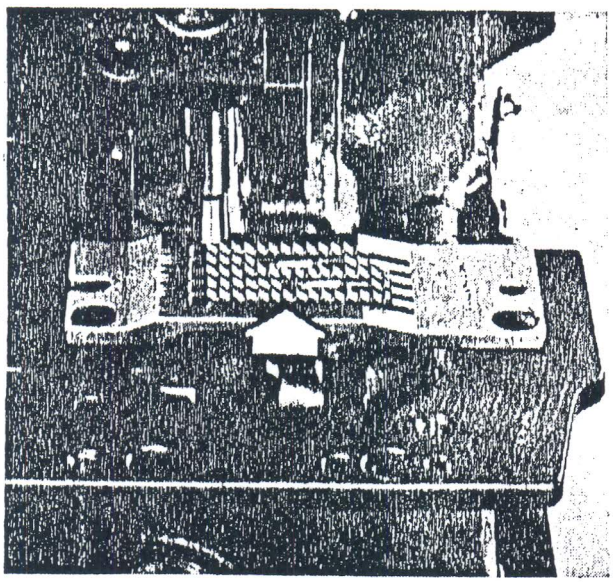


Figure #3

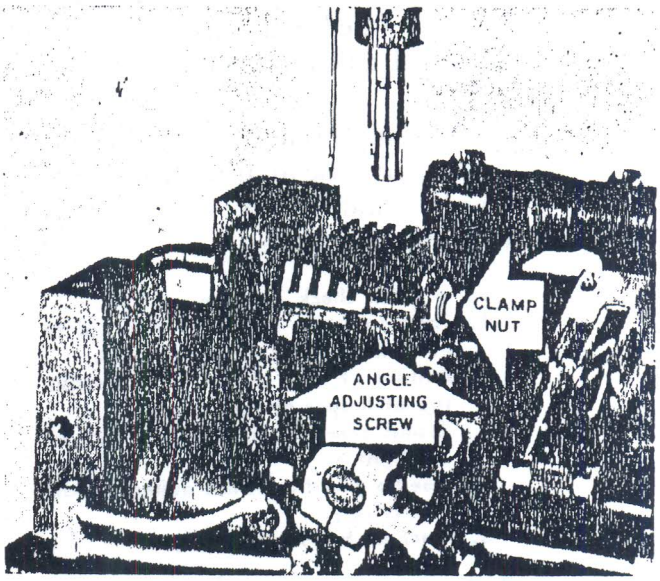


Figure #4

Figure #5

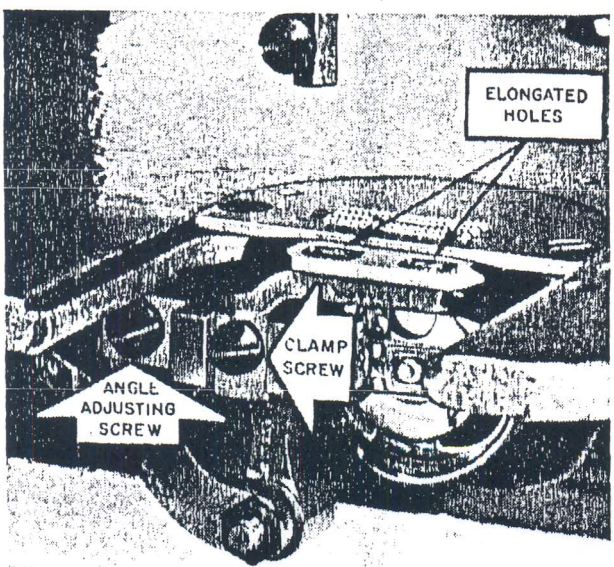
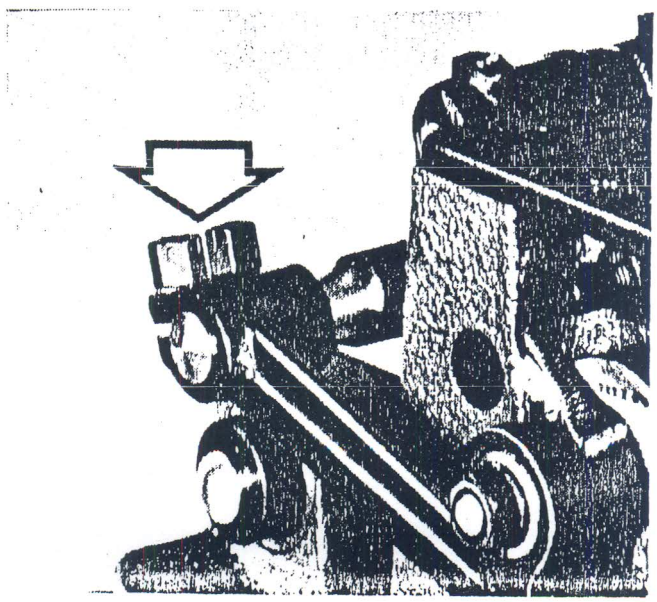


Figure #6



feed dog might contact the front or back of the throat plate slots causing a slight bind or tightness when turning the machine over by hand. On all *50000* series machines this adjustment can be changed by loosening the two screws on the feed drive at the left rear corner of the machine. *See Figure #6.* It is then possible to space the feed dog on the throat plate slots properly and then re-tighten these screws.

Union Special *Class 61400* machines provide for this adjustment by being fitted with feed dogs with elongated adjusting holes. *See Figure #5.*

After any change in adjustment, it is usually wise to turn the machine over by hand to make sure there is no part interference.

For a quick check, be sure.

1. **Feed dog does not strike throat plate at front or back of feed travel.**
2. **Bottom of feed dog does not strike top of looper or rotary hook.**
3. **Clamp screws and adjusting screws are tight.**
4. **Needle guard does not deflect needle excessively.**
5. **Machine turns over freely.**

As you can see from the foregoing, most of the feed adjustments are comparatively simple when they are understood. Properly applied feed adjustments will not only improve quality but production as well.

50 000 Series Differential Feed Machines

Differential feed systems are usually a combination of two feed dogs driven independently to allow one feed, the differential feed, to travel a greater or lesser distance than the main feed at any given stitch length. *See Figures #1 and #2.* This permits variation in the amount of gathering or stretching of the fabric as it is being sewn.

Usually, the differential feed is the front feed dog and the main feed is the rear feed dog. There are commonly two arrangements for differential feed systems: *tandem* and *offset.*

A *tandem differential* feed dog is usually the same width as the main feed and is directly in front of it. This type of differential, in most cases, is used on superposed or lapped seams, such as double needle sleeve setting on ladies' blouses. *See Figure #3.*

The *offset differential* feed dog is about one half the width of the main feed and is usually used on binding operations, such as attaching a ribbed knit collarette to a knitted T-shirt. *See Figure #3.*

Typical Union Special differential feed machines are *Styles 39500 A, 51400 BC, 52700 BT, 52800 BP and 53100 E.*

In addition to the difference in the physical shapes of differential feed dogs, there is also a difference in the type of feed driving mechanism.

The *straight* or *continuous differential* feed is usually *wrench* or *cam* adjusted for the amount of differential required which remains fixed until mechanically re-adjusted. *See Figure #4.*

Intermittent differential feed as the term implies, permits the operator to control the use of the differential feed either intermittently or continuously, usually through a knee press or treadle device. *See Figure #5.* Intermittent differential feeding is required on any operation where gathering of the material is required at a specific place, such as a puffed sleeve in a blouse.

On all *Class 39500* intermittent differential feed machines and on certain 50,000 series machines, a thumbscrew adjustment enables the operator to make instant, accurate adjustment in the amount of differential to suit changing conditions.

The amount of gathering or shirring accomplished by continuous or intermittent differential feed can range from 0 to 5 to 1, or greater, depending on the type of material being sewn and the mechanical design of the machine being used. An example of this would be a girl's dress where 100 inches of skirt material can be gathered into a 20 inch waist.

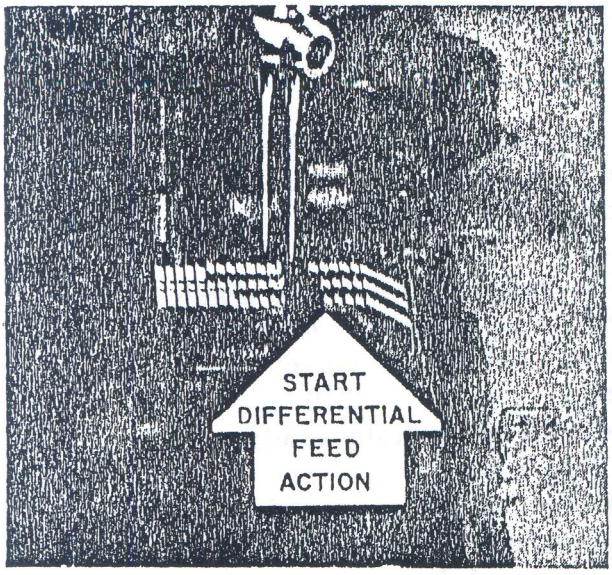


Figure #1

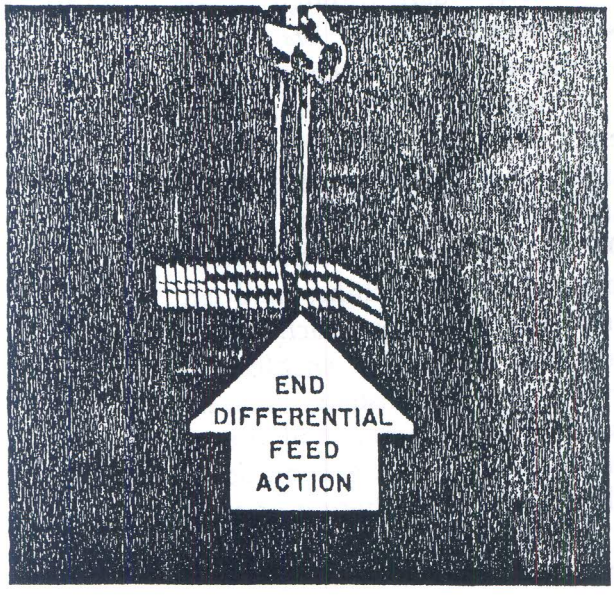
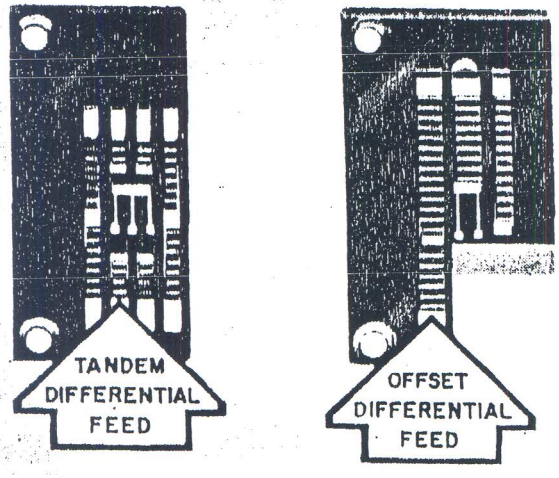


Figure #2

Figure #3



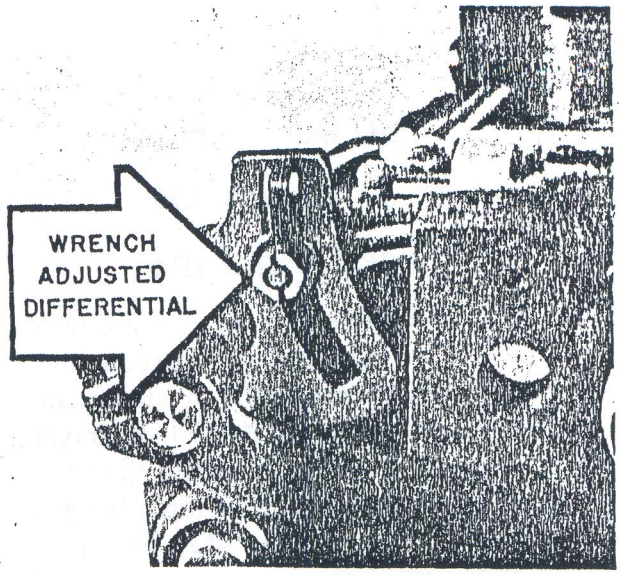


Figure #4

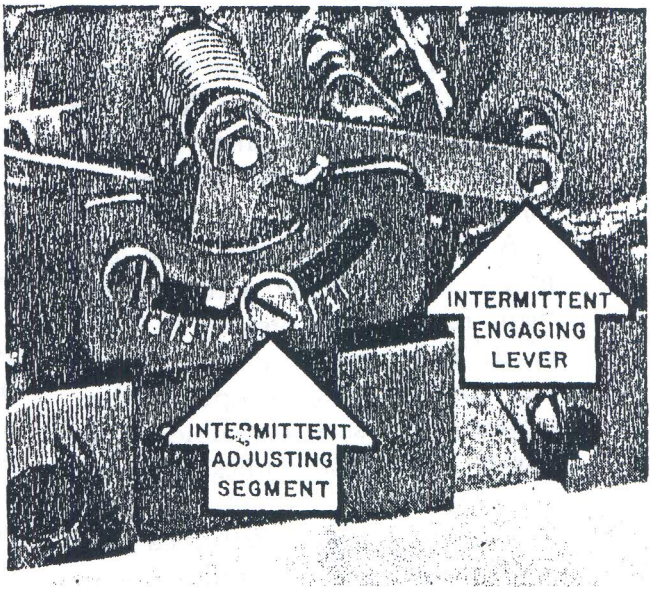
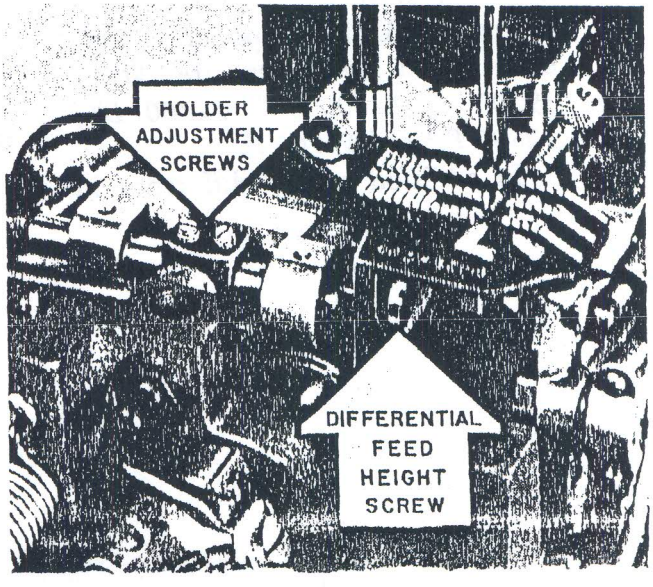


Figure #5

Figure #6



In most cases, the following rules apply to differential feeding:

1. **Condition: Both plies of the finished seam are wavy when overedging or binding knit materials.**
   Solution: Increase the differential feed action.
2. **Condition: Both plies of the finished seam are pulled in or are tight when overedging or binding knit materials.**
   Solution: Decrease the differential feed action.
3. **Condition: Changing the amount of differential has no feeding effect on the sewn seam.**
   Solution: Check heights of differential feed dog teeth. They should be same height or slightly higher than the main feed dog teeth to firmly grip material.

On all Union Special 50,000 series machines the differential feed is mounted on a feed dog holder as illustrated in *Figure #6.* This differential feed dog holder can be adjusted in or out for proper spacing in the throat plate and the feed can be adjusted up or down for correct feed height. The illustrations show the points of adjustment in the differential feed mechanism for 50,000 series machines.

The proper use of differential feeds can bring higher quality and more production on your knit and woven garments. For best results, take advantage of the broad adjustability features designed into Union Specials; adjust your machines to suit your product, your requirements.

Union Special adjusting instructions are available on request.

Chaining Tips On 401 Stitch Machines

In a preceding article we discussed chaining of lockstitch machines. Many of the principles of chaining are the same on 401 stitch or double lockstitch machines.

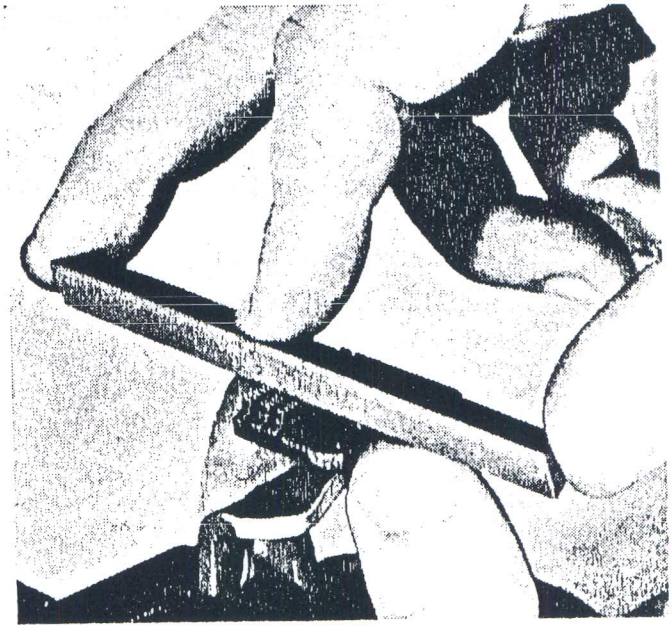
First of all, the sewing parts—presser foot, feed dog, throat plate and looper, should be in good repair and adjusted properly.

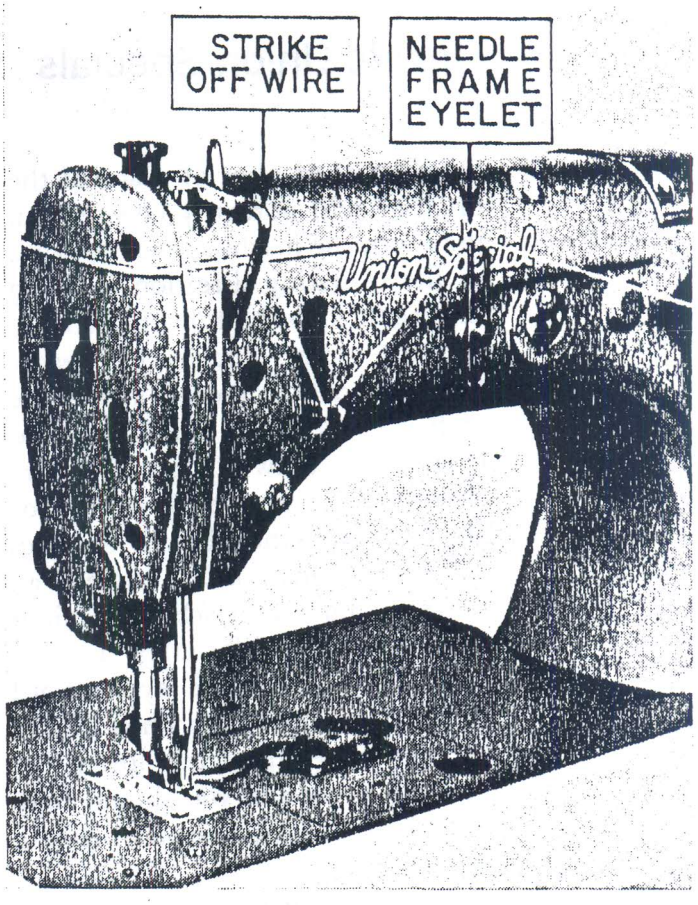
When stitching on material, the feed dog contacts the material not only behind the needle, but all around the needle hole, and in effect the material cushions the stitch as it is fed away from the needle. However, when chaining, there is no material. Consequently, the chain must be held between the presser foot and throat plate as the feed dog descends, and is then grasped by the feed dog as it rises against the presser foot for the feeding portion of the stitch cycle. The throat plate and presser foot must have sufficient land or holding area behind the needle hole to momentarily hold or clamp the chain while the feed dog is down and is being returned for the next feeding cycle. If the presser foot and throat plate do not securely hold the chain at this time, the tension that is placed on the needle thread to form the new stitch will draw the chain back down into the needle hole where it will be picked up by the looper point and broken.

The same principle of avoiding chain cutting by the feed dog on lockstitch machines applies on 401 stitch machines also. Namely, that the teeth should not be razor sharp, neither should they be deeply grooved or badly worn.

If you are using a presser foot with a tumbler or a chaining section, be sure that the tumbler or chaining section is free in the presser foot so that it will hold the chain snugly against the throat plate. Often a strand of thread wedged between the chaining section and the

SHARP FEED DOG TEETH—To satisfy customers' requirements, practically all feed dogs are manufactured with reasonably sharp edges on the feed dog teeth. This, too, is necessary for good feeding on the wide variety of fabrics that are used. For special conditions, minor alterations to these teeth can best be done in the individual plant. Chaining-off is one of these conditions.





inside of the foot will prevent proper holding action by this part and cause breakage of the chain when running off the material.

Occasionally, excessive pressure on the presser foot will result in chaining difficulties. The pressure adjustment should be sufficient to hold the material firmly and feed it evenly, but no more.

There are other conditions that can cause breakage of the thread when chaining with a 401 stitch machine. The throat plate needle hole for a 401 stitch machine is elongated to allow needle thread control eyelets to pull up and firmly set each stitch against the material. If the needle hole is not long enough, the needle thread can be pinched as it is being fed and cause malformation of the stitch on the material. When chaining, this condition may prevent the needle thread from pulling up, and again the looper point will catch the thread hanging down below the throat plate and break it.

The length of stitch being made and the length of the throat plate needle hole have a definite relationship on a 401 stitch machine. A good rule to follow is *the length of the throat plate needle hole from the back of the needle should be at least 25% longer than the longest stitch that will be used.*

Also, there should be a slight radius at the back of the needle hole to avoid cutting the chain on a sharp edge. By angling this radius slightly to the left or right, it is possible to guide the chain to the center or the feed dog prong when the needle hole is not centered on the feed dog prong. It is also important for the needle to have sufficient clearance in the throat plate needle hole and does not rub the front or either side, since this prevents the machine from forming a stitch properly.

On the *50000* series machine pictured, there is a movable frame eyelet that can be used to increase or decrease the amount of needle thread that is put in the material. Usually the best setting for this eyelet is high enough so that all of the thread for the next stitch is drawn from the cone on the upstroke of the needle bar and the thread is taut from the needle bar eyelet to the needle on the downstroke after the needle eye enters the material.

Adjust the thread tensions for a relatively strong tension on the needle thread and a very light tension on the looper thread. Sew on

the number of plies of material the machine will normally be used on, then turn the machine over by hand in the operating direction to bring the needle to the bottom of its stroke. At that point, grasp the needle thread about 2 inches above the material with the forefinger and thumb and draw up on it. There should be a very small amount of slack before the thread becomes tight in the material. If there is an excess amount of slack, this might cause chaining difficulties. In that case, raise the frame eyelet until thread breakage occurs when sewing on the material. Then lower the eyelet slightly and you should have a setting for satisfactorily sewing and chaining.

Be sure to sew across any seams the machine will be expected to sew on. If the thread breaks when crossing the seams, again make the same test as above where the seam is crossed. If there is no slack to be drawn up by the thumb and forefinger when crossing the seam, the frame eyelet should again be lowered slightly to avoid breakage and still have a good chaining condition.

The strike-off wire next to the needle bar eyelet is used primarily to control the size of the needle loop. Generally if the strike-off is even with the needle bar eyelet at the bottom of its stroke, a satisfactory loop is formed. Certain threads that have a great deal of elasticity do not make a large enough loop at this setting. This can result in skipping sometimes on the material, and in particular, on the chain. If a larger loop is needed or desired, raise the strike-off 1/16" to 1/8" depending upon the condition required.

If the machine will not chain at a slow speed when sewing at relatively short stitch lengths of say 12 to 18 stitches per inch, check the looper thread control for slack looper thread between the heel of the looper and the looper thread take-up as the needle point comes out of the material on the up-stroke. This slack should be removed. If the machine has a fixed position take-up, this condition can be helped by adding slightly more looper thread tension. On a machine equipped with an adjustable looper thread take-up, retard the take-up slightly or reset the adjustable looper thread controls until the condition outlined above is obtained. For longer stitch lengths, some looper thread slack is necessary at this point to allow the needle thread to pull up and form a proper stitch.

Occasionally, a condition will arise where the machine chains satisfactorily, but will skip one or two stitches when starting on the material. A small amount of looper thread should be drawn through the looper thread tension as the looper reaches the end of its travel to the left. This can prevent skips as you start on the material that can be caused by slack looper thread at this point. If slack is occurring, it can usually be removed by adjusting the controlling thread guides or eyelets for the looper thread.

Again, as in the case of lockstitch machines, it is well to remember that certain sewing combinations designed for a particular sewing operation are not conducive to good

chaining conditions.

Summing up, if chaining difficulties occur, inspect the following:

1. **Check tensions and be sure a reasonably good stitch is being formed.**
2. **Check for excessive presser foot pressure.**
3. **Be sure frame eyelet is set sufficiently high to chain and not break thread.**
4. **Be sure the feed dog is feeding the chain without cutting it.**
5. **Check the length of the throat plate needle hole in relation to the stitch length.**
6. **Check the looper thread control.**
7. **Be sure presser foot and throat plate are holding the chain securely when the feed dog is down.**

These are the seven most important points to keep in mind in connection with chaining on 401 stitch machines. Most difficulties encountered in chaining can be remedied by correcting one or all of these seven points.

"How Much Are My Maintenance Costs?"

AS THE MINIMUM hourly wage increases and labor costs in general continue to climb, it is more important than ever to keep all operators sewing at peak efficiency.

This requires all sewing machines to be in good repair and adjustment and makes it imperative that obsolete machines or machines with high maintenance costs be replaced immediately with modern, high production equipment. As logical as this sounds, many manufacturers cannot prove definitely, one way or the other, whether or not a particular machine is operating efficiently or inefficiently.

Today, fortunately for themselves, hundreds of producers in the needle trades are using a system that gives a true picture of the maintenance cost of their sewing machine equipment—that will tell them at a glance, "How much are my maintenance costs?"

There are two variations of this system, both very simple, but one offering a somewhat more complete record.

The first method consists of a machine maintenance file made up of 5 x 8 cards, called Machine Maintenance Record—Form 237, (one card for each machine) which provide spaces for the maker's name, style of machine, type of needles used, serial number of the machine, and the date of purchase. The cards are generally filed according to the serial number of the machine. Columns are also provided for the listing of repair parts used in each machine and the cost.

When it is necessary to repair a machine, the card covering that particular machine is withdrawn from the file and the parts used, together with the cost and date of replacement, are entered. By following this method, a manufacturer can obtain his maintenance cost for any particular machine for a given period at a moment's notice. Further, Machine Maintenance Record—Form 237, can also be used as a means of determining the advisability of purchasing new equipment due to abnormal maintenance costs or age, which is very important under the new tax laws.

The second method is a little more thorough. It consists of a machine record file composed of an individual record of each machine. Like the method outlined in the preceding paragraphs, this record is also kept on 5 x 8 cards, called Machine Repair Record—Form 233, having space for the inventory symbol, maker's name, maker's symbol, type of needles used, serial number of the machine, and date of purchase. Columns are also provided for dates of repairs, mechanic's clock number, labor costs, cost of

parts, total cost, service days, and any remarks that might be necessary. These cards are filed according to serial numbers, inventory symbol, or to suit individual preference.

In addition, a 3 x 5 card, called Repair Request—Form 234, is used in this second method. These cards are kept by the forelady or foreman, and are used when a machine needs mechanical attention. Spaces are provided for the date, inventory symbol, maker's name, machine serial number, operator's number, parts used, cost of parts, time required, and the mechanic's number. This card, Form 234, bearing the above information is given to the mechanic on which he lists parts used, time the job is started and finished, and his clock number. The card is then sent to the office where the Machine Repair Record is filed. The cost of the parts and the amount of labor are entered, completing the record of Form 234. From this then, all information is transferred to the master card of the Machine Repair Record file.

An added benefit of this type of record is an accurate indication of the types and quantities of spare parts that should be kept on hand for emergencies.

Sample copies of these forms are available and will be supplied free upon request or quantities may be ordered at cost.

In addition, Union Special offers, free of charge, Form 496 for computing comparative sewing costs to determine the savings of modern high speed machines on your product and overhead costs.

NOTE: The above forms are just a few of the many aids available to you from Union Special Machine Company. Other helpful information such as lubrication charts, parts and needle catalogs, adjusting instructions, thread consumption charts, etc., are yours for the asking.

Setting the Check Spring

THE SECRET of adjusting sewing machines is in understanding some of the fundamental settings that affect the handling of thread when forming a stitch.

On most reciprocating takeup drop feed lockstitch machines, the needle thread is drawn from the cone, through the needle thread tension device, around the check spring, through the eye of the takeup lever and down into the eye of the needle.

The bobbin thread is a self-contained supply of thread held on a bobbin that is inserted into the rotary hook assembly.

When the needle penetrates the fabric, it carries the needle thread below the material to form a loop. This loop is picked up by the hook point and greatly expanded so that it is passed completely around the supply of bobbin thread.

When the needle thread loop reaches the 6 o'clock position, *(Figure 2)*, it contains about a 3-inch supply of thread reaching from the previous stitch in the material completely around the supply of bobbin thread and back up to the throat plate needle hole.

This is accomplished by the action of the takeup lever allowing this 3-inch supply of needle thread to be fed into and around the hook and then drawn up and out of the hook assembly as the hook rotates to form the stitch.

It is at this 6 o'clock position that an accurate check spring setting is vital.

The function of the check spring in the thread handling system is essentially that of a shock absorber between the needle thread tension device and the takeup.

The takeup draws new thread from the cone for each stitch as it reaches the top of its stroke. This happens just as the previously made stitch is set against the material by the up-stroke of the takeup lever and the complete depressing of the check spring. At this point the check spring has absorbed most of the shock resulting from setting the stitch, and the positive action of the rising takeup lever overcomes the needle thread tension and draws sufficient thread from the cone for forming the next stitch.

The setting of the check spring is extremely important. If the check spring action comes too early or too late in the stitch-forming cycle, thread breakage can result.

Tension should be sufficient for the spring to have a lively snap when the spring is depressed and released by the finger.

The check spring action should be set so that all of the slack is taken out of the needle thread at the check spring when the needle thread loop is at the 6 o'clock position in the hook. *Figures 1 & 2.*

The check spring should have a slight movement or wink at this point. The needle thread loop can be observed by removing the slide plate to the left of the throat plate and placing a piece of white paper below the hook to reflect the light.

Sew on the material for several inches, then turn the machine by

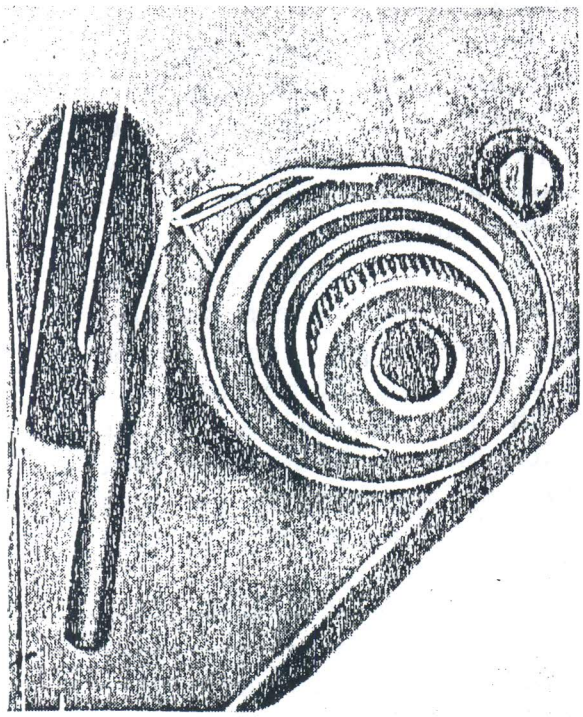


Figure 1

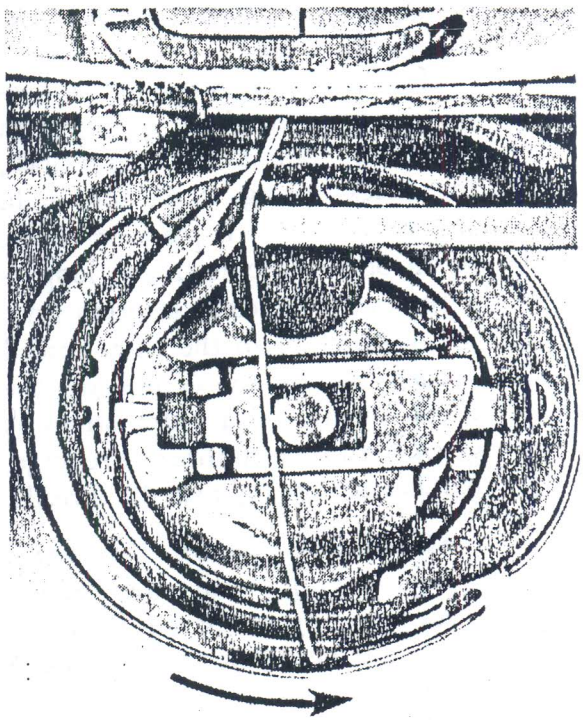


Figure 2

Figure 3

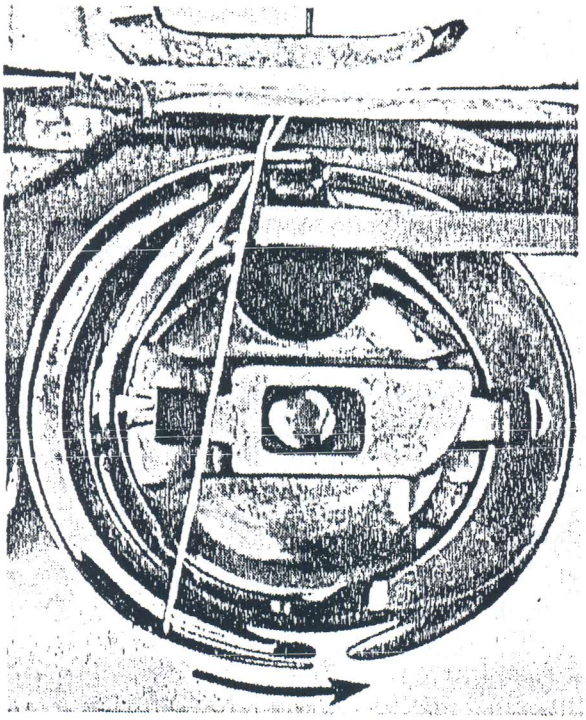
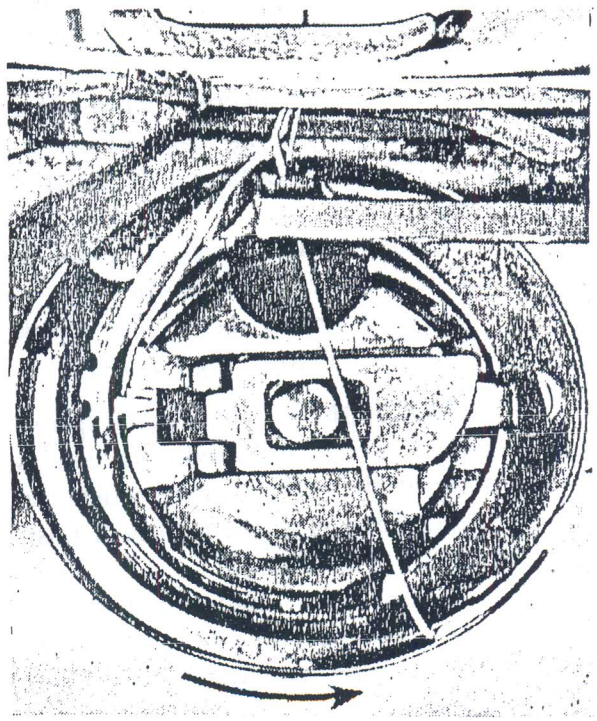


Figure 4



hand and observe the action of the check spring in relation to the needle thread loop.

If all the slack is out of the needle thread at the check spring when the needle loop is at 7 or 8 o'clock, the check spring is set too high. *Figure 3.* This will place an undue strain on the needle thread loop as it passes the 6 o'clock position since it can only obtain the extra thread needed by greatly depressing the check spring. This extra strain is often the cause of thread breakage, particularly on lightweight threads.

SOLUTION: *Lower* the check spring setting until the needle thread is snug at the check spring when the needle loop is at the 6 o'clock position.

This setting is made by loosening the screw that holds the needle thread tension assembly barrel then rotating it slightly in the desired direction.

Always sew several inches after changing a setting, then check to see if you have obtained the desired result.

If the needle thread is slack at the check spring when the loop is between 6 and 5 o'clock the check spring is too low. *Figure 4.*

SOLUTION: *Raise* the check spring setting until the needle thread is snug at the check spring when the needle loop is at the 6 o'clock position. *Figures 1 & 2.*

Again, after changing a setting always sew several inches, then turn the machine by hand to check the setting.

If the setting is still not correct, make the slight adjustment necessary, sew a few inches and check it again until the 6 o'clock loop condition is obtained.

Proper check spring settings can eliminate many operator complaints on needle thread breakage, particularly where back tacking is necessary. Don't overlook this simple but important adjustment.

By way of additional information, if a machine is set at 8 stitches per inch, any given point on the needle thread will pass back and forth thru the needle's eye, the throat plate needle hole and hook assembly approximately 24 times before becoming part of a set stitch in the material.

On a setting of 16 stitches per inch this figure can jump to approximately 48 or three times the number of stitches per inch.

To prove this to yourself, thread up a plain sewer with white thread and start to sew. Stop the machine and make a mark on the needle thread with a fountain pen between the check spring and the takeup eyelet.

Turn the machine over by hand until the mark on the thread passes thru the eye of the needle the first time. Continue to turn the machine by hand counting the number of times the mark on the needle thread passes thru the eye of the needle as it is alternately fed and removed from the hook assembly by the takeup.

This is the best way to convince yourself of why a machine must have a good needle and be free of nicks and burrs in the throat plate needle hole and hook assembly.

Chaining on Lockstitch Machines

THERE ARE many lockstitch machine operations that require "chaining" or sewing off the edge of the work. The advantage of chaining is, of course, in keeping the sewing pieces together as a bundle. Look very carefully at the operations in your plant that require chaining and be sure that the machines on these operations are performing as they should. Proper performance means added production and profits.

There is no magic necessary to get a machine to chain properly. It's strictly a matter of machine adjustment and the right sewing parts combination and setting. Generally, "chaining" with heavy threads, such as 40-3 cord or even 50-3 cord, is less critical since there is little tendency for thread of this size to be cut by the feed. Light threads such as 70-2 cord or 00-2 mercerized are more critical to work with and much closer attention must be paid to the various machine adjustments that affect the chaining performance.

First of all, to set a lockstitch machine so that it will chain with lightweight threads, be sure that it is adjusted properly and that there are no abrasions or nicks on the hook, throat plate, or other thread handling parts.

Second, it is desirable to have relatively fine feed dog teeth to allow the chain to be contacted at several places rather than very coarse teeth which will allow only two or three teeth to touch the chain behind the needle hole. Feed dogs with 18 to 22 teeth per inch are desirable.

It must be remembered that when stitching on material, the feed dog contacts the material not only behind the needle hole but all around the needle hole and, in effect, the material cushions the stitch as it is fed away from the needle. However, when chaining, there is no material to carry the stitch away and you must depend on the feed dog grasping the chain securely against the bottom of the presser foot and moving it one stitch length. The throat plate and presser foot must have sufficient land or holding area behind the needle hole to momentarily hold or clamp the chain while the feed dog is down and being returned for the next feeding cycle. If the presser foot and throat plate do not securely hold the chain at this time, the tension that is placed on the needle thread to form the new stitch will draw the chain back down into the needle hole where it will be picked up and broken by the revolving hook point.

It is also desirable to have feed surface directly behind the needle hole about 3/32 to 1/8 of an inch wide which will usually prevent the chain from rolling off one side or

the other of a very narrow feed section at this point.

Not all feed combinations are conducive to good chaining. However, many of these special feed and plate combinations are desired for operations that do not require chaining so the problem is not as great as it might seem. *Figure 1* illustrates two throat plates. The left plate, with a wide land and feed slot, permits good chaining. The right plate, with narrow land and feed slot, is less desirable where chaining is required.

Assuming that a "chaining" set of parts is being used, some chain cutting which, in effect, can cause needle thread breakage or unthreading may still be experienced. This can be caused by at least two things:

1. **PRESSER FOOT PRESSURE**
   Sufficient pressure should be exerted by the presser spring on the presser foot to allow good feeding of the work. It should not be tightened down beyond that point since that puts undue pressure on the chain as it is being formed and results in cutting.
2. **SHARP FEED DOG TEETH**
   To satisfy customers' requirements, practically all feed dogs are manufactured with reasonably sharp edges on the feed dog teeth. This, too, is necessary for good feeding on the wide variety of fabrics that are used. For special conditions, minor alterations to these teeth can best be done in the individual plant. Chaining-off is one of these conditions.

If chain cutting is experienced as the result of sharp feed dog teeth, remove the feed dog and the feed dog holder and clamp the holder in a vise—*Figure 2*. Using a triangular

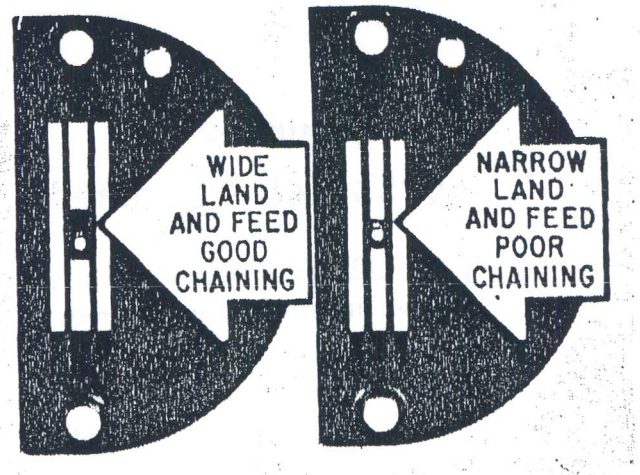
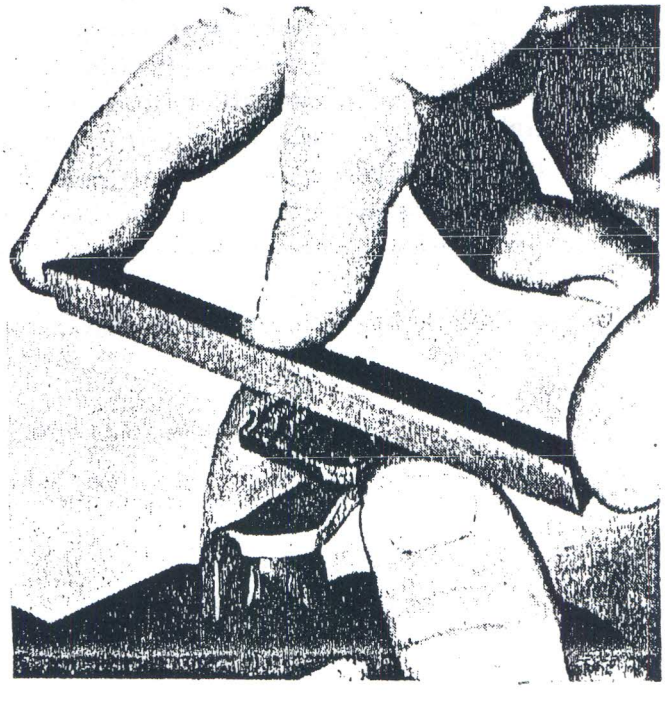


Figure 1

India stone, very carefully make a fine radius on the tops of the feed dog teeth behind the needle only. This can be done by placing the stone in the slot of the first row of teeth behind the needle, supporting the stone on either side of the feed with the thumb and forefinger of the left hand, and then moving the stone back and forth in an arc with the right hand. About four or five strokes for each row of teeth is all that is necessary. Then, take a triangular Arkansas stone and repeat the process. The Arkansas stone puts a very fine finish on this tiny radius on top of the teeth and in most

Figure 2



cases will eliminate any tendency to cut.

The best way to test for sharpness of the teeth is to run your fingernail over the center row of teeth after the two very fine stoning operations have been accomplished. If the feed dog teeth shave off a slight amount of nail with a very small amount of pressure, a few more strokes with the Arkansas stone or a very light buffing on the center row of teeth only is recommended.

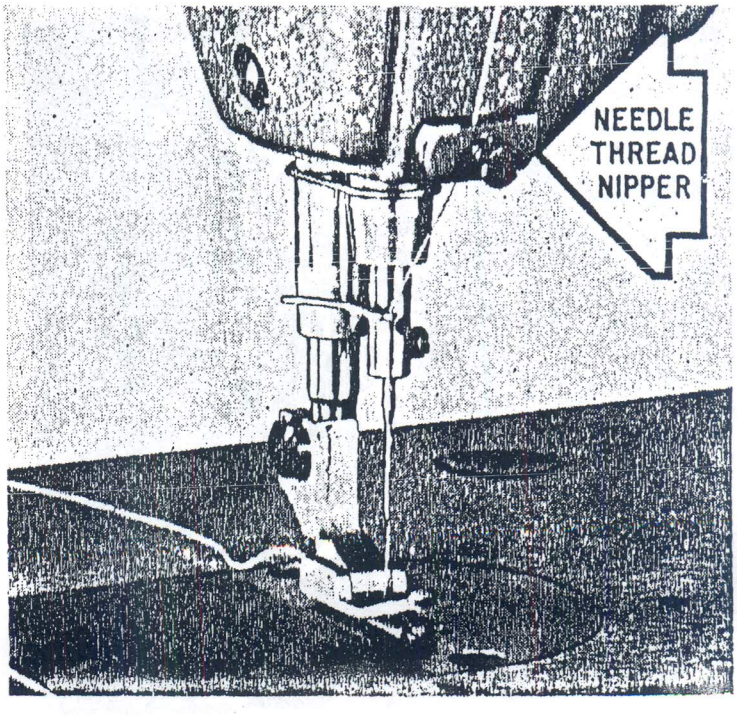
If the teeth are buffed, hold the feed at a 45° angle to the corner of the buffing wheel for a couple of seconds and buff against the wheel in both directions. That is, buff against the teeth and with the teeth and only on the feed area directly behind the needle hole. This will result in a very smooth finish to the tops of the teeth. Practically no metal will be removed from the teeth if this operation is done properly. The result will be a very, very fine radius that is capable of feeding the material and feeding the chain without cutting it.

In most cases, the best adjustment is to set the feed level so that it will contact the bottom of the presser foot firmly. On a machine that has been set properly and the feed stoned carefully, draw the two strands of needle and bobbin thread behind the needle, set the presser foot down and start to sew by making chain—*Figure 3*. It is not necessary to put cloth under the machine if all conditions are correct.

In an attempt to improve chaining, certain alterations are sometimes made which are detrimental rather than helpful. In some cases, the tops of the feed dog teeth behind the needle have been ground off as much as .020 or .025 to avoid a chain cutting problem. This will eliminate the chain cutting problem since the feed dog teeth never touch the chain. However, in doing so, it burdens the operator with the task of feeding the chain out by hand. This usually means a drop in production and for this reason this type of alteration is not recommended under any circumstances.

Another alteration that is sometimes made to lockstitch feeds is that of making a groove in the teeth from the needle right back through the last tooth using either a hand stone or a hand grinder. Again, this usually results in the chain not being fed by the feed dog placing the burden of feeding the chain out on the operator. There are certain circumstances where using a very fine thread with an extremely coarse feed would make this type of alteration permissible; however, in general, it is not recommended.

Figure 3



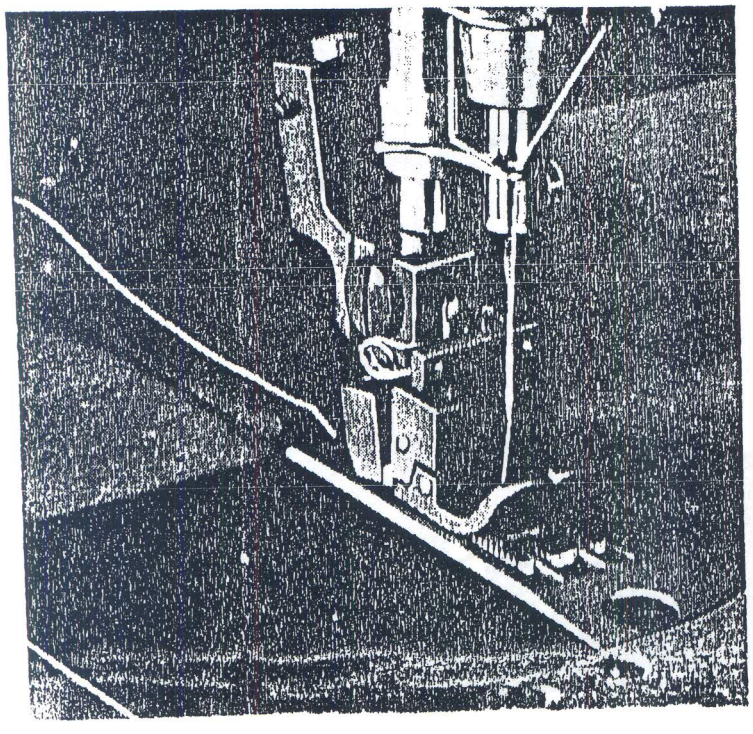
Inside Union Specials

When chaining without fabric, it is difficult to confine the needle thread. The needle thread loop can be very loose and unstable allowing it to swing away from the hook point causing a skip. Slight tightening of the check spring tension will help. A more satisfactory aid is the addition of a needle thread nipper spring above the lower needle bar bushing—*Figure 3*. This minimizes the unstable condition of the needle thread loop, thereby offering more positive thread control.

An additional aid to chaining lies in the selection of the needle used. In a previous article it was pointed out that the needle thread moves back and forth through the sewing parts a great number of times before it becomes part of the stitch. This same condition occurs during chaining on a lockstitch machine and a needle with an extremely sharp point sometimes has a tendency to fray the needle thread. Use a ball-point needle whenever possible.

While thus far we have been concerned with eliminating chain cutting, there are certain circumstances where it is desirable to cut the chain. For this purpose chain cutting combinations are available for Union Special drop-feed lockstitch machines, and needle-feed lockstitch machines—*Figure 4*. These combinations are specially designed for the purpose of chaining off and cutting the chain 1/8 to 1/4 of an inch from the edge of the material. More information on these combinations can be obtained from your Union Special representative or by writing to the Union Special Machine Company, 400 North Franklin Street, Chicago 10, Illinois.

Figure 4



The Hook and Bobbin Case

THE WORK HORSE in most every sewing factory is the plain sewer or lockstitch machine. It produces the 301 stitch type that is formed by a threaded needle and a rotary hook containing a bobbin of thread. The lockstitch is a wonderful piece of machinery that will sew at over 5,000 stitches per minute, which means that the rotary hook assembly is turning over 10,000 times a minute. This can easily amount to over two million revolutions a day — so it shouldn't be too much of a surprise if on occasion a rotary hook assembly needs minor repairs to put it back into first class sewing condition.

The rotary hook is an odd shaped object to hold in a vise or fingers for buffing or polishing. Therefore, an important first step in working on a rotary hook is to use a short piece of shafting as a handle, *(Figure 1)*. A hook shaft or any piece of steel rod of similar diameter serves very well for this purpose and by drilling a hole in one end of the rod and adding a clamp screw it can also be used to hold the bobbin case holder or basket, as it is often called.

The first thing to look for on a hook that is suspected of breaking thread is a chipped or blunted hook point. This can be caused by the hook striking the needle. To correct this condition, remove the hook from the machine and restore the hook point as near as possible to its original shape, *(Figure 1)*. This is done by first stoning off the roughness with a triangular India stone, then using a strip of fine emery cloth as illustrated in *Figure 2*. By drawing the emery cloth across the entire length of the back side of the hook point, the point will be reshaped and the thread will have a satisfactory surface to follow when the needle thread loop is being picked up.

Notice the sharp upper edge of the thread stop portion above and behind the hook point after the thread deflector has been removed, *(Figure 2)*. Be very careful not to alter the contours of the upper edge of this thread stop surface in any way. After emery cloth has been used to remove a sufficient amount of material to restore the tip of the hook point to its original shape, the hook point should then be buffed very carefully to give a glass-like finish for perfect handling of the thread.

Care should also be taken to be sure there are no nicks or rough places on the thread deflector, *(Figure 3)*. Should these occur, they should be removed very carefully with emery cloth and then buffed well. In the event a buffing wheel is not available, these parts should be carefully polished with crocus cloth.

On a rare occasion, it might be necessary to buff the rail on the basket. This should be done very carefully, always buffing away from the point on the thread deflector to avoid destroying the angle that is used to hold the needle thread loop. *See Figure 4.*

Always wash all parts of the hook carefully with benzine or a similar solvent after buffing and before re-assembling. Oil the re-assembled hook and install in the machine at standard settings, always using a new needle.

Run the machine at a low speed for a few minutes to dissipate the excess oil in the hook and then make the necessary tension adjustment for a balanced stitch.

Properly maintained machines give top production.

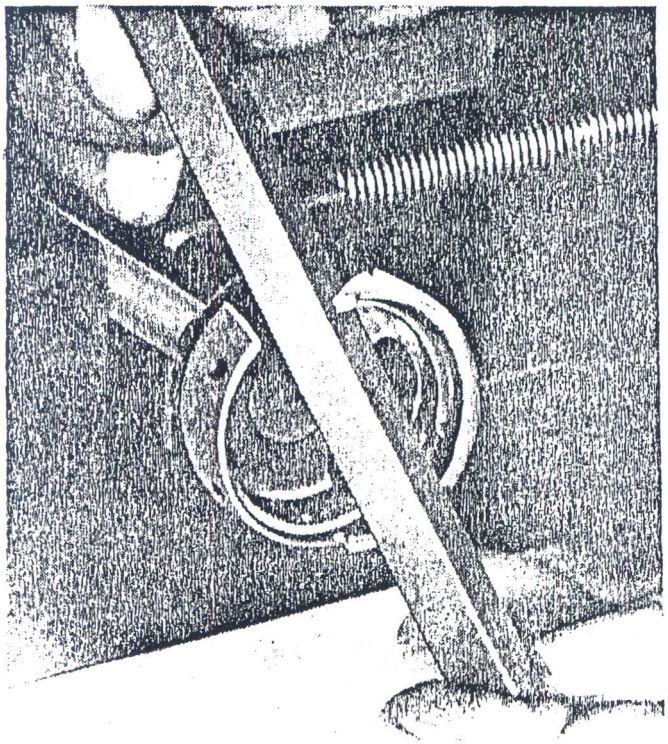


Figure 1

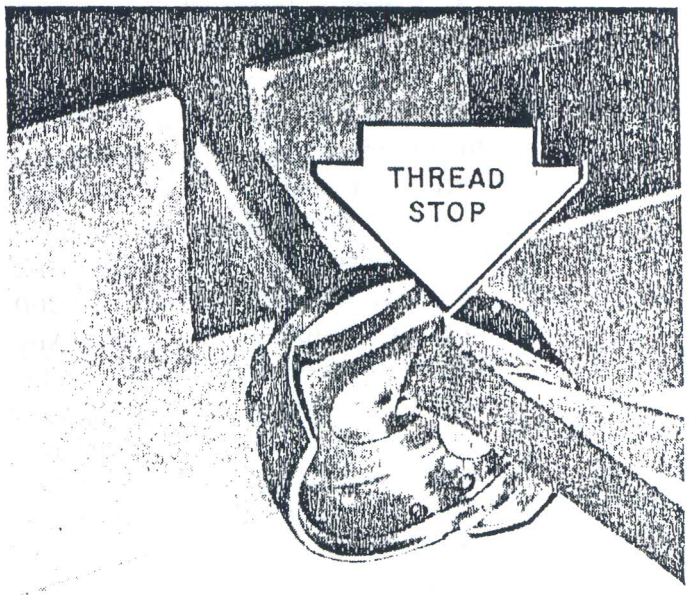


Figure 2

Figure 3

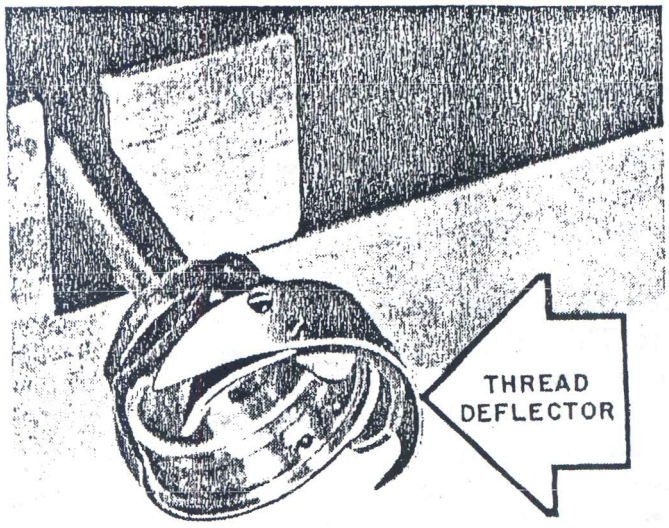
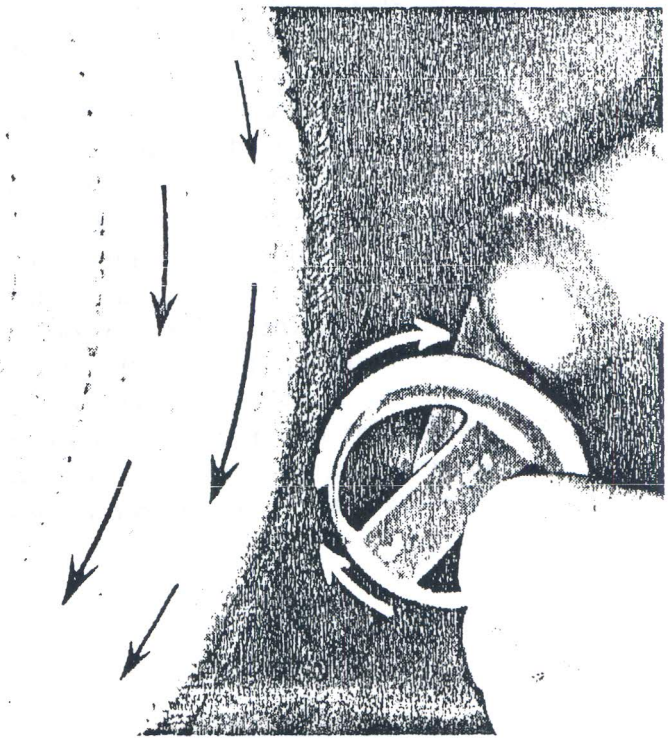


Figure 4

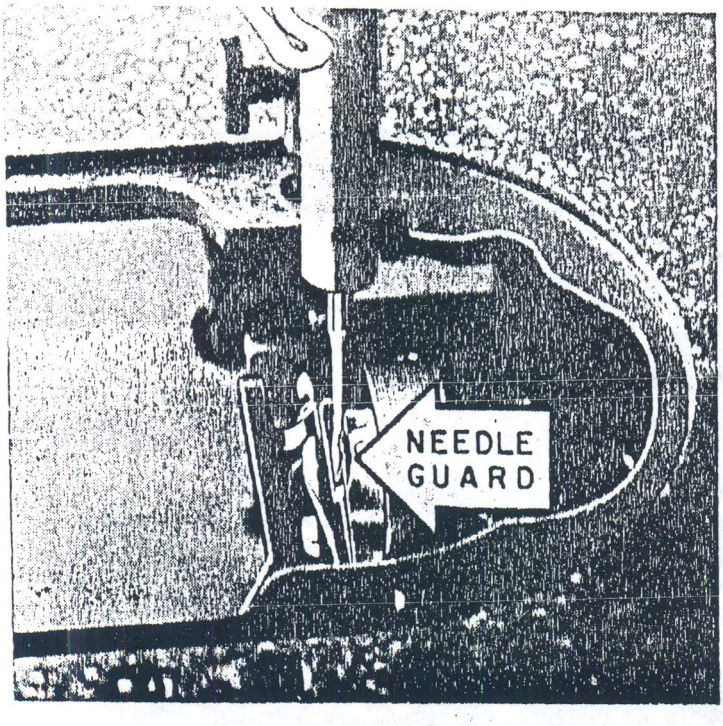


Needle Guards
Bobbin Type Machines

MODERN SEWING MACHINES that sew at 5500 to 6000 stitches per minute subject a needle to a great deal of strain. Stitching through elastic, or across seams and through varying plys of material can cause needle deflection that may seriously damage rotary hook points, looper points and spreaders if it were not for needle guards that counteract most of the deflection and prevent serious damage to these rapidly moving parts.

In the *61400* drop feed lockstitch machines, the *61900* needle feed lockstitch machines, and in the all new high performance *63400* lockstitch machines, a unique needle guard is built into the basket or bobbin case holder. *See Figure 1.*

Figure 1



High-speed rotary hook assemblies are manufactured with the precision of a fine bearing to assure a long life and cool running at the 10,000 to 11,000 revolutions per minute that is normal for lockstitch machines. Part of this precision manufacturing is creating the needle guarding surface on the bobbin case holder or basket so that a new rotary hook assembly when properly adjusted will usually prevent the hook point from striking the needle.

The purpose of this guarding surface is to prevent the hook point from coming in contact with the needle at "loop-taking" time, should the needle be deflected toward the hook point. In its proper setting the needle guard may slightly deflect the needle or just touch it when the needle is at the bottom of its vertical travel. However, at loop-taking time, that is, when the point of the hook point advances to the needle, there should be a little or no deflection of the needle by the needle guard. *See "A & B", Figure 2.*

The new rotary hook assemblies are purposely designed for proper guarding on an .036 needle. When larger needles are used it is frequently necessary to provide additional clearance by repositioning or altering the needle guarding surface.

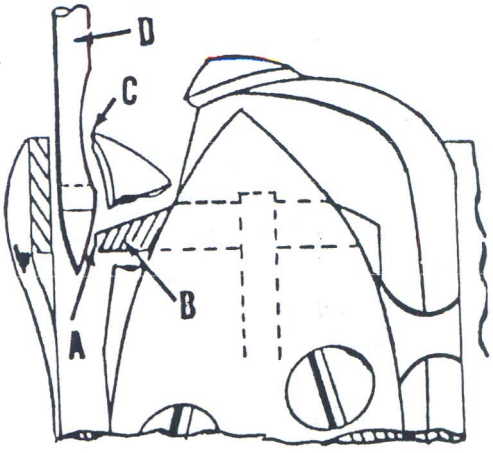
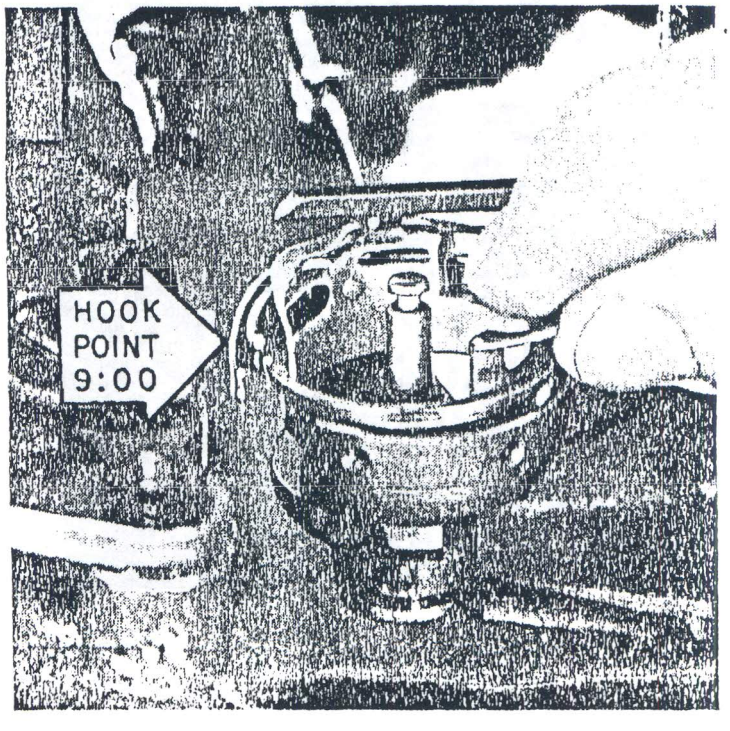


Figure 2

Before removing metal from the guarding surface on the bobbin case holder or basket, all related settings should be checked as follows:

1. Put in a new needle of the type and size normally used.
2. See that the needle bar is set to the correct height.
3. Remove the bobbin case holder from the hook assembly by removing the gib screws and gib. The basket or bobbin case holder is most easily removed and reinserted in the hook with the hook point at about the 9:00 o'clock position. *See Figure 3.*
4. Be sure that the hook is timed properly, not only rotationwise, but also with a very slight clearance between the needle scarf or spot "D" and the hook point "C". *Figure 2.* Then re-insert the basket or bobbin case holder into the rotary hook and hold it in position by lightly placing the left forefinger against the bobbin case holder stem.
5. Rotate the handwheel in the operating direction by hand. Check for excessive needle deflection by the needle guard beyond what is indicated above as a desirable condition.
6. If needle deflection is excessive follow steps A and B below:
   A. Remove the basket, or bobbin case holder. *See Figure 3.*
   B. Remove excess metal from the needle guarding surface. This may be done by using 1/8" strip of fine emery cloth, number 280 to number 320 with one end secured in the vise and rubbing the guarding surface back and forth until sufficient metal is removed. *See Figure 4.* When metal is to be removed from the needle guarding surface the bobbin case holder should be cleaned each time before re-inserting in the rotary hook and checked until the proper needle guarding action is obtained.

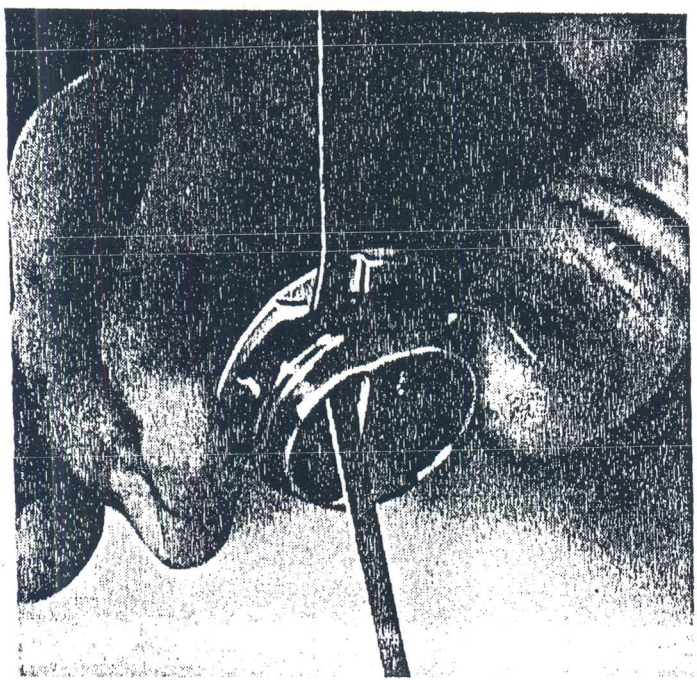
Figure 3



Be very cautious not to remove too much metal from the needle guarding surface since failure to provide any guarding action could cause damage to the hook point when sewing, particularly with larger size needles. The bobbin case holder should be carefully cleaned each time before it is placed in the rotary hook to check for the proper guarding action. When the desired result is finally obtained, the bobbin case holder should be cleaned again and oiled slightly before re-assembly into the hook. Be sure when reassembling the gib and gib screws that they all are tightened securely.

Excessive deflection of a needle by the needle guard surface will eventually wear the short grooves below the needle eye to a sharp edge and cause thread breakage. The best preventative is checking the guarding action when adjusting the machine. However, if a machine sews for an hour or two with a new needle and then starts to break thread, this is an area to suspect and inspect. Proper needle guarding improves production and decreases operator tension by mininimizing unnecessary thread breakage.

Figure 4



Needle Guards
Looper Type Machines

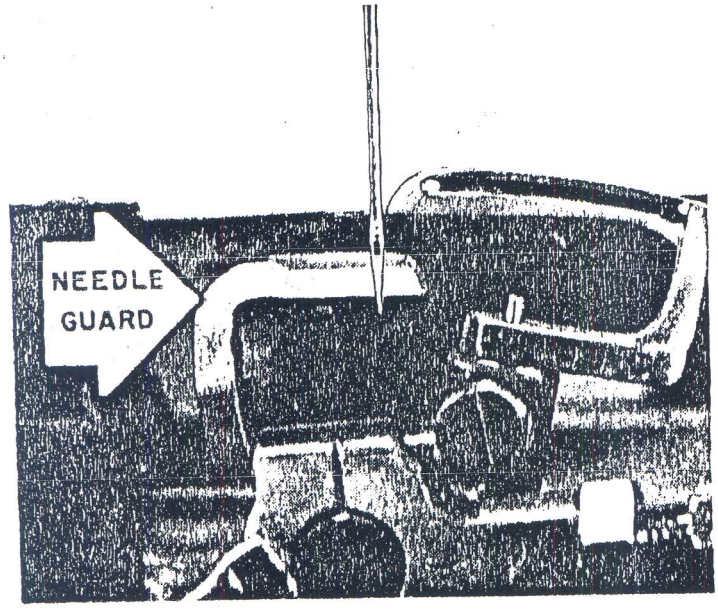
NEEDLE GUARDS on *50000* series 401 stitch or similar machines many times mean the difference between sewing and not being able to sew certain difficult materials and seams. *Figures 1 and 2* illustrate the most common type of needle guard for this class machine. Needle guards for *50000* series machines can be adjusted front to back or up and down as the need may require.

The needle guard is attached to the feed bar and guards the needle from the rear on looper-across-the-line-of-feed machines. A proper needle guard setting is obtained after the stitch length has been determined since this needle guard is attached to the feed bar or feed dog holder which determines the stitch length. Once the stitch length has been established and the looper set correctly in relation to the needle, the needle guard should then be brought forward until it just contacts the needle below the eye at the time the looper point is entering the scarf or passing behind the land on the needle. *See Figure 1.* If the guard does not contact the needle at this point, crossing seams in the material may cause the needle to deflect to the rear where the looper point will strike the needle and either bend or break it. Striking the needle continuously in this manner will also damage the looper point.

If the needle guard is set too far forward so that it deflects the needle instead of merely touching it, *(Figure 2),* the needle will eventually bend or a hook will be worn on the point which, of course, will cause a detrimental sewing condition. In addition, if the needle guard is adjusted too far forward, it is possible to cause a skipping condition, since this deflection will push the needle and the needle loop away from the looper point at the loop-taking time. This condition can occur if an adjustment is made from a short stitch to a long one without resetting the needle guard.

The height of the needle guard is controlled by the height adjusting screw. *See Figure 2.* Generally,

Figure 1



the most satisfactory height setting is to adjust the needle guard height so that it does not interfere with the loop as it is being formed, and contacts the needle just below the bottom of the needle eye.

After the needle guard setting has been made the machine should be turned over by hand to be sure that there is no possible interference between the needle guard and the bottom side of the looper or any other associated parts.

In the case of multiple needle machines, care should be taken to be sure that the needle guard properly guards all needles at the correct time. Be sure that the needle bar and needles are properly aligned in relation to the needle holes in the throat plate and the loopers. If the needle guard still does not guard the needles properly, replace with a new guard. In an emergency, if necessary, slightly bend or alter the needle guard until a full contact surface is established for all needles.

In addition to the needle guard indicated above that is affixed to the feed bar, there is also a reciprocating front needle guard that is attached to the looper avoid shaft. *See Figure 3.* This needle guard should be set in the same manner: it should contact the needle just below the eye at the time the looper is passing into the scarf of the needle. To obtain this setting it is necessary to loosen the clamp screws and rotate the needle guard holder slightly on the looper avoid rocker shaft to the proper position, and also to adjust the height of the guard in relation to the needle eye. Normally, this type of guard is

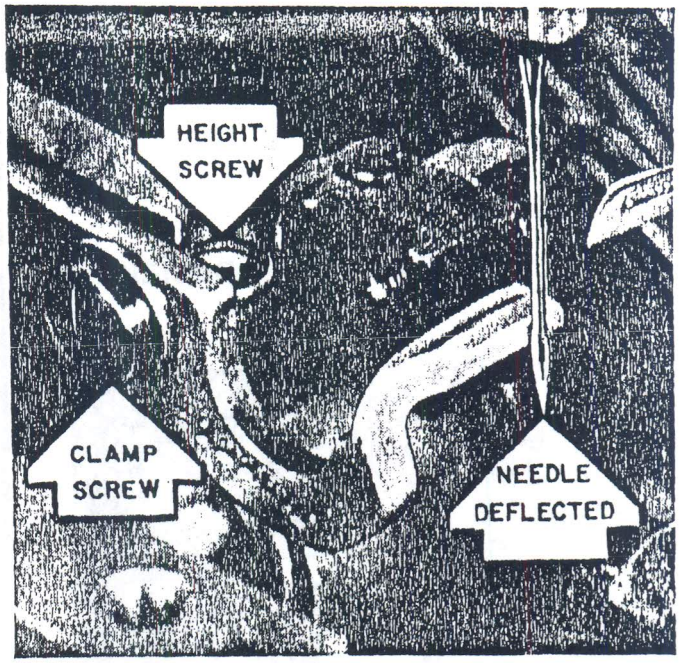
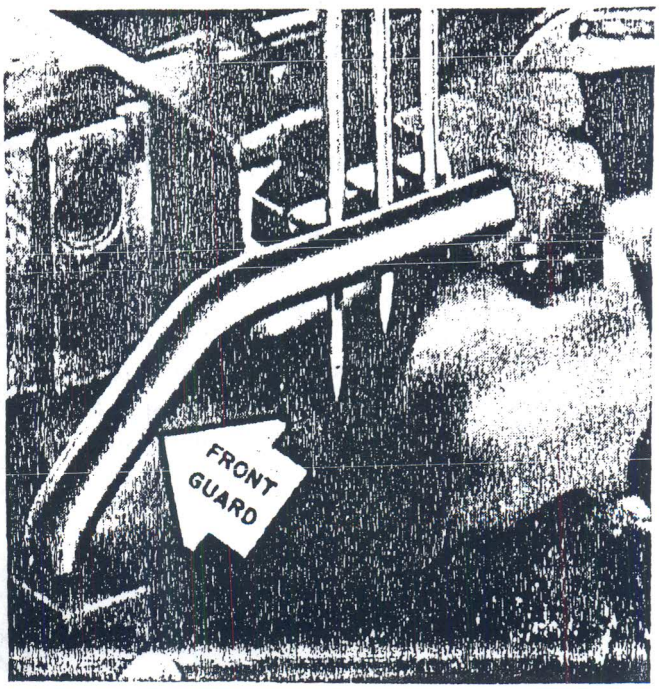


Figure 2

used most effectively on machines making a 406, 602 or 605 type of stitch, that is, where two or more needles abreast are forming a stitch with the aid of only one looper.

A third type of needle guard is commonly referred to as a looper needle guard. *See Figure 4.* This needle guard is mounted on the looper and is designed to pass in front of the needles at the time the looper point would be passing be-

Figure 3



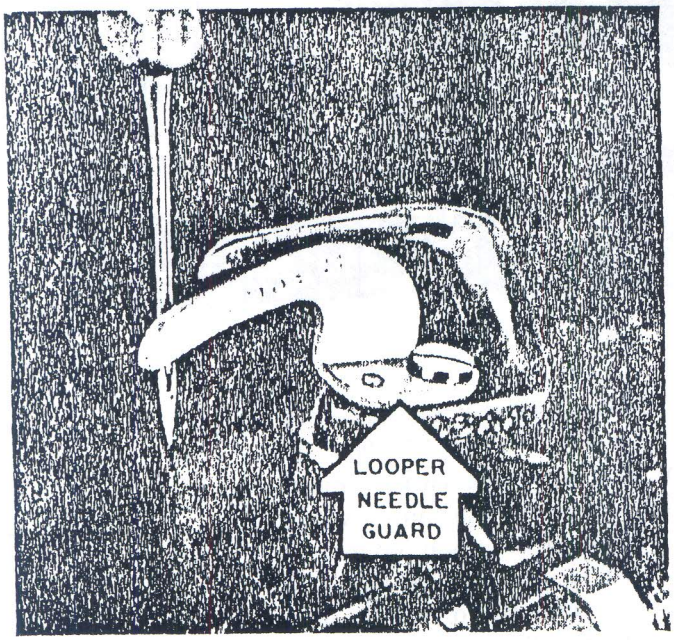


Figure 4

hind the needles to pick up the needle loop. The main purpose of this type of guard is to correct any deflection of the needles away from the looper point to avoid skipping stitches.

Figure 5 illustrates needle guards used on differential feed machines. Here the rear needle guard is attached to the right side of the feed bar and must be adjusted to the needles after the stitch length setting has been determined.

The reciprocating looper avoid guard is often used in conjunction with the feed bar needle guard. *See Figures 3 and 5.* Particularly on modern high-speed frill elastic and binding machines where speeds of 5000 stitches per minute using size .032 needles are not uncommon.

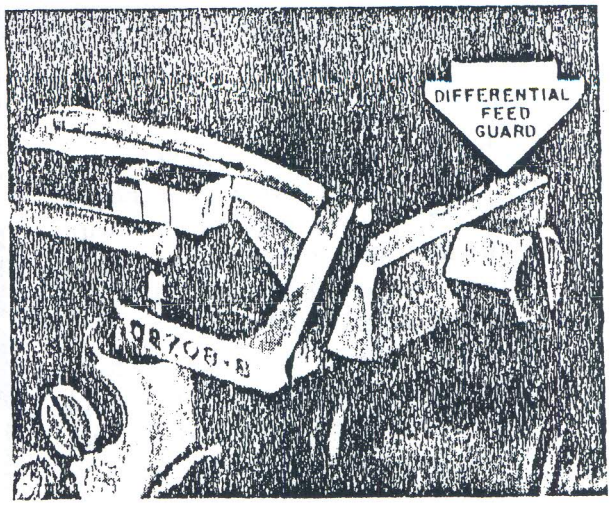
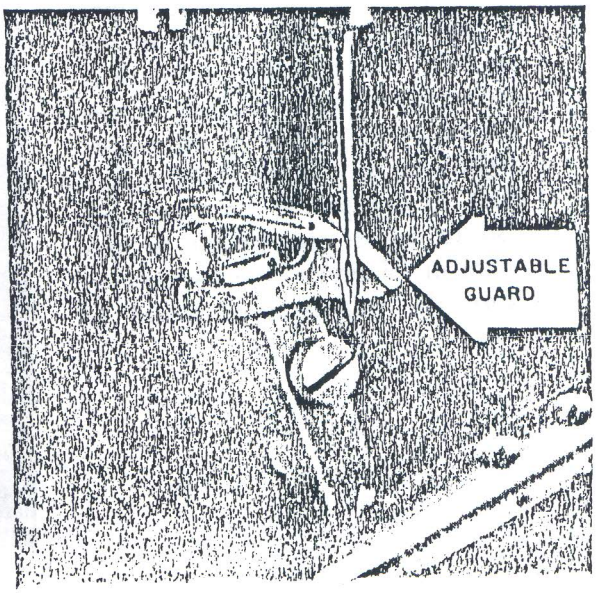


Figure 5

Looper-in-line-of-feed machines represent a slightly different problem of needle guarding in that deflection of the needle from front to back has little effect on the ability of the machine to sew properly. However, there is definitely a need to prevent the needle from deflecting to the right or the left to any great degree on these type machines, causing interference with the looper, or skipping as the case may be. *Figure 6* is typical of the needle guard that is used on a looper-in-line-of-feed machine. You will note that this needle guard is attached to the looper carrier and has a reciprocating action the same as the loopers. Normally, the looper is adjusted to the scarf side of the

Figure 6



needle and remains in a fixed position. Any deflection of the needle to the left is taken care of by the beveled guarding surface on the upper right side of the looper. Deflection to the right is taken care of by moving the adjustable guard very close to the needle as the looper is entering the needle scarf.

The proper use and adjustments of needle guards greatly reduces damaged needles created by the normal hazards of stitching, and also improves the quality of garments by minimizing holes caused by hooked needle points, skipping or malformed stitches.

Specific detailed adjusting instructions for most Union Specials are yours for the asking.

Operator Fatigue

FIRST CLASS MECHANICS and supervisors should all be interested in not only the obvious problems connected with sewing machines, but in some of the subtle problems that contribute to operator fatigue and thereby reduce quality and production.

Excessive operator fatigue usually results from working under strained or uncomfortable conditions.

A prime example of this is the operator whose machine does not have its own individual light or is located in a poorly lighted area in the factory. As long as the operator is working with light colored threads and light colored materials the problem is not too great, but just as soon as a change to dark colored thread and dark colored fabrics is made, she is working under a strain trying to follow the thread, the seam, and the lines of stitching.

A chair that is not the correct height for the operator and does not have its four legs resting squarely on the floor is also an annoyance to operators since they cannot be in a comfortable position while operating the machine and reaching for work.

By the same token, improper work supports that are either too high or too low or do not hold the work in a proper position for the operator to grasp also contribute to a decrease in quality and production as the work day progresses.

These details, however small they appear, should be brought to the attention of whoever is responsible for approving and making such corrections, for these problems can cost dozens of garments per day in production just as surely as a machine that constantly breaks thread.

Concerning the machines themselves, eventually a feed dog will become worn to the point where it does not properly take the work away from the operator. This is a change that comes about very gradually and is quite often the source of trouble when an operator says a machine does not feel right. More times than not, a properly adjusted new feed dog will solve this problem.

Occasionally, due to excessive lint in the feed slots or a loosening of the clamp screw, a feed dog will not contact the work properly. This causes a machine to feel heavy. Cleaning out the lint and re-adjusting the feed dog to the correct height will usually correct this condition.

A machine will feel sluggish to an operator if the belt from the machine pulley to the transmitter is not adjusted with the proper amount of tension. A belt that is too loose will obviously not get the machine up to speed quickly, and a belt that is too tight will give the machine a very heavy feel and over a period of time make a machine run hot.

In addition to the proper belt tightness, it is important that the starting treadles, foot lifter treadles,

and knee presses be adjusted properly so that an operator can actuate the devices while sitting in a comfortable position. The more experienced operators will usually bring these matters to the mechanic's attention quickly, but many times new inexperienced operators are not aware that treadles and knee presses can be adjusted to suit individual needs.

The sewing machine itself should be properly installed in the table board with the right type of isolating cushions in place and with work trays or other work supports installed in such a manner that they do not contact the sewing machine in any way. A machine that is properly installed is easy to start and stop and in most cases has a nice smooth feeling when the operator is sewing.

Always be sure that the drawer under the table is snug fitting and that the thread stand is securely fastened to the table in the correct position in relation to the sewing machine.

Careful attention to all of these details will not only reduce operator fatigue and increase production, but in general will make your factory a more pleasant and efficient place to work.

Needle Cuts

UNNOTICED NEEDLE CUTS in the fabric of various garments result in a finished product that must be sold as a second rather than a first quality item. There is little profit in seconds.

We cannot hope to list all of the factors that enter into needle cutting, however, listed below are a few of the causes and some of the measures that can be taken to reduce the needle cutting problem.

In most cases, needle cutting can be traced to one of the following:

1. **A burr or hook on the needle point.**
2. **Extremely delicate or brittle fibers in the make up of the fabric as a result of the weaving, knitting, or finishing and dyeing processes.**
3. **Diameter of needle too large for a given fabric.**
4. **A sharp-pointed needle instead of a ball point.**
5. **Too short a point on the needle from the eye to the tip.**
6. **Insufficient clearance in the needle hole or needle slot in the throat plate.**

Burrs or hooks on the needle points usually can be traced to the needle striking the presser foot, throat plate, hook point, looper, or needle guard during the sewing process. Occasionally, this is caused by an operator not being as careful as she should be in the sewing of a garment. However, the problem of burrs or hooks on the needle point can be minimized by checking to be sure there is sufficient clearance for the needle in the presser foot and throat plate needle holes or slots. Care should be taken also to see that the hook point or looper and the needle guards are set close enough to the needle to avoid skipping, but far enough away to avoid excessive needle deflection that will damage the needle point.

On many fabrics, needle cutting is due to the use of very delicate yarns in the knitting or weaving process of making the cloth or to the finishing and dyeing processes that sometimes make the yarn fibers brittle.

In general, on all sewing operations, we recommend using the smallest diameter size needle that will sew without excessive breakage on any particular operation.

Where needle cutting is a problem, we would suggest that a ball point needle be used rather than the sharp round point. The ball point is actually a very tiny radius on the tip of the needle point that tends to push the fibers apart rather than cut through them. *See Figure 1.*

If cutting still persists, we would recommend what is known as a government point needle. This type of point has a long thin taper from the eye that again separates the fibers gradually, resulting in

minimum of distortion and thereby reduces the cutting possibilities. The extra length from the eye to the tip on a government point needle reduces, slightly, the sewing capacity of a machine from the standpoint of thickness; however, in most cases cutting problems are experienced on the lighter weight materials and this should not be a disadvantage.

As a further step to reducing needle or stitch cutting, it is sometimes necessary to make a slight alteration to the throat plate needle slot or slots. *See Figure 2* which illustrates a *39500* throat plate after alteration to the needle slot to reduce needle cutting. Also a similar alteration can be made on other throat plates to minimize stitch cutting on heavy fabrics such as denims.

This alteration is made by using emery cord or emery tape to create a very slight radius at the edges of the needle slot in the area where the needle descends through the material. Great care should be used

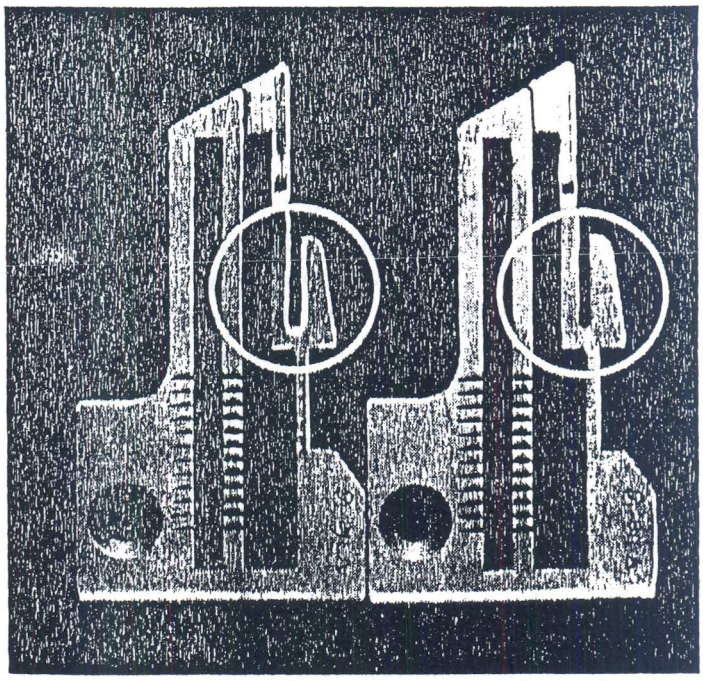
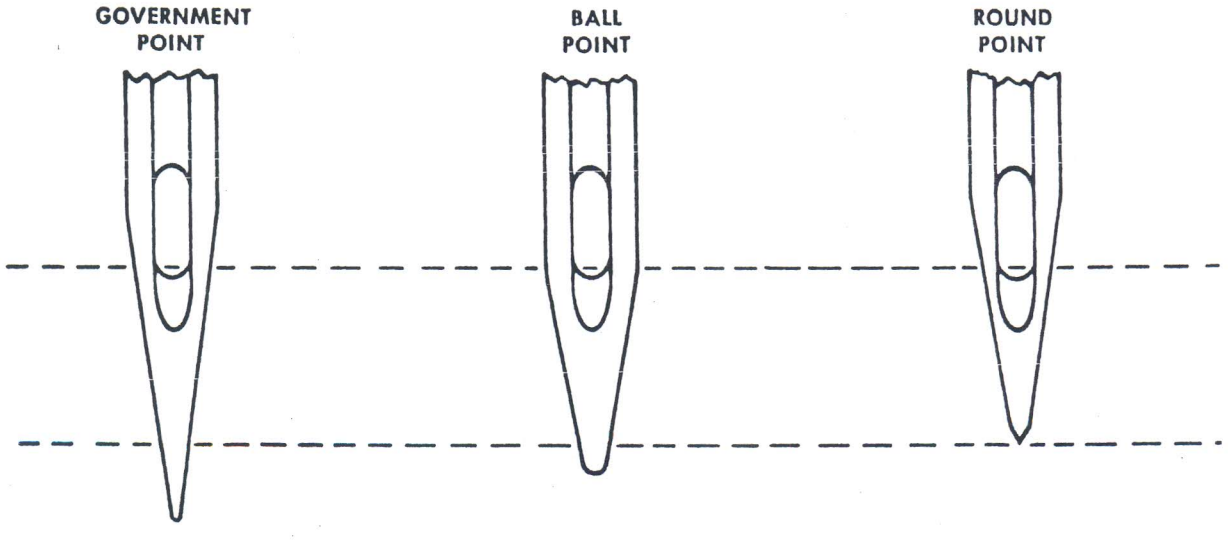


Figure 2

to be sure that only a small amount of metal is removed and that the area altered blends in smoothly with the rest of the needle slot. On any machine making an overedge stitch, be sure that the chain flows smoothly off the stitch tongue without the presser foot in place. If the chain chokes on the tongue, you have probably made too deep or abrupt a radius on the side of

Figure 1



the stitch tongue, thus preventing the chain from flowing off smoothly. This can usually be remedied by extending the taper gradually to the end of the tongue.

After any alteration, polish all thread contact surfaces very carefully with either a buffing wheel or crocus cloth.

Sometimes an inexperienced operator might sew across a pin or some similar foreign matter in the material which can cause burring or hooking of the needle point. It is good practice to train all new operators and remind experienced operators to watch carefully for any evidence of a burr on a needle and to replace the needle promptly to avoid producing bad work. This is particularly true on blindstitch machines where a burred needle will not only damage the fabric but will sometimes have an erratic pattern of fabric penetration.

Quality stitching starts at the needle. Be sure that your machines are adjusted properly with the correct needle in order to obtain the finest possible seaming conditions.

Stocking Parts and Needles

THERE ARE MANY AREAS in the garment manufacturing plant today where the sewing machine mechanic can be a great benefit to his company beyond the physical repairing or adjusting of sewing machines.

One major responsibility should be maintaining an adequate stock of spare parts and needles. Regardless of how well machines are maintained and how careful the sewing machine operators are under production conditions, needle and sewing part breakage is going to occur. There is also the occasional loss of a screw, nut, tension spring or similar small items, and on a rare occasion a major mechanical part may break, wear out or just plain fail.

In most factories each sewing machine is depended on to produce a given number of dozens daily. Loss or breakage of a single part on a machine may put that machine out of production until a replacement can be obtained. If adequate spare parts are not kept on hand, it means that replacement parts must be obtained from the supplier. Even in cases where the plant is in the same city as the supplier, a half-day's production is easily lost by the time someone goes to pick up the part and gets back to the factory with it. Where replacement parts must be obtained by mail, the delay is even longer.

Spare parts and needles are production insurance, and like other insurance, they should be adequate to fill the need but not a financial burden.

In the case of key machines, spare throat plates, presser feet, feed dogs, and loopers should be kept on hand at all times; then if a looper or feed dog breaks, it can be replaced without unnecessary loss of time. A new spare part should be ordered immediately. It is probably not practicable to have a complete range of spare parts to match every machine in the house, but certainly spare parts should be on hand for the key machines that could cripple production if an accident should occur.

In addition, a variety of spare parts such as check springs, tension springs, bobbin cases, bobbins, hook assemblies and sewing parts should always be on hand for the types of lockstitch machines that are in use.

Quantities of parts that should be on hand will vary, depending on the number of machines that are being operated. If the quantities of parts that probably should be on hand, has not already been established, a clue to the amount can be obtained by checking the parts used in the past year. The amount of parts that a plant would want to have on hand in anticipation of breakage or replacement should be no more than thirty to sixty days' needs. It is extremely important that the mechanic be sure that ade-

quate parts are requested. However, it is equally important that spare parts be ordered in relation to actual need and not order two or three years supply of some item and then have it lying in the parts drawer.

A mechanic can and should be a part of the plant management team in thought, words and actions.

A mechanic's daily work keeps him in contact with the operators, the construction of the garments, and the general tempo of the plant as well as the mechanical condition of the machines. Mechanics should listen to the operators for possible helpful suggestions. Many times, because of an operator's intimate contact with a particular operation, they are able to see a shortcut or a better way to do an operation if someone will make a worktable, bundle clamp, ticket box or some similar work aid.

A mechanic's imagination should run free as the various sewing operations are watched. If there is a better or faster way, explain it to the plant superintendent so that the proposed change can be brought to the operator's attention.

If there is difficulty with a particular operation, fabric, or thread, look outside the plant for the answer. There are a great many companies that make specialized products for the sewing industry that are designed to increase production, alleviate trouble, or both.

Attachments, thread trimmers, needle positioners, stop-motion devices, pleating devices, thread lubricants, rubberized feed dogs and a host of other specialized items have been made to fill particular needs in the industry. All too often these items are needed in the plant but are not used simply because no one has taken the time to investigate them. A source of all of these items should be known to the mechanic, so that he can at least make recommendations to the plant owner or superintendent when a problem arises. Quite often if various suppliers are contacted, they will send their catalogs or pamphlets that will give details on the various products that they make. This not only helps to eliminate manufacturing problems but makes the mechanic more valuable to himself and to his company.

For any mechanic or superintendent who might be interested, Union Special Machine Company has a partial list of the many suppliers of specialized items. We will be glad to send this list upon request.

Being a competent sewing room mechanic is an important and rewarding job. Like most things, the more effort that is put into it, the more pleasure will be derived.

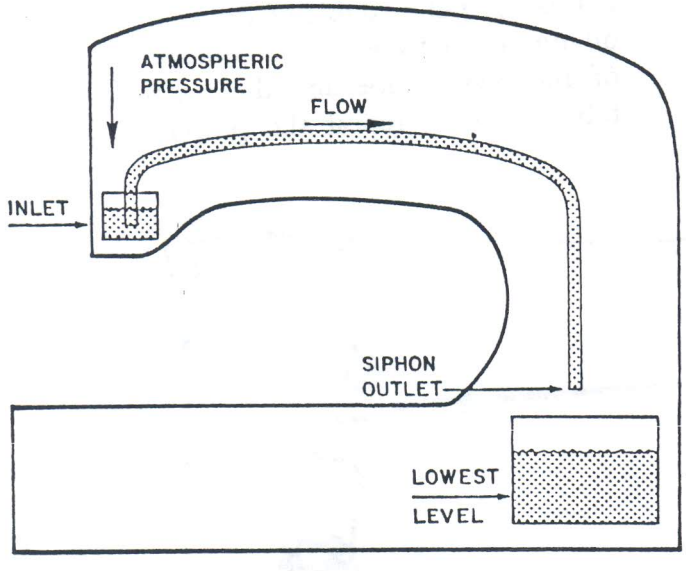
Siphons

THE NEEDLE-BAR DRIVE and take-up mechanism in lockstitch and looper stitch machines move at fantastic speeds and thus require minute, but constant lubrication. Because of varying conditions such as summer and winter temperatures, viscosity of oils, and a wide range of machine speeds, it is necessary to design the lubrication system to deliver slightly more than the minimum lubrication desired to these moving parts.

The main sewing machine oil reservoir in these machines is several inches below the needle-bar area, thus the use of a siphon is a most dependable method for removing excess oil from the needle-bar area. *See Figure 1.*

To add this principle to a sewing machine it is necessary to add a means of self-priming and filtering. In the head end of the machine, an inlet felt is held at the bottom of the needle-bar area where any excess oil will collect. A siphon tube is inserted snugly in the felt so that oil can be removed and drawn through the felt and into the tube. Once the siphon is saturated with oil no air will leak into the tube and cause the siphon to fail; also the felt filters out any foreign matter and prevents oil in the main chamber from becoming dirty.

Figure 1



The siphon tube carries the excess oil to the self-priming cup where it descends vertically through the siphon outlet tube and into the main reservoir.

In the self-priming cup are cylindrical felts which are constantly splashed with oil by the mechanical action of the machine. Once the felts are saturated, no air can leak in from the top and the drops of oil slowly flowing down the siphon outlet tube actually form a partial vacuum, or decrease of normal air pressure, in the inlet tube causing the siphoning action to commence at the inlet felt. This self-priming is a continuous action and will slowly but steadily remove excess oil in the head as it accumulates.

The two possible causes of siphon difficulties are: clogged felts or tubes, and air leaks.

If felts become loaded with dirt or sizing they will not allow oil to pass through. Inlet and priming felts should be replaced occasionally just as an automobile engine filter is replaced. Tubes can be checked for clogging by removing felts and

running oil into the priming cup. Oil should flow out of the outlet tube promptly. To check the inlet tube remove the inlet felt and disconnect the plastic tube at B, *Figure 2*. Turn the end of the tube upright and inject oil, it should promptly run out at the inlet felt end of the tube. If either tube is clogged it can be cleared with oil from a pressure can or by using air pressure. Be sure to reassemble the plastic tube and felts properly.

If air leaks are suspected it is necessary to check for air leaks step by step until the source of leakage is located and corrected. If a small pool of oil has collected around the area of the inlet felt and the felt itself is not extremely dirty, there is probably an air leak.

Assemble a new inlet felt being sure that it is snug on the tube and held firmly in place in the cavity surrounding the lower needle bar bushing. Soak thoroughly with oil.

Remove the priming cup felts and replace with two new clean felts. Be sure that the new priming felts are snug and in full contact with the inside perimeter of the priming cup. Soak priming felts

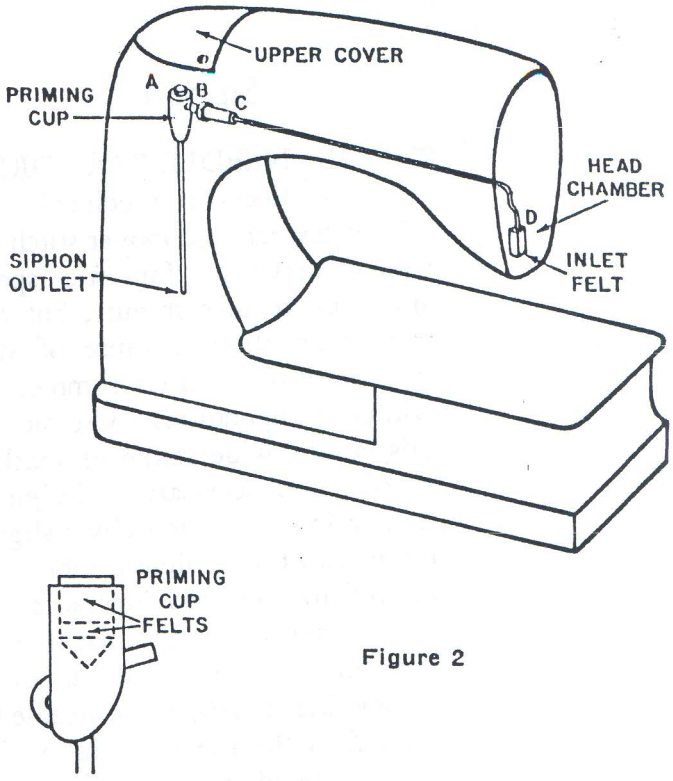
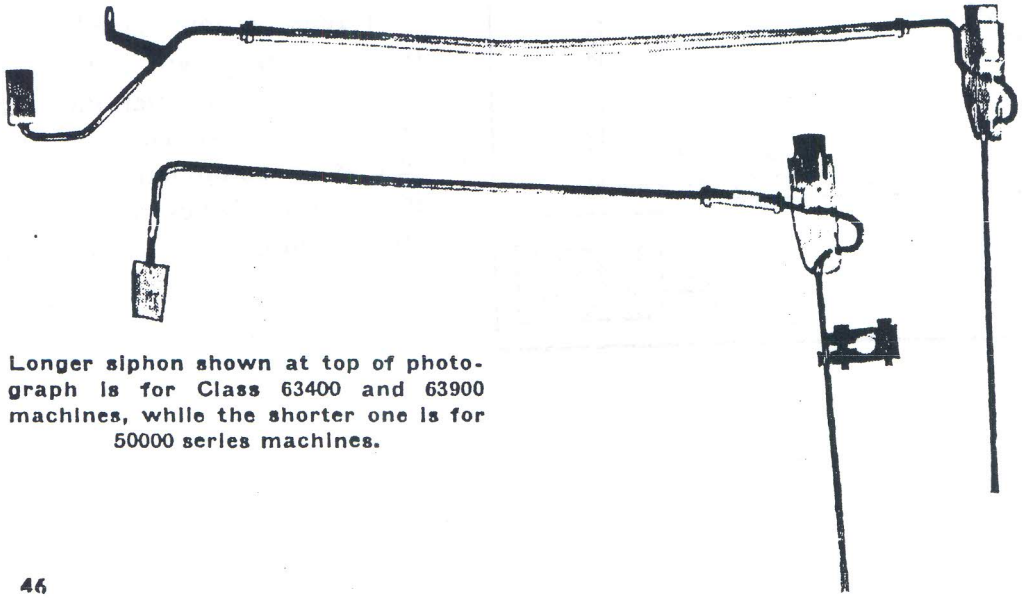


Figure 2

with oil for 5 minutes and then watch for action drawing oil through the inlet felt. If, after 30 minutes of hand priming, the priming cup does not bring the desired results there is probably an air leak at junctions B or C, *Figure 2*. To determine which of these two points is leaking, put a couple of drops of oil on the outside of the junction of the plastic tube and the metal tube and then repeat the priming



Longer siphon shown at top of photograph is for Class 63400 and 63900 machines, while the shorter one is for 50000 series machines.

process. The drops of oil around the plastic tube will form a temporary seal and if the siphon begins to function the air leak is probably at the point that has just been sealed temporarily with drops of oil on the outside. With this type of leakage, installation of a new tube is recommended. While leakage at these points has been rather rare, as a further precaution to eliminate this particular problem, all plastic tubes are now fitted with clamp collars, *#21212,* that virtually make this type of leakage impossible.

If the siphon appears to function satisfactorily during the day when the machine is operating, but oil collects in the needle bar area during the night, there is undoubtedly a slight air leak somewhere in the system. Here again be sure that the priming cup felts are fitted snuggly in the priming cup and also check for air leaks at junctions B and C, *Figure 2.*

Union Special machines, *Classes 52800, 52900,* and *53100,* all require siphons and use the siphon with two felts in the priming cup. The long, soft felt acts as a filter, and the thin felt that is placed in the bottom of the priming cup is used to retard the flow and create suction in the inlet tube. This siphoning cup assembly is readily accessible in the crank shaft chamber and replacing these two felts is a very simple matter.

In the *Class 63400* and *63900* machines, a single felt of slightly different composition is used. This can be replaced easily through the rear access opening that is now provided for this purpose on these machines. Felts, plastic tubes, and collars are very inexpensive and should be kept on hand for replacement needs. Since there are several classes of Union Special machines using siphons it is not possible to reprint all of the variations in individual parts in this space. Union Special has available detailed drawings indicating the exact parts used in each machine class and these are available for the asking.

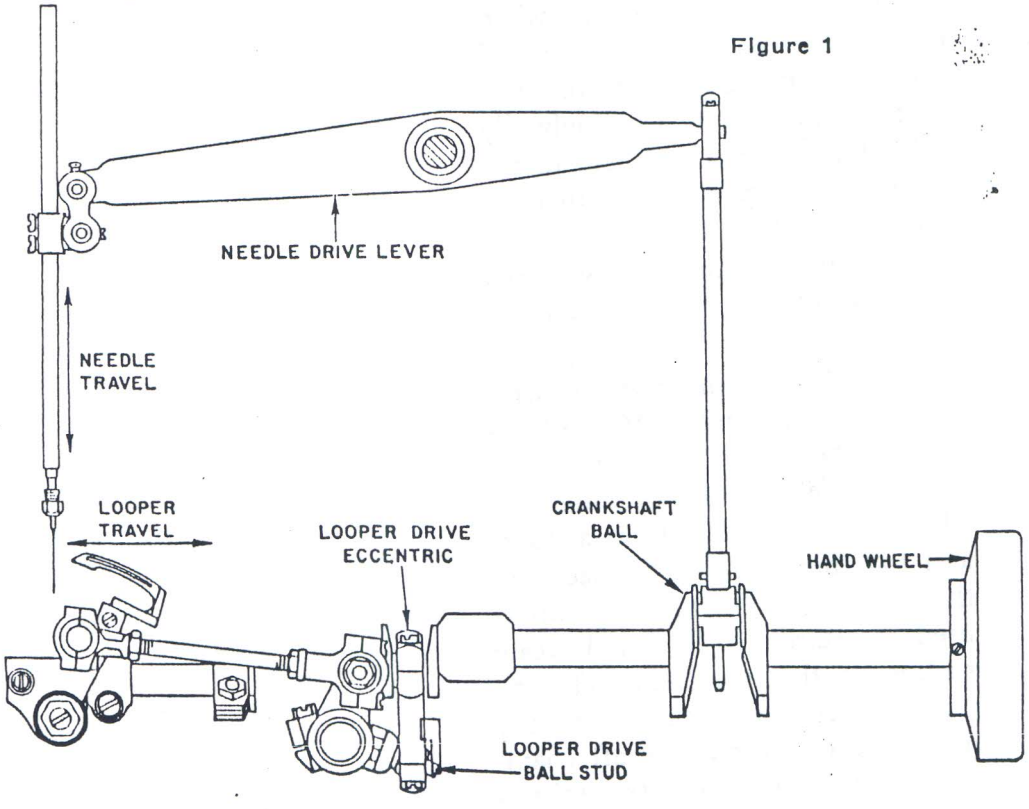
Synchronization— Its Purpose And Its Settings

IN PRINCIPLE, synchronizing a sewing machine puts the looper, needle and thread control mechanisms in proper relation to each other to provide an ideal sewing condition. A machine slightly out of synchronization will be very sensitive to adjustments and usually troublesome. A machine badly out of synchronization probably will not sew at all.

The automobile engine is an example of this principle. When the ignition points in the distributor are timed or synchronized properly in relation to the proper firing order in each cylinder you have a smooth running engine with no misses or skips. Adjustments are provided to permit proper timing or synchronizing of the ignition system at each cylinder to allow the perfect tuning of an engine.

To obtain a fundamental understanding of synchronization as applied to sewing machines, let's examine the mechanical motions that are involved. *See Figure 1.* On Union Special *50000 Series* machines, the handwheel rotates a crank shaft 360°, which in turn, thru connecting rods and a lever, drives the needle bar up and down.

Figure 1



When the crankshaft ball is at its highest position, or the top of its stroke, the needle is at its lowest position, or the bottom of the stroke for the needle travel. When the handwheel is now rotated 180° or one half of a revolution, the crank ball also rotates 180° to its lowest position or the bottom of its stroke. The needle has now risen to the top of its stroke or the uppermost limit of its travel. This establishes the relationship between the needle and the crankshaft.

Now, let's add another element or mechanism, namely, the looper drive. By placing a looper drive crank or eccentric on the crankshaft and connecting it to a series of levers we are able to drive the looper itself.

To obtain approximate looper drive timing, a flat or slot has been made on the handwheel driven crankshaft. The spot or timing screw in the looper drive crank or eccentric hub is tightened on this flat or slot on the crankshaft. Rotating the handwheel drives the needle bar up and down and the looper right and left. When the needle is at its lowest point, the looper drive crank or eccentric is also at its lowest point and the looper is at the extreme end of its travel to the right. When the handwheel is rotated 180° the needle reaches the top of its travel and at the same time the looper reaches its extreme travel to the left. At this point the looper drive crank or eccentric is at its highest point.

In this type of machine design, the needle and looper always reach the ends of their respective travels at the same time. Theoretically, the needle drive and looper drive on *50000 Series* machines are designed

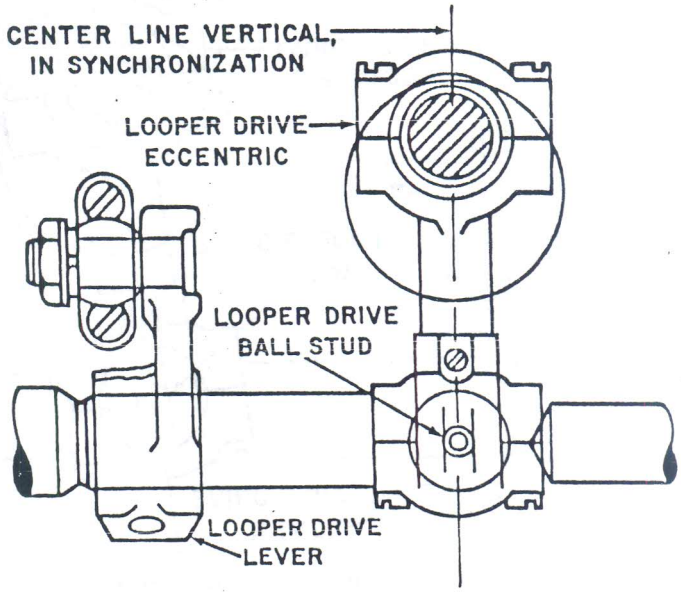


Figure 2—Looper drive in synchronization, position centers vertical.

so that they are synchronized or timed together during the entire cycle. However, a look at the looper drive mechanism will reveal where errors in timing or synchronization can occur.

Suppose we look thru a machine from the handwheel end. Since the main crankshaft ball should be at the top of its stroke at the same time the looper drive crank or eccentric is at the bottom of its stroke, a vertical line could be drawn thru the center of both. However, the looper drive crank or eccentric drives a series of levers to move the looper. In order for these levers to start their motion at the proper time, the ball stud at the bottom of the looper drive assembly must also be positioned in the center of the main crankshaft ball and the looper drive crank or eccentric. *See Figure 2.* In other words, a vertical center line would pass thru the center of all three.

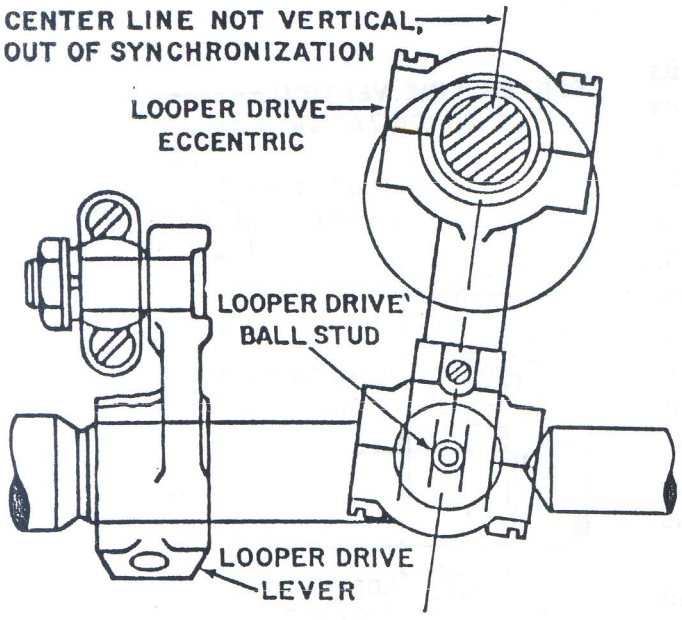


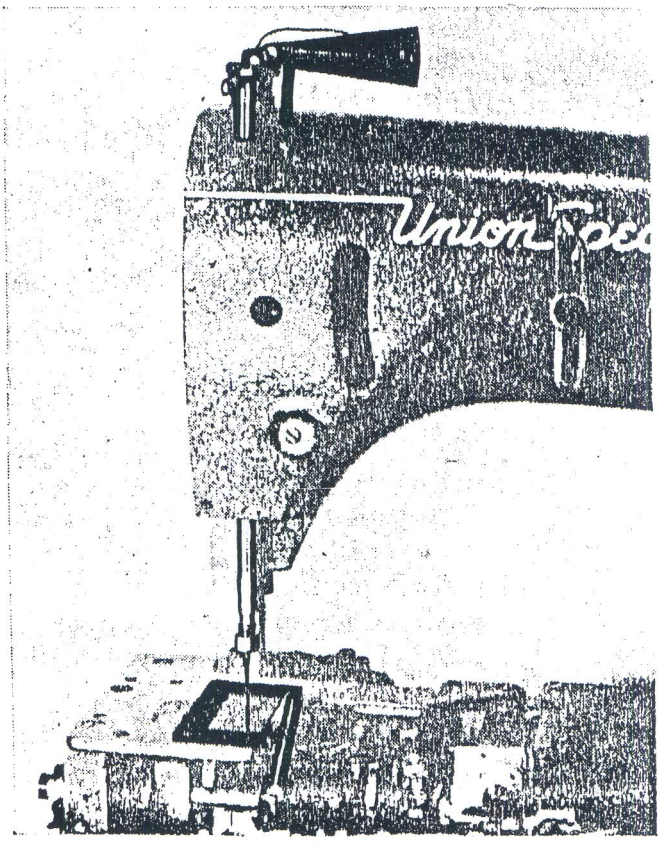
Figure 3—Looper drive not synchronized, off about 10° from vertical.

Inside Union Specials

At the highest and lowest points in a single revolution, the driving motions will then be straight up or down, which will cause the needle and looper to start and end their respective travels at the same instant. However, if the looper drive mechanism and bushings are assembled in such a manner that a center line thru the looper drive crank or eccentric and the ball stud is 10° off of the vertical line, this will change the timing or synchronization of the looper travel in relation to the needle travel. *See Figure 3.* In other words, the looper will start its motion from right to left, either before or after the needle has started to rise. With this setting, the machine will be out of time resulting in skipping or malformed stitches.

There are two methods for checking and correcting synchronization. One method is to use a kit of synchronizing gauges. *See Figure 4.* A gauge plate is positioned on the throat plate support and held in place with the throat plate screws. After setting the machine to the proper looper gauge, the looper is removed and a pin is placed in the looper holder. The indicator gauge is secured in the strike off wire holder with the engaging lever above the needle bar. The handwheel should be turned in the reverse direction until the pin in the looper holder contacts the edge of the gauge plate. At this point the engaging lever should touch the top of the needle bar and the indicator should be set at "0". Tighten the indicator holding screw and turn the handwheel in the operating direction until the pin again contacts the gauge plate. If the machine is in synchronization the pointer on the indicator will return to the same reading. A variation of one graduation is allowable. However, if, when

Figure 4

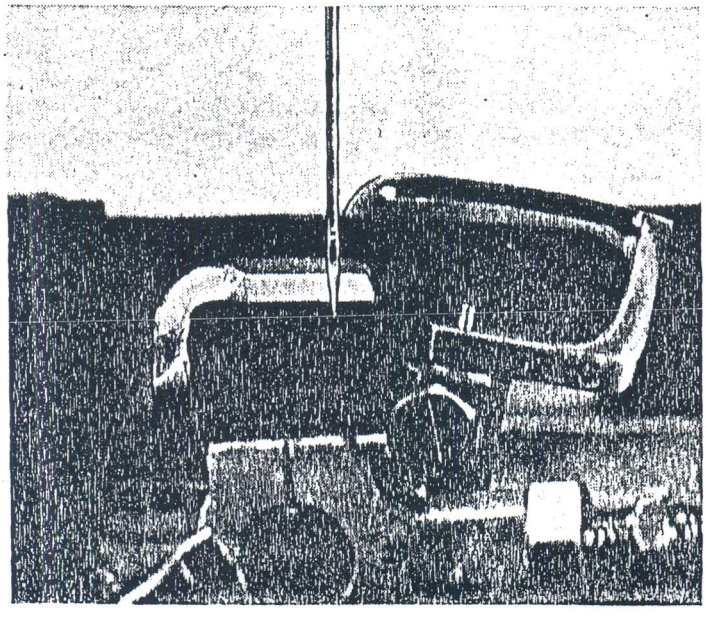


the handwheel is rotated in the operating direction the reading is above "0" on the scale, the looper drive lever rocker must be moved to the rear of the machine. If the reading is below "0", the looper drive lever rocker must be moved to the front.

This adjustment is made by loosening the clamp screws for the looper cross-shaft bushings on older style machines and slightly tapping the whole mechanism either in or out until a perfect synchronization reading is obtained. On the high speed machine styles loosen the looper drive lever clamp screw and then tap the cross-shaft synchronization plug, in or out. Then take out the end play and tighten the looper drive lever.

The other method, in the event synchronization gauges are not available, is to again set the machine to the proper looper gauge. Then very carefully turn the handwheel in the operating direction until the point of the looper is just even with the right edge of the needle as the looper starts to pass behind it. *See Figure 5.*

Figure 5



Note carefully the point or height on the needle where the looper has started to pass behind it on what would be the loop taking stroke. Now reverse the handwheel until the looper point is again even with the right side of the needle, except in front of the needle or on the avoid side. If the machine is in synchronization the looper should pass the needle at the same point or height on the loop taking stroke and avoid stroke.

If the looper comes in at a different height on the needle on the avoid side than on the loop taking side, the machine is out of synchronization and the changes indicated above should be made.

It should be pointed out that in Union Special modern high performance machines this setting is made at the factory, and in the normal course of machine adjusting there should be no problem occuring in this area. However, in the case of a major overhaul-job, where the looper drive assembly mechanism is removed and new cross-shaft bushings are installed, it is necessary to understand how to correctly position the looper drive assembly so that proper timing or synchronization can be achieved. A word of caution: always be sure the timing or spot screws are seated squarely and firmly on the timing flat or slot on the crank shaft; then tighten these screws and then set scews securely.

In the next article we discuss the proper synchronization of Union Special feed-off-the-arm machines.

Automation and the Mechanic

THE FIRST STEP toward automation in the garment industry probably came in 1830 when Barthelemy Thimonnier, a Frenchman, constructed 80 wooden sewing machines to sew uniforms for the French Army. So frightened were the hand sewers at the future possibility of jobs being lost through this new mechanical development, that a riot ensued, and they burned the factory to the ground, including the machines.

Sounds ridiculous, doesn't it? But it's no more ridiculous than someone in the garment industry today, advising plant owners not to buy a proven labor-saving device because it costs too much, it may be obsolete next year, or the mechanic will never understand how to fix it.

The remark is made that even some of the simple automation devices are difficult to handle. Of course they are until you understand them. When we review the problems that came to the surface with synthetic threads and fabrics, drip-dry finishes for cotton, eyelet buttonhole machines, and a hundred other items, plus operators themselves, we can agree that we have already handled difficult problems with less experience, less knowledge, and some times less desire than we have today.

The fact of the matter is, that in thousands of sewing plants, capable mechanics are already servicing a wide range of complex equipment that is reducing labor costs and improving quality.

Adding the word "automation" doesn't reduce the ability of a capable mechanical man to maintain and troubleshoot new equipment. It may point up the need for the mechanic to add some new skills to his already interesting job, and there is no reason why this cannot be done almost at once.

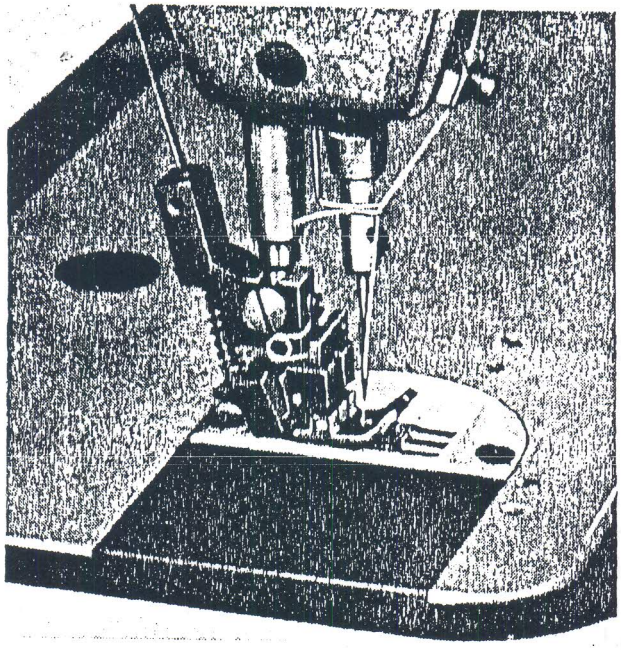
Practically all present and future labor-saving devices are or will be a combination of two or more of the following basic elements:

1. Thread handling
2. Mechanical devices
3. Air, pressure, or suction
4. Hydraulics
5. Electrical circuitry
6. Electronics

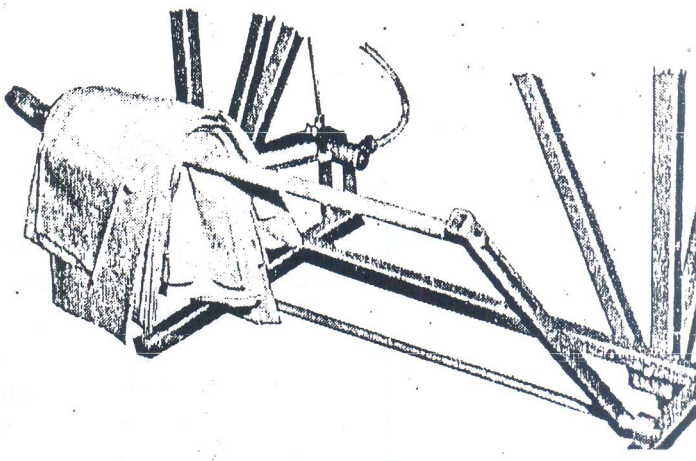
Sounds complicated? Not really. You may know more about these individual elements than you realize, and if you don't, we and our allied suppliers, are already taking steps to bring more basic knowledge to the mechanical people in our industry.

You are probably already using automatic chain cutters, If so, this is simple automation combining proper thread handling and a mechanical device for automatically cutting the chain.

You are probably using stackers. If so, they are being operated by mechanical devices, air, or by hydraulics.

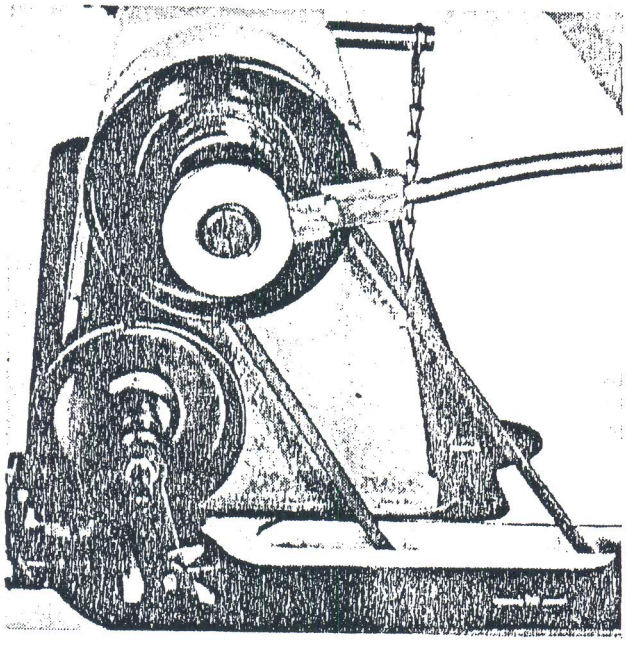


Automatic Chain Cutter

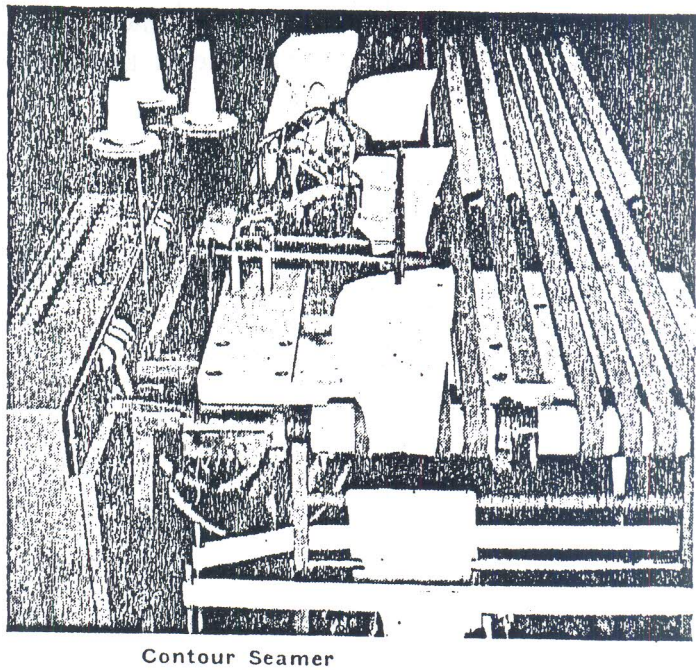


Stacker

AUTOMATION IS HERE!



Needle Positioner



Contour Seamer

You are probably using needle positioners and thread trimmers. There you may have a combination of thread handling, mechanical devices, and electrical cricuitry.

The new Union Special JetSew Self-Programming Contour Seamer merely combines these five elements and adds the sixth, basic electronics.

Automation is already with us to a degree, and it is coming more rapidly every day to our industry. Because of the tremendous labor shortages in most of the European countries, many labor-saving devices or automated pieces of equipment are already used that are merely being thought about in our North American industry.

Automation in some form can and will be used by every garment

plant that is operating profitably and intends to stay that way.

It is our opinion that the experienced mechanics in our industry can and will meet the challenge of servicing this more sophisticated equipment by increasing their knowledge of special skills and by passing on their knowledge and experience to the young trainees.

We at Union Special intend to devote a major part of our efforts to making the knowledge that we obtain available to the trade.

Synchronizing Feed-off-the-arm Machines

IN THE DECEMBER issue of THE NEEDLE'S EYE, looper and needle synchronization, its purpose and how to accomplish the correct adjustment on Union Special *50000* series machines were discussed. In this issue, we will discuss adjusting *Classes 35700* and *35800* feed-off-the-arm machines producing stitch Type 401.

Feed-off-the-arm machines, for the purpose of closing sleeves or trouser legs, were manufactured by Union Special as far back as 1900. This design—while advanced for the times—was cumbersome in that each completed seam had to be removed from the cylinder. In 1927, Union Special pioneered the first *35700-35800* series feed-off-the-arm machines which allowed the operator to dispose of the garment when the seam was completed. Obviously, production was greatly increased, operator fatigue reduced, and manufacturing costs lowered.

The early *35700-35800* machines operated at speeds up to 4,000 stitches per minute, were semi-automatically lubricated and, since speed was in the 4,000 rpm range, the mechanisms were designed with fixed timing or synchronization between the needles and looper. At these lower speeds, exact synchronization is usually not as critical as at today's higher operating speeds.

In 1945, Union Special introduced the now-famous "V" cylinder, automatically lubricated, dynamically balanced, *35700-35800* series, which boosted sewing speeds to 5,000 stitches per minute. In 1961, further refinements of this basic design allowed a further increase in speeds up to 6,000 stitches per minute, depending on the material and operation performed. As speeds were increased, it became increasingly important to have exact synchronization settings to permit the best possible adjustments for both sewing and chaining.

When the feed-off-the-arm machines are being manufactured in Union Special factories, the cylinders are very carefully aligned in special jigs, and the needle and looper mechanisms are synchronized carefully with elaborate gages. This assures the best possible sewing conditions for the new machine leaving the factory. Sometimes, after several years of service it is necessary to replace broken or worn parts in the needle or looper drive mechanisms. This necessitates disassembling the machine to install the new parts, and it then becomes necessary to re-synchronize the machine when it is re-assembled so that proper sewing adjustments can be made.

Synchronization is actually accomplished by means of an adjustable split coupling. The coupling connects the crankshaft—which

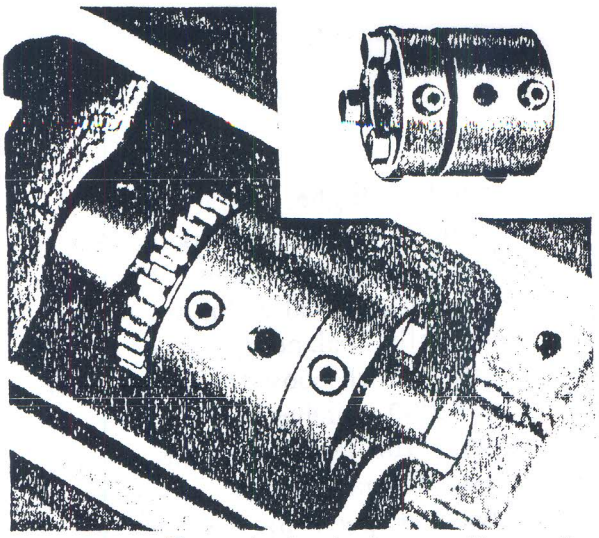


Figure 1—Inset shows split coupling out of machine.

drives the needle—to the upper mainshaft, which drives the looper mechanism. This coupling is located beneath the top cover on the upper portion of the machine—as shown in *Figure 1*. Both ends of the coupling are secured to the two shafts by spot screws and set screws. On the right or mainshaft end of the split coupling, there are three additional screws that run lengthwise through the two sections of the coupling. The screw holes in the right-hand section are several thousandths larger than the diameter of the screws, and this allows the main-shaft section of the coupling to be rotated several degrees in either direction in order to properly synchronize the looper and needle travel.

On this type machine, synchronization should be checked only when the needle has been brought to the bottom of its stroke and is on its upward travel. Depending upon the direction the hand-wheel is turned, the looper can be seen moving in either its loop taking or avoid position in the sewing cycle.

To synchronize the machine, remove the needles, presser foot, feed dog, and throat plate. Remove the looper for the left-hand needle, and

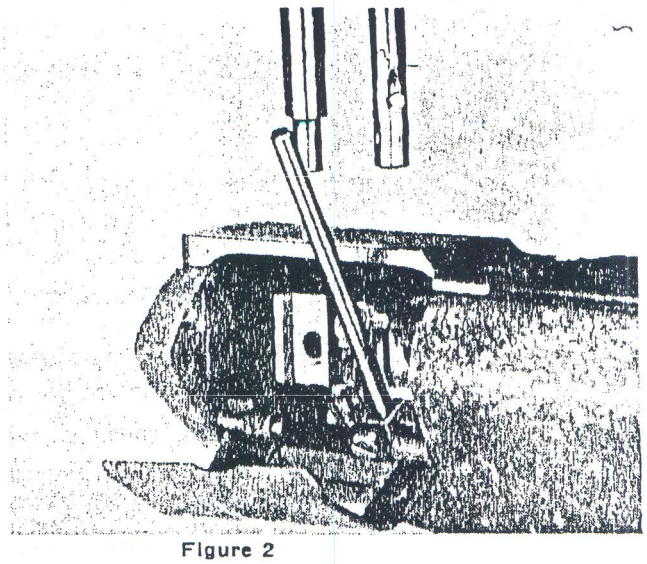
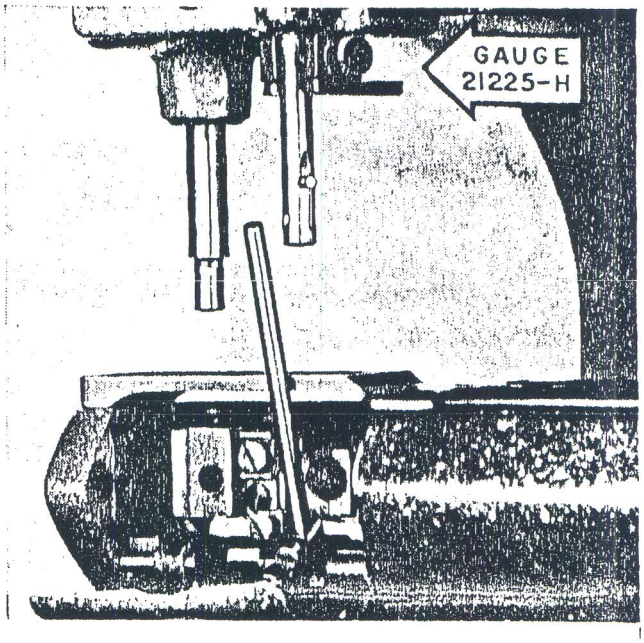


Figure 2

insert a piece of 5/32″ or 11/64″ steel rod pin in the looper holder. This pin should be 2 1/2″ long. Re-position the looper-holder so the pin will be in a vertical position when the looper-holder is at its farthest travel to the right. Tighten the looper-holder clamp screw and rotate the handwheel until the pin is at the extreme left. Re-install the throat plate, see *Figure 2*.

Then, turning the handwheel in the operating direction, raise the needle bar until the pin touches the throat plate. At this point, clamp Union Special Timing Gage #21225H around the needle bar and against the underside of the machine casting, as shown in *Figure 3*. Now, rotate the handwheel

Figure 3



in the reverse direction until either the gage contacts the machine casting on the upstroke of the needle, or until the pin contacts the edge of the throat plate. Actually, if the machine is in synchronization the variation or space between the pin contacting the throat plate and the gage on the needle bar contacting the machine casting should be no more than .005. This can be checked with a shim gage. *See Figure 4.* In the event that the distance between the pin and the throat plate or the gage and the underside of the casting is more than .005, the machine should be re-synchronized. The three horizontal clamp screws on the adjustable couplings should be loosened and then with the pin at its farthest position to the left, barely tighten the uppermost horizontal screw on the coupling merely to hold the coupling in position. A 1/4" right angle open-end wrench is used for this purpose. If the handwheel is turned in the reverse direction and the gage on the needle bar contacts the machine casting *before* the pin contacts the throat plate, loosen the horizontal holding screw, hold the coupling in place with an Allen wrench, and rotate the handwheel slightly in the reverse direction. *See Figure 5.* Re-tighten the horizontal holding screw and re-check with a shim gage until there is no more than .005 clearance at either the machine casting or throat plate, in both the operating and reverse directions.

Again, if the handwheel is turned in the reverse direction and the pin contacts the throat plate before the gage contacts the machine casting, make the adjustments indicated above, except turn the handwheel slightly in the operating direction while holding the right end of the coupling with the Allen wrench. When this setting has been made, the three horizontal screws should be tightened securely and the synchronization should be checked once again to be sure there has been no slip during the tightening of the screws.

After this setting is properly made readjust the machine in the normal manner.

Figure 4

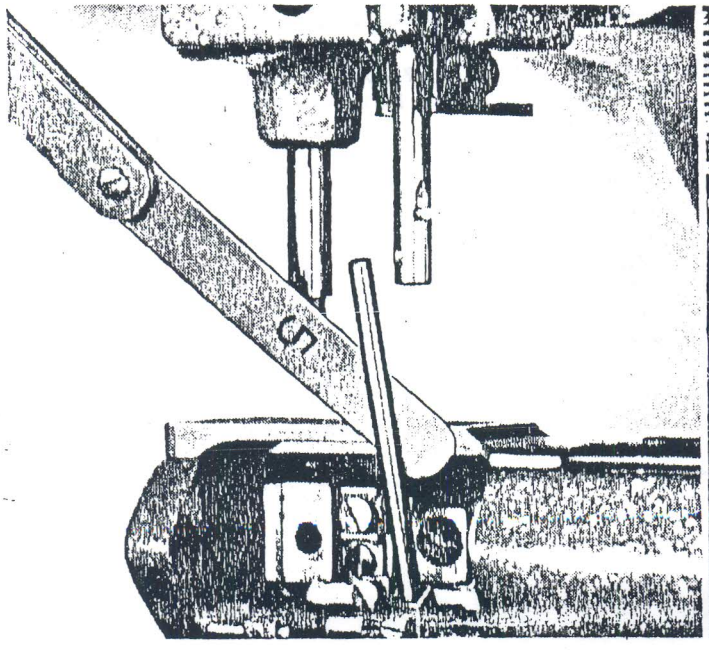
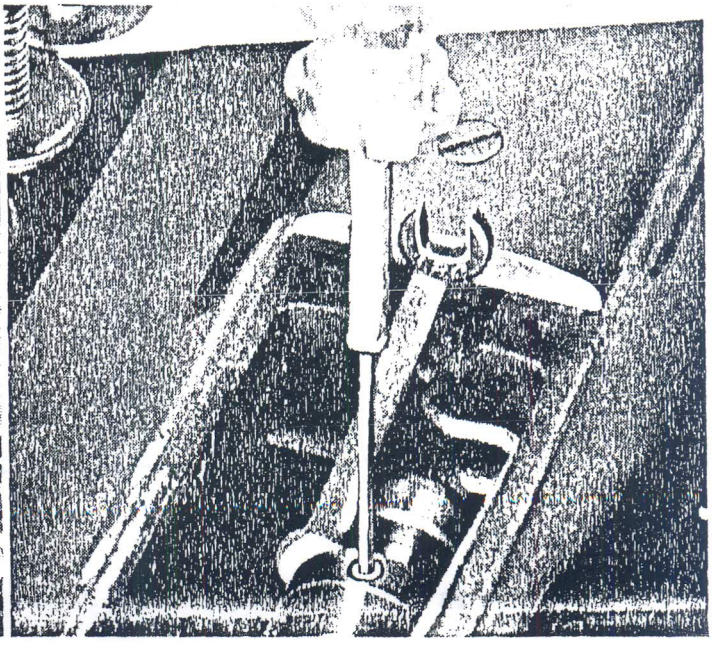


Figure 5



Needle Spacing and Parts Information

IT IS USEFUL to the young mechanic to understand the method of establishing the machine gauge or needle spacing on multiple needle machines, since all sewing parts for a particular needle spacing must be related to each other. Having some knowledge of the numerical coding of similar type parts is also very helpful.

In the early years of Union Special, it became apparent that machines with more than one needle could be used to tremendous advantage to improve garment quality and reduce costs. Since the spacing between needles could vary, at that time, between 3/64" and 13/32", it was felt that a code identifying specific needle spacings on a set of related sewing parts would be helpful to everyone.

Arbitrarily the following "Gauge" or "Needle Spacing" chart was set up and sewing parts identified accordingly.

As an example, an old style sleeve closing machine with #4 gauge sewing parts would produce a needle spacing of 3/16" on the sewn seam. To simplify parts ordering all sewing parts for 3/16" needle spacing had the suffix "4" added to the parts symbol and thus were referred to as "4" gauge parts.

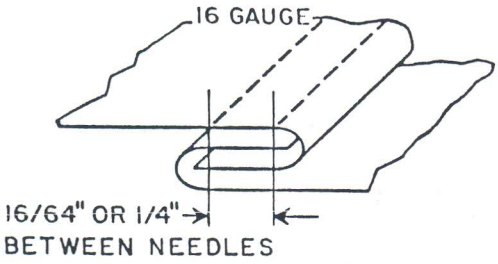
This system worked well on older style machines. However, as the line of products began to include many variations of standard and special multiple needle machines with needle spacings from 1/16" to 4" it became necessary to adopt a new gauge coding method.

Today the Union Special standard gauge or needle spacing code is based on divisions of 1/64" of an inch. This increment of variation allows the widest possible range of needle spacings to meet the needs of various seam structures.

Since a large number of repair parts for older machines are identified with the old gauge chart it was decided to continue using those symbols to avoid confusion.

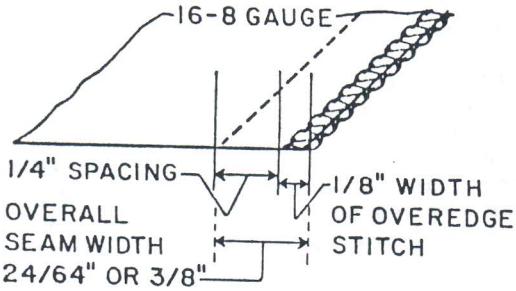
The new gauge chart represents the distance in "64ths" of an inch between two adjacent needles making independent rows of stitches or two outside needles on a single stitch formation, requiring two or

OLD GAUGE OR NEEDLE SPACING SYMBOL	EQUIVALENT IN INCHES	EQUIVALENT IN MILLIMETERS
00	3/64"	1.18
0	1/16"	1.59
1	3/32"	2.38
2	1/8"	3.17
3	5/32"	3.97
4	3/16"	4.76
4 1/4	7/32"	5.56
4 1/2	1/4"	6.35
5	9/32"	7.14
5 1/4	21/64"	8.33
5 1/2	3/8"	9.52
6	13/32"	10.32

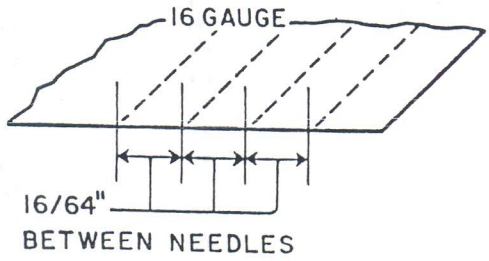


more needles. As an example, a 1/4" needle spacing machine for setting shirt sleeves is styled as *51400 BP-16*. The "16" represents 16/64" or 1/4" between two needles making independent rows of stitches.

As another example, a *52900 BG* Safety-Stitch machine with a 401 safety-stitch 1/4" from the 1/8" width of overedge stitching is identified as 16-8 gauge. Adding 16/64" and 8/64" together gives an overall seam width of 24/64" or 3/8".



On multiple needle machines with equal needle spacing the gauge is the distance between any two adjacent needles. An example would



be a Union Special 4-needle machine for attaching elastic waistbands, *Style 54200 A-4-16*. The "4" represents the 4 needles and the "16" represents 16/64" between each two adjacent needles or an overall needle spacing of 3/4". Union Special's present gauge chart is listed below:

NEW GAUGE OR NEEDLE SPACING SYMBOL	EQUIVALENT IN INCHES	EQUIVALENT IN MILLIMETERS
4	1/16	1.59
6	3/32	2.38
7	7/64	2.77
8	1/8	3.17
9	9/64	3.57
10	5/32	3.97
12	3/16	4.76
14	7/32	5.56
16	1/4	6.35
18	9/32	7.14
20	5/16	7.94
21	21/64	8.33
24	3/8	9.52
26	13/32	10.32
28	7/16	11.11
32	1/2	12.70
36	9/16	14.29
40	5/8	15.87
48	3/4	19.05
56	7/8	22.22
64	1"	25.40
72	1-1/8	28.56
80	1-1/4	31.74
88	1-3/8	34.91
96	1-1/2	38.09
112	1-3/4	44.45
128	2"	50.80
144	2-1/4	57.15
160	2-1/2	63.50
etc.		

LAST TWO NUMBERS OF PART SYMBOL	PART	EXAMPLE
01	Cloth Plate	39501
02	Cloth Plate Slides	51202
03	Edge guides	61403
04	Cast off wires	51404
05	Main Feed Dogs	43405
08	Loopers, front	52908 B
09	Loopers, back	52909 C
10	Looper needle guards	52710
11	Retainers	54211
13	Looper rockers	43213
15	Needle levers	52715
17	Needle bars	51217
20	Presser feet	43220 A
21	Handwheels	51221
22	Main shaft, crankshafts	54222
23	Looper thread take-ups	35823
24	Throat plates	39524 D
25	Needle guards	52325
26	Differential feed dogs	39526 A
27	Also presser feet	14527 F
49	Trimming knives lower	52949
57	Cast off plates	51457
60	Spreaders	39560 A
70	Trimming knives upper	52970
80	Throat plate supports	52480
90	Bushings and bearings	52390

Inside Union Specials

In general, individual parts symbols denote the class machine the parts were created for, the general classification of the part and a specific identifying number or letter.

For instance *61405 Y* is a feed dog made originally for the *61400* machines, *05* indicates a feed dog, and *Y* indicates a specific feed dog.

To carry part identification still further, the last two numbers of a part symbol generally indicate the type of part. There are exceptions.

In most cases a letter will appear after the last two digits of the part symbol to indicate a specific part in a general group, i.e., 39526 *A*.

All Union Special screws and nuts are coded according to tap and drill size, and die size as well as lengths and types of heads. This information is printed in detail in Screw Catalog 86 N which is available on request.

Better understanding of part coding and symbols should simplify the task of ordering and maintaining an adequate supply of spare parts.

Class 39500
Trimming Knives

UNION SPECIAL *Class 39500* overseaming machines are recognized the world over as the finest and fastest machines of their type. Today, 38 different standard styles of this machine class are made that range from the closing of ladies' 15 denier nylon hosiery to attaching zipper flys on 13½ oz. denim.

Not the least of the marvelous design features of these machines are the trimming mechanisms. The rugged, powerful, smooth running, completely enclosed knife mechanisms will last for many years with very little attention other than slight adjustments and resharpening knives.

Most everyone recognizes the need for several types of needles to sew the variety of materials and threads being used. Not everyone is as aware of the variety of trimming knives that are made for the *39500 styles* for specific operations or the proper method for sharpening and setting trimming knives.

Listed below is a chart indicating the parts symbols for the various upper and lower knives.

KNIVES FOR USE WITH CLASS 39500

RIGHT ANGLE UPPER KNIVES	EDGE TYPE	CUTTING EDGE	TYPE KNIFE	GRINDING WHEEL	FOR USE WITH KNIFE
39570	Straight	Narrow	Hi-Carbon Steel	6998 T or 39598 H	39549
39570 A	Corrugated	Narrow	Hi-Carbon Steel	6998 T or 39598 H	39549 N
39570 TC	Straight	Narrow	Sintered Carbide Steel	6998 TT	39549 TC
39570 J	Straight	Wide	Hi-Carbon Steel	6998 T or 39598 H	39549 J
39570 K	Corrugated	Wide	Hi-Carbon Steel	6998 T or 39598 H	39549 K
39570 TJ	Straight	Wide	Sintered Carbide Steel	6998 TT	39549 TJ
STRAIGHT LOWER KNIVES					
39549	Straight	Narrow	Hi-Carbon Steel	6998 T or 39598 H	39570
39549 N	Straight	Narrow	Carbide Tipped	Special Diamond (K 70205)	39570 A
39549 TC	Straight	Narrow	Sintered Carbide Steel	6998 TT	39570 TC
39549 J	Straight	Wide	Hi-Carbon Steel	6998 T or 39598 H	39570 J
39549 K	Straight	Wide	Carbide Tipped	Special Diamond (K 70205)	39570 K
39549 TJ	Straight	Wide	Sintered Carbide	6998 TT	39570 TJ

GRINDING WHEELS FOR USE WITH ABOVE KNIVES

39598 H***—Grey, Carborundum 100 grit emery wheel.
6998 T*** —White, carborundum 120 grit emery wheel.
6998 TT —Carborundum emery wheel used for sharpening Sintered Carbide Steel knives.
K-70205 —Diamond grit emery wheel used for sharpening Carbide Tipped knives.

***These wheels are for use with standard steel knives. In some cases, depending on the type of material being trimmed, it is desirable to have a rough finished cutting edge, and in these cases, the coarser 100 grit wheel number 39598 H is recommended. Complete grinder assembly is 39598.

You will note Union Special furnishes knives made of three different types of steel. The normal standard steel knives more than suffice for normal usage. The Sintered Carbide Steel is recommended for operations where the finish of materials has a strong tendency to dull the cutting edges. While these knives are more expensive than standard knives, top and bottom knives of this same material can be used together with a considerably longer wear life.

The solid carbide tipped knife is recommended for extremely hard usage particularly with fabrics that have a strong abrasive quality. The solid carbide tip is glass hard and the cutting edge will last a considerable length of time before sharpening is necessary. Carbide is very hard but brittle, so extra care in adjustments is important to avoid chipping the cutting edge. A possible disadvantage is the extremely expensive diamond grit wheel that is required to sharpen carbide tipped knives.

You will note three different types of grinding wheels are required for the knives listed depending the steel being used.

A grinding wheel is a special tool designed for a specific function. In the case of the knife grinding wheels, they are made for that purpose and that purpose only. If these grinding wheels are used for grinding screwdrivers or removing excess solder from a folder, the surface of the wheel becomes loaded with these softer metals and will not properly cut the harder knife steel.

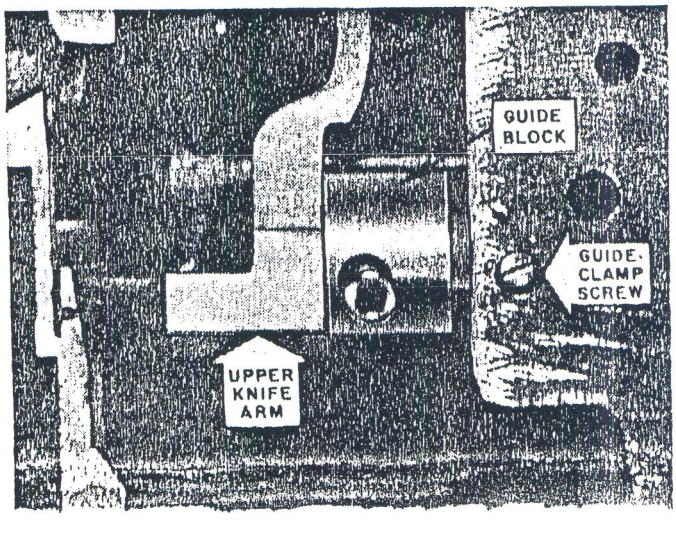
The grinding wheels should be "dressed" or cleaned off periodically with a carborundum stick, Union Special Part #St-265. This "dressing" recreates a clean fresh grinding surface on the wheel for the maximum grinding efficiency.

Knife grinding wheels should rotate at 3500 to 4000 revolutions per minute to cut efficiently. Running the wheel at lower speeds requires excess pressure of the knife against the wheel. This will overheat the cutting edge of the knife and result in rapid wear of the knife edge. Be sure there is no end play in the grinding wheel and driving pulley shaft since that could alter the proper grinding angle on the knife pilot. Never allow any oil or grease to come in contact with the knife grinding wheels.

When grinding a new edge on a knife remove only a few thousandths of metal at one pass. Be sure to use a light pressure across the wheel to avoid burning the knife edge. After removing the knife from the grinder lay an Arkansas Stone flat against the length of the knife and gently stone any fine burr that might overhang the edge.

On the machines themselves the upper knife arm runs vertically against the guide block. *See Figure 1.* Over a period of time a slight

Figure 1



amount of play or side motion can develop between the knife arm and the guide block. This play should be removed by loosening the guide clamp screw located under the top cover and moving the guide block to the left until there is no end play. In repositioning the guide block be sure to keep the thread tube in a verticle position to avoid any sewing problems. Tighten the clamp screw and then check to be sure no bind has been created.

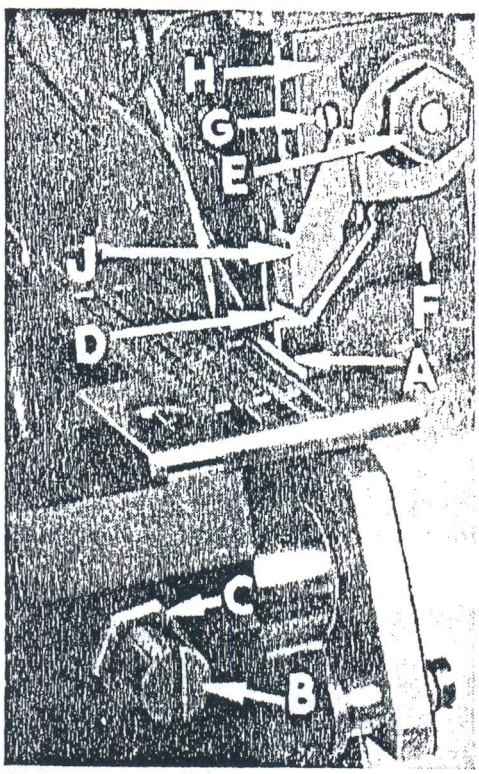
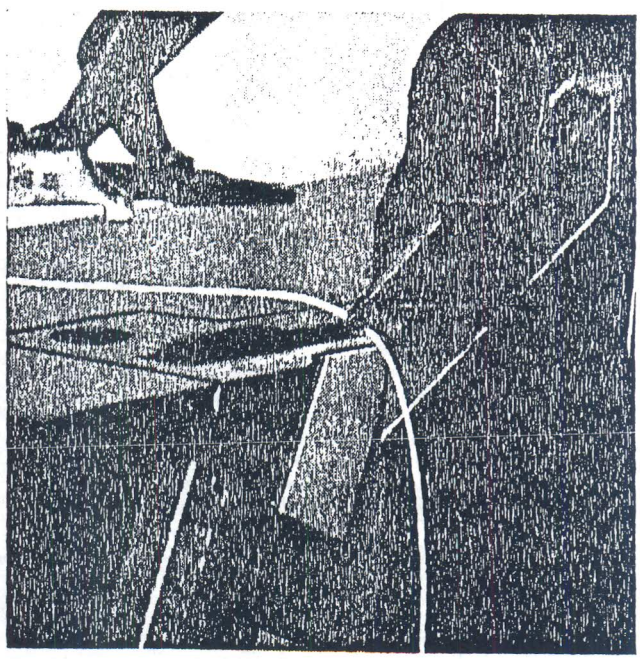


Figure 2

The throat plate support post, *(Figure 2)* also is the holder for the front and rear needle guards and the lower knife assembly. "A" lower knife; "B" lockscrew; "C" locknut; "D" upper knife; "E" locknut; "F" chip guard; "G" set screw for upper holder; "H" upper knife holder. Since the upper knife is in a fixed position the lower knife can be adjusted for proper alignment of the two cutting edges. This adjustment is made in the factory, however, if it should be necessary to realign the knife edges it can be done as follows: Remove the foot; install two freshly sharpened knives; the top edge of the lower knife should be even with the top surface of the throat plate. Front cutting edge of the upper knife edge should come about 1/64" below the cutting edge of the lower knife at the bottom of its stroke. Turn the machine by hand until the knives are open. Place a single strand of thread in the back of the opening and bring the knives together. The thread should cut clean. *See Figure 3.* Place a second strand of thread at the front edge of the knife opening and repeat the cutting

Figure 3



operation. *See Figure 4.* It should also cut clean. In the event that one of the two threads is not cut cleanly the edges are probably not in alignment. To properly align the knives loosen the two allen screws that hold the throat plate post and lower knife assembly. This will allow the lower knife to be shifted a few thousandths, right to left or front to back in relation to the fixed position of the upper knife. *See Figure 5.* You can usually check alignment by examining the cutting edges of the knives. They should show even wear.

When the two knives are aligned properly there should be a very slight shearing action between the two cutting edges. Lower knife should flex about .003 during one full stroke of upper knife. When you feel the setting is correct repeat the thread cutting test previously outlined. Tighten the throat plate post screws securely. Be sure that the feed dogs do not bind in the throat plate slots. Also be sure to carefully check the needle guard settings and needle slot alignment if the throat plate support post is repositioned.

Put the presser foot in place, put a drop of oil on the cutting edges and run the machine for a few seconds. This creates a honing action that improves the life of the cutting edges. Run on scrap material until all traces of oil are absorbed. The machine is now ready for the operator. To prolong life of both knives, all future chaining off should be done with lower knife depressed.

The lower knife is spring loaded to assure maximum cutting life and minimum wear. On some very hard fabrics or heavy seams it is sometimes desirable to lock the lower knife in place. A lock screw is provided for this purpose.

Dull cutting edges will produce a ragged seam and in some cases will retard feeding, especially when crossing seams. When one considers that the trimming mechanism on a *39500* machine completes over 1,000,000 cutting cycles in an average working day, the importance of proper knife settings and sharpening is apparent. Properly sharpened knives help produce quality seams.

Figure 4

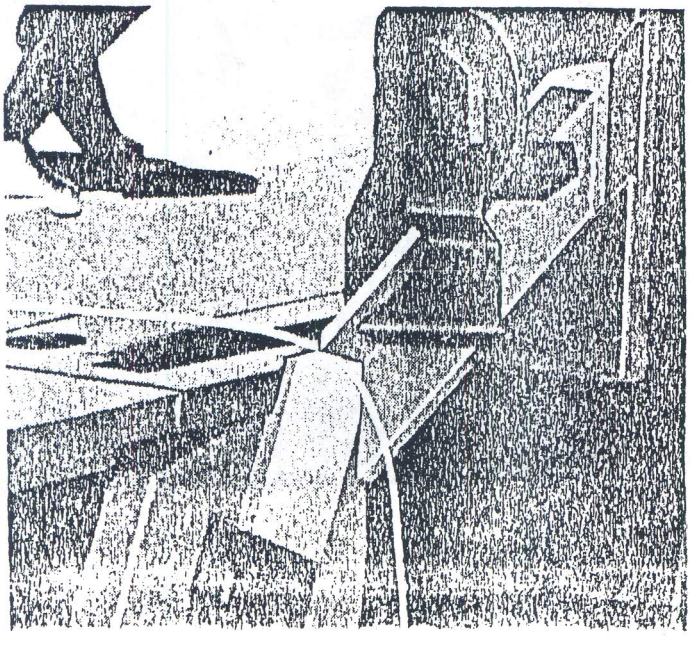
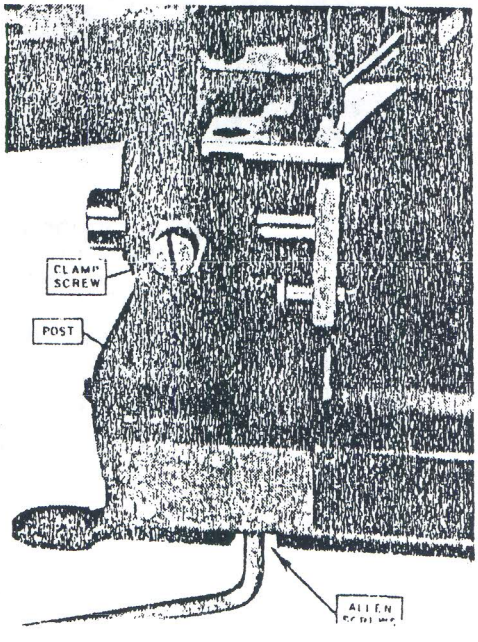


Figure 5



Durable Press Fabrics Require Sewing Care

DURABLE PRESS FABRICS are rapidly relieving the housewife of the tedious task of ironing. These new finishes are not only receiving consumer acceptance but consumer demand for the crisp smartness durable press garments add to the wardrobe.

As long as the consumer receives good looking, quality-produced garments for his clothing dollar, the demand for these fabrics and finishes will continue. "Quality" is the key word in the sewing room—for errors that occur in stitching, in general, cannot be pressed out and will be baked in for the life of the garment. "Quality" is most assuredly part of the mechanical staff's concern where subtle changes or adjustments on a modern sewing machine or replacement of obsolete machines can contribute greatly to smooth, flat seams.

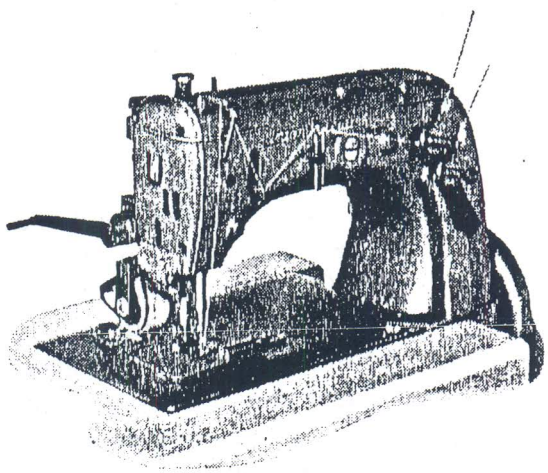
Seam pucker can be traced to many things. A sewing machine cannot eliminate pucker that is an inherent part of fabric construction and finish that will not allow fibres to return to almost their original position after having been deflected by the sewing needle. However, puckered seams can be greatly minimized by using the proper machine, needle size, sewing combination, stitch length, thread and correct adjustments.

While there are exceptions, most sewing machines that were designed prior to 1950 were made to sew on cotton and wool fabrics where puckering or feed marking was seldom, if ever, a problem. Sewing mechanisms, feed mechanisms, and thread handling were designed for these fabrics and did the job well. However, in comparison with modern machine design, brute force was used to feed, cross seams and pull up a stitch.

Union Special's development and engineering staffs were quick to realize that the new synthetic fabrics and minimum care finishes were a different breed of cat that required improved feeding and thread handling if quality seams were to be the end result. Subsequently, Union Special's present line of light running, positive feeding, soft tension machines were designed and manufactured to sew today's miracle fabrics.

Using obsolete sewing machines on today's fabrics is about as efficient as a business man taking a

STYLE 54200 N—Roller-feed, single-needle bobbinless seaming machine.



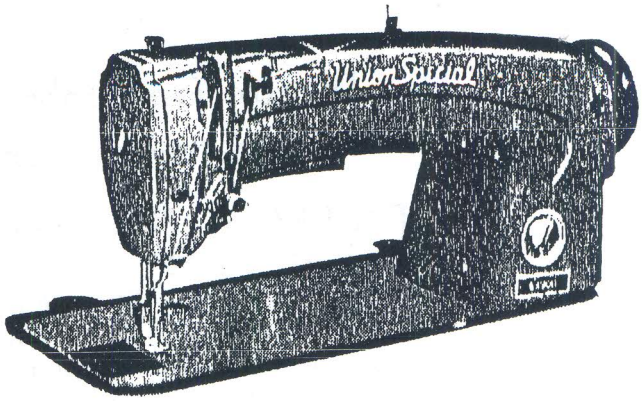
DC-3 coast to coast just because it costs a few pennies more to ride the modern, efficient jet.

To reduce sewing machine-connected pucker to a minimum requires a step by step approach:

1) Wherever necessary use or recommend machines with auxiliary feed mechanisms to obtain smooth, flat seams. By auxiliary feed machines we are referring to modern, high production, needle-feed machines such as the Union Special *Class 63900;* grip feed machines such as *Style 61400 AB* or *Styles 51300 BU* or *BX;* top roller feed machines such as *Style 61400 S* or the new Union Special top-driven puller feed machine *Style 54200 N,* designed especially to make a relaxed stitch and to lay a flat seam. If an auxiliary feed can not be used by all means use the plain-feed machine that requires the lightest possible needle thread tension.

2) Use a thread that is engineered for the fabric, finish and garment being made. Special threads with a low rate of recovery and that do not deteriorate under high baking temperatures are available from the major thread companies. Durable press garments are no place to use the job lot of the thread that has been lying around for two years. Contact the thread companies, they are glad to recommend the proper thread for your garments.

3) On modern machines presently in use be sure the stitch length setting is correct. In general, the longer the stitch usable the flatter the seam. As an example, 12 stitches will usually produce a flatter seam than 16 S.P.I. On runstitching



CLASS 63900—Needle-feed, single-needle lockstitch machine.

operations such as collars and cuffs, 10 stitches per inch can lay flatter than 14. Don't forget any pucker made in runstitching cannot be removed in the top stitching operation. Stitch lengths must be uniform on all machines doing like operations on durable press fabrics if the same quality level is to be maintained.

4) Remove all tension from the presser bar spring and then be sure the presser bar moves freely and smoothly up and down in the presser bar bushings. If the bar seems to stick in the bushings or to have side play due to excess wear correct the problem at once. Usually a drop of oil at each bushing will correct stickiness. Replacement of bushings will correct side play.

With the presser bar free in the bushings apply just enough pressure on the tension spring to feed the material and cross seams but no more. Excessive pressure will not contribute to seam flatness. It can cause feed marking and chain cutting in addition to making a machine run heavy.

5) Use the smallest size needle that is practical without excessive needle breakage. Where needle heat

is a problem a ball eye chrome plate needle is most helpful. Non-staining thread lubricants can also be used to good advantage. On 401 stitch machines lubricate the looper thread as well as the needle thread since it contacts the needle below the surface of the fabric providing an additional friction reducing coating on the upstroke of the needle.

6) Examine the sewing parts on each machine and replace those that are not in first class condition. On most machines Union Special recommends 16 teeth per inch or more on the feed dogs. Feed dogs with 22 teeth per inch which offer an excellent condition on medium and lightweight fabrics are also available. More teeth offer more fabric contact surface and more uniform feeding providing the teeth are sharp. Dull feed dogs should be replaced promptly.

Throat plates with enlarged needle holes as a result of stringing out or polishing contribute to seam pucker. Use a new throat plate with the smallest needle hole available in relation to the needle size being used. Also check the flatness of the top surface of the throat plate. Frequently when a needle has struck the top of the throat plate the center section of the throat plate will be cracked or bent downward slightly.

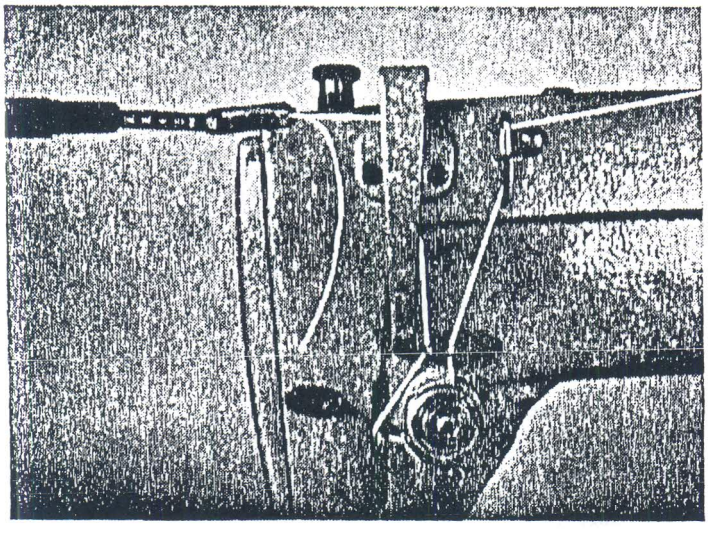
Often the condition is not noticed unless the throat plate is removed and the top surface checked with a straight edge such as a steel ruler. A bent or cracked throat plate may allow the material to flag instead of being held firmly. This condition can contribute to seam pucker. Chaining difficulties are also a by-product of a damaged throat plate.

Examine the needle hole in the presser foot and also the presser foot bottom. If the needle hole is unduly enlarged, flagging and the resulting pucker can again occur. If the presser foot bottom has grooves worn in it from the action of the feed dog replace with a new foot.

7) Feed dogs should be adjusted so they are level or tilted up very slightly in the rear to obtain a flat seam. Tilting the feed dog up in front can cause seam pucker.

8) On 301 stitch machines set the bobbin thread tension to barely support the weight of the bobbin case. On *Class 63400* machines, needle thread tension is usually set between three and four ounces at a 5500 stitch per minute, far below the tension required on most plain sewers. Obviously, this light tension means smoother seams. Use a thread

Thread tension scale shown here is Union Special Part #21227 CW.



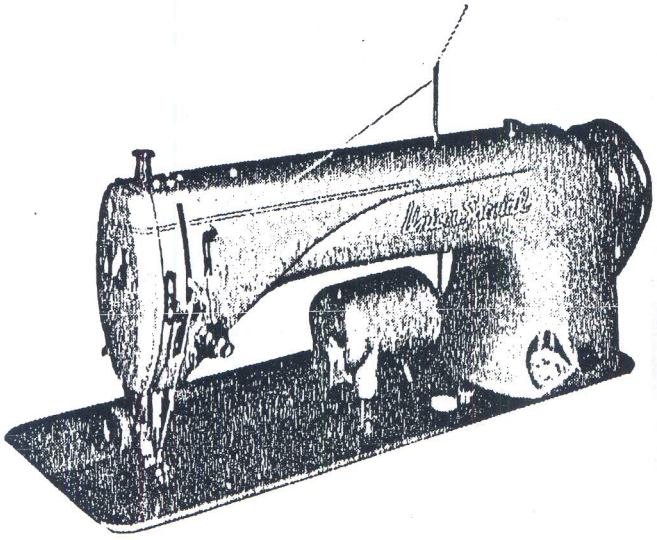
tension scale and determine the least needle thread tension that a particular type machine requires to sew and set a good stitch and then set the tension for similar machines at approximately the same tension. Once the optimum tension is determined, caution the operator not to tighten the tension out of force of habit.

9) On 401 stitch machines use a light looper thread tension and be sure the looper thread is not pinched at any point between the looper thread take-up and the cast-off wire. Ideally, the looper thread size should be about one half that of the needle thread.

Since most 401 stitch operations require chaining off, set the needle thread tension just tight enough to pull up the needle loop for adequate chaining. If you will unlock the stitch on the material the needle thread loops should actually hang slightly below the underside of the fabric. If the loops are extremely small, usually more thread can be put in the stitch by gradually lowering the needle thread frame eyelet. Contrary to past experience, the main construction seams on durable press fabrics should have a very slight grin before pressing and backing. This is due to the additional needle thread in the stitch which provides the flat, soft seam desired.

10) Frequently, on any style machine it may be desirable to use thread tension springs with less tension to decrease the adjustment sensitivity. The last digit in the part symbols indicate the spring wire size. The smaller the number the softer the tension.

STYLE 61400 S—Roller-feed, single-needle lockstitch machine.



MACHINE CLASS	THREAD TENSION SPRINGS
63400, 63900	61392 F-9
	61392 F-14
50000, All Styles	51292 F-1
	51292 F-2
	51292 F-4
	51292 F-5
	51292 F-8
	51292 F-14

A normal combination on a *Style 51300* BU would be a 51292 F-8 on the needle thread and a 51292 F-2 on the looper. Under certain circumstances a 51292 F-5 and 51292 F-1 might provide a better combination.

These are a few of the suggestions that should contribute to quality seams in all garments. The customer is the last inspector, good quality brings repeat orders.

50000 Series
Oil Filter System

ALL OF UNION SPECIAL'S modern 50000 series machines are equipped with an oil filtering system and return pump to insure a clean oil supply.

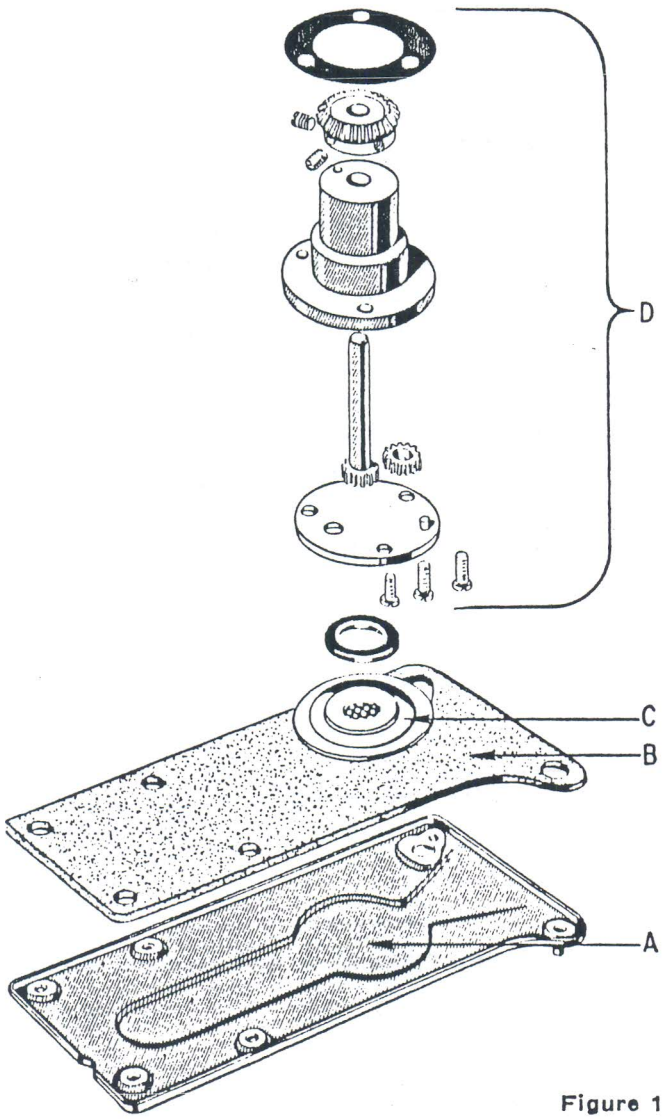


Figure 1

A very small amount of attention will keep this system functioning properly for years.

Basically, the system is comprised of an installation pan, base filter, filter cap, and the oil return pump assembly. *See Figure 1.*

The installation pan is made with a depressed channel that has its deepest area slightly to the right of center *(A)* and directly below the oil pump when the machine is in place. This portion of the depressed channel in the pan is circular allowing the filter cap to be held in a relatively fixed position below the pump.

The base filter is ⅛" thick green felt material *(B)* cut to the shape of the installation pan. Its porous construction allows excess oil to flow through the filter; but prevents lint, sizing, thread ends, or any other foreign matter from contaminating the oil.

The filter cap assembly *(C)* has an additional thickness of felt on its under-side that acts as a second filter thus guaranteeing that only clean oil is presented to the return pump. The top side of the filter cap assembly is fitted with a soft rubber sealing ring that compresses against the bottom of the oil pump assembly *(D)* when the machine is in position. This forms an air-tight seal around the oil inlet opening in the bottom of the pump. The action of the pump then creates a suction that draws excess oil through the

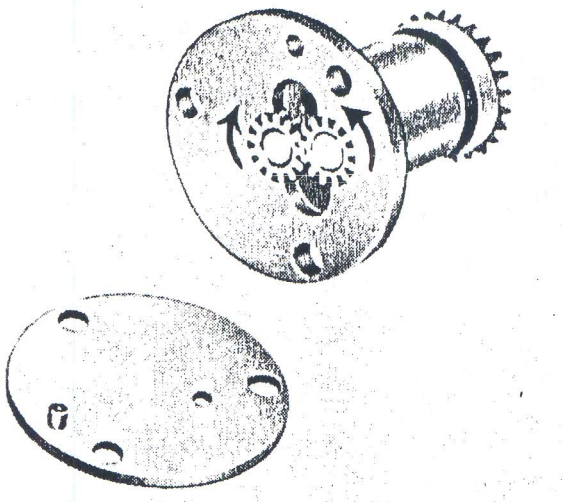
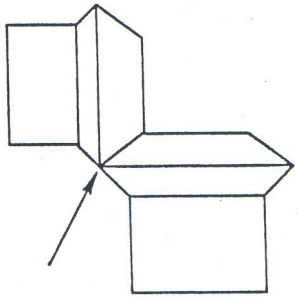


Figure 2

filter up into the pump where it is circulated back into the machine reservoir.

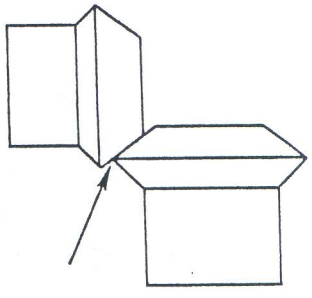
The bottom face plate for the pump has been removed to show the pumping action. *See Figure 2.* The rotation of the two pumping gears creates a suction that draws oil through the hole in the base plate as indicated. The rotation of these gears carries the oil around their outer circumference and forces the oil into the chamber indicated. The oil being forced into the chamber escapes up the outlet pipe and flows back into the machine reservoir. This is a very simple and efficient type of pumping action. No sealing agent is required between the bottom of the pump housing and the pump faceplate since this plate fits extremely close to the two pumping gears and any sealer would create additional thickness that could reduce pumping efficiency.

The driving gears on the upper portion of the pump should be set carefully to avoid noise and gear failure. When the three holding screws securing the pump to the bottom of the machine casting have been properly tightened, the upper driven gear on the pump is in a fixed lateral position. It can only be adjusted up or down. The driving gear that is located on the crank shaft should be moved laterally into a position where it meshes with the driven gear as shown in *Figure 3* and a slight amount of back lash should be felt in the gears at all positions of the handwheel. In the event the gears are not aligned properly, *Figure 4,* it may be necessary to adjust both to achieve the proper condition indicated in *Figure 3.* Care should be taken that there is no end play in the crank shaft before the gear setting is made. If end play is observed, it can be removed by adjusting the thrust collar in the crank shaft chamber.



ALIGNED PROPERLY

Figure 3



NOT ALIGNED PROPERLY

Figure 4

After a period of several months use, various foreign matter may accumulate around the edge of the pan which might decrease the efficiency of the filter and pumping

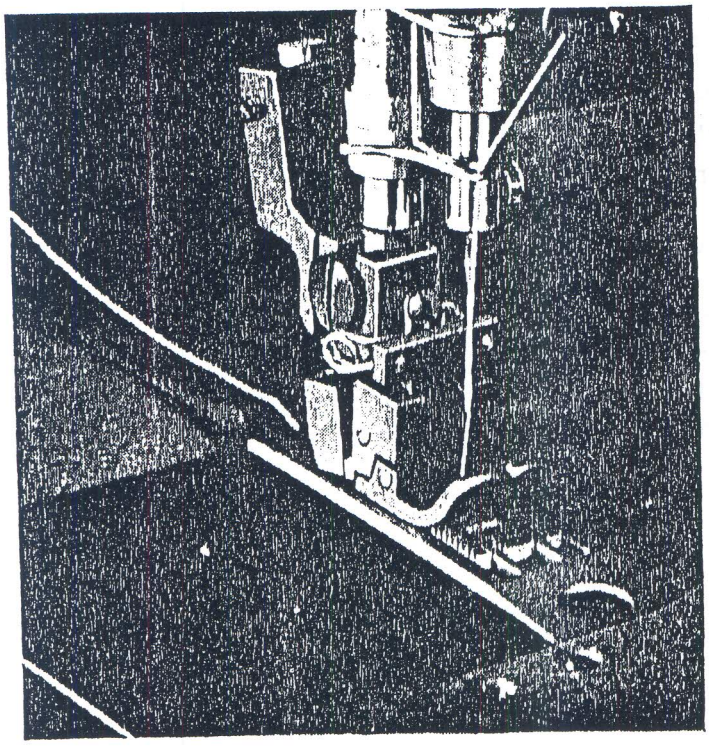
action. This is most easily noticed if the edge of the felt inside the pan stays wet and does not appear to soak up or remove excess oil. In this event, remove the machine from the pan. Wash the filter cap assembly and base filter in cleaning fluid or some other agent that will remove any foreign material that may be clogging the felt. If they are badly clogged, it is a good idea to replace both the base felt and the filter cap since they are quite inexpensive. In the event the soft rubber ring on the filter cap assembly has lost its resiliency, leaks may occur when the old ring is reassembled effecting the efficiency of the filtering and pumping action. In this case, we would recommend that the complete filter cap assembly be replaced.

With a very small amount of attention, this filtering and pump system will work efficiently for extremely long periods of time assuring good machine operating life and a minimum of maintenance cost.

Automatic Chain Cutters

IN THE DECEMBER, 1962 issue of THE NEEDLE'S EYE, the *"Inside Union Specials"* article discussed chaining on lockstitch machines. In that article, brief reference was made to Union Special's automatic chain cutters. Since that time, many inquiries have been received about these devices indicating a strong interest in their use on Union Special *61400, 61900, 63400* and *63900* machines. *See Figure 1.*

Figure 1



Where should you use automatic chain cutters? Basically on any operations where two plies of material are to be joined and the threads cut at the edge of the finished seam as the operator sews off the material. Some examples are attaching facings to front and back pockets on work pants, slacks and dress trousers; making darts on trousers, ladies' blouses, uniforms and similar garments; hem shirt pockets; close back pockets; and sew, turn and top stitch front pockets before inserting pocket into trousers.

Why use chain cutters? On any operation where the separating of sewn garment parts by the operator is required, chain cutters should be considered. Operator production can be increased since scissors need not be picked up or held. Quality is improved because of the uniform handling condition and short length of chain.

Will chain cutters cause a lot of down time? Many thousands of dollars were spent to develop these devices as production and cost aids. They do the job well providing they are used well. Most difficulties stem from improper application, improper sewing machine adjustments, and poor feeding of the chain.

Complete adjusting instructions are available with the chain cutting combinations listed below. Copies of the instructions are available on

request. These chain cutting combinations are designed to utilize the famous Union Special lockstitch feed curve that provides positive feeding of material and chain while the teeth are above the throat plate. *See Figure 2.* The throat plate itself

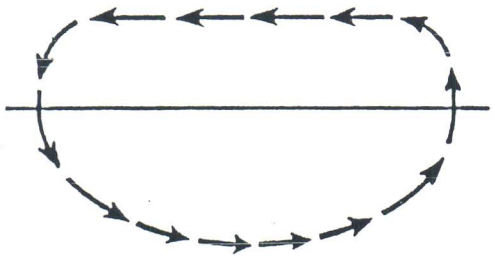


Figure 2

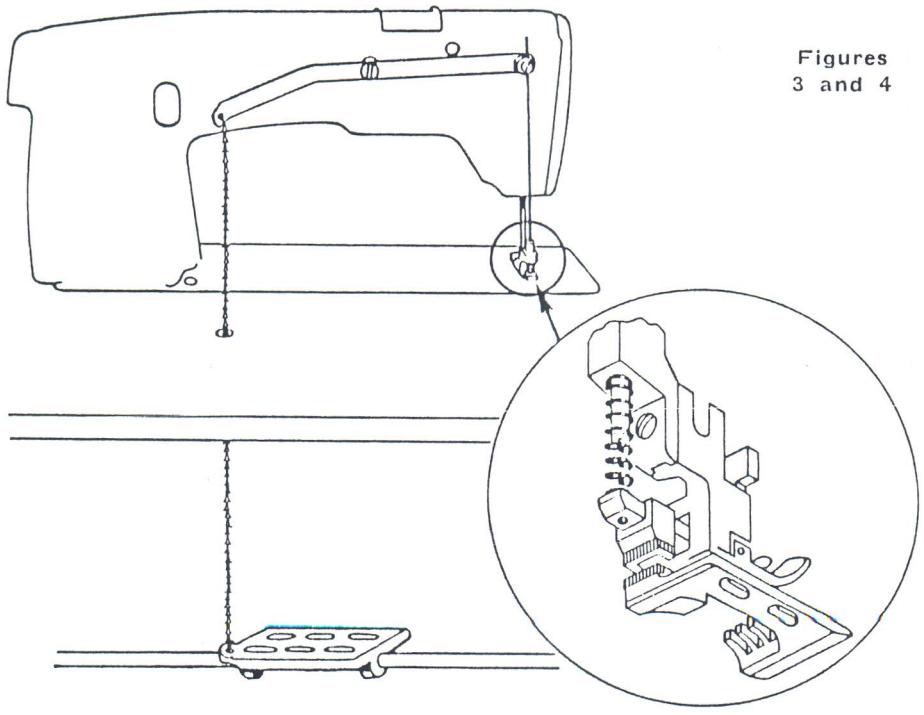
is very carefully gauged top and bottom to insure perfect contact between the presser foot bottom and throat plate when the plate and foot are securely tightened to the machine. The feed dog is also part of this finely machined set of chaining parts that make *63400* and *63900* lockstitch machines the most productive lockstitch machines on the market.

Automatic chain cutting sewing combinations consisting of a matched presser foot, feed dog and throat plate are available as follows:

Machine Style	Chain Cutter	Presser Foot Width
61400 A, B	29480 CE	37/64"
	29480 CF	7/16"
61900 A, B	29480 CN	37/64"
	29480 CM	7/16"
63400 A, B	29480 CR	37/64"
	29480 CS	7/16"
63900 A, B	29480 CN	37/64"
	29480 CM	7/16"

In conjunction with the *63400* and *63900* chain cutters, Union Special also manufactures a chain cutting release assembly, 29480 DY, that releases pressure on the presser foot chain cutting upper knife while sewing on the fabric. *See Figures 3 and 4.* Heeling the treadle to stop the machine when coming off the garment re-engages the chain cutting knife and cuts the chain. This device allows almost pucker-free stitching on light fabrics which is almost impossible on any other company's chain cutters.

Automatic chain cutting has a place in your sewing room. Applying these devices and maintaining them is one of the mechanic's opportunities to assist in reducing costs and increasing production.



Figures 3 and 4

INSIDE Union Specials

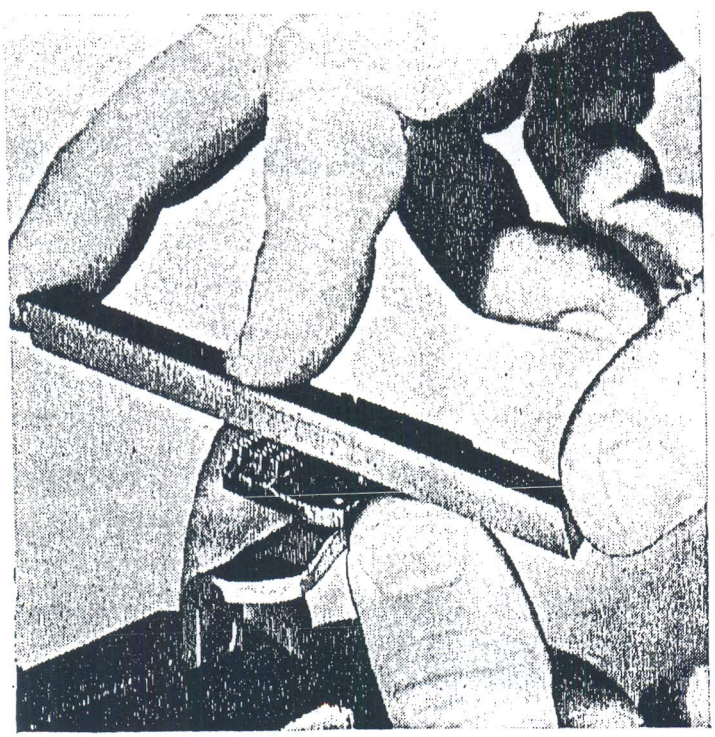
By John R. Haderly, Chicago

Tools, Gauges and Supplies For the Mechanic

ABOUT FOUR YEARS AGO, we listed in THE NEEDLE'S EYE, the minimum requirements for the mechanic's shop in a medium size plant. Medium size, in our opinion, would be 35 to 75 machines with anything over that quantity of machines falling into the next category of size, whatever it might be called.

Several customers have pointed out the need for a metal turning lathe, brazing and welding equipment, drill press, circular saw, and even surface grinding equipment. All of these machine tools can be useful in a plant that requires major repairs and maintenance by the mechanical staff. These tools are also exceptionally useful in a well-engineered plant where alterations of table boards, stands and other accessories are made to obtain the most efficient handling methods. The need for this type equipment should be discussed between the mechanic, engineer and superintendent in each plant.

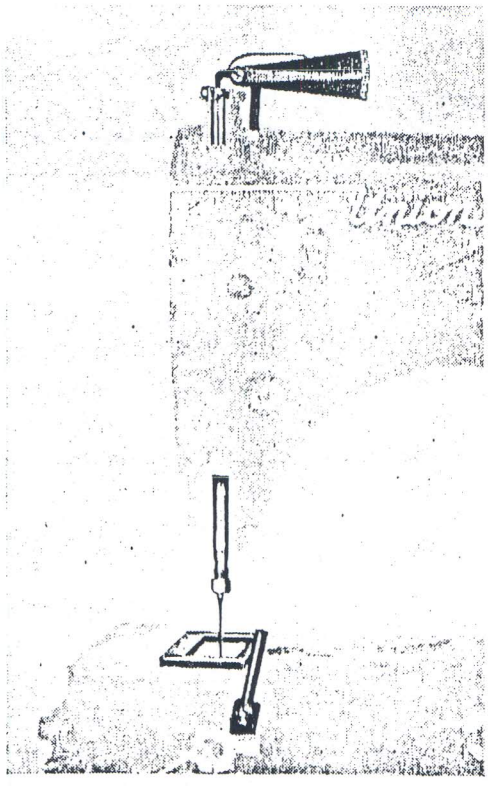
Using triangular India stone for making fine radius on tops of feed dog teeth.



There are many cases where plant mechanics are frustrated in their work due to inability to secure small, but necessary, items from local sources.

As sewing machine speeds increase and higher production goals are constantly sought, it is important for the mechanic to have all the necessary tools and gauges to adjust and repair machines properly and quickly. Many Union Special machines can be adjusted more quickly by making use of special gauges designed for specific functions on certain machine classes.

Most mechanics are familiar with looper gauges for setting the proper timing distance between the needle and the looper. For Union Special machines there is a complete range of looper gauges under the part symbol 21225, from a 1/16″ setting to 13/32″. In addition, for



Synchronizing gauges

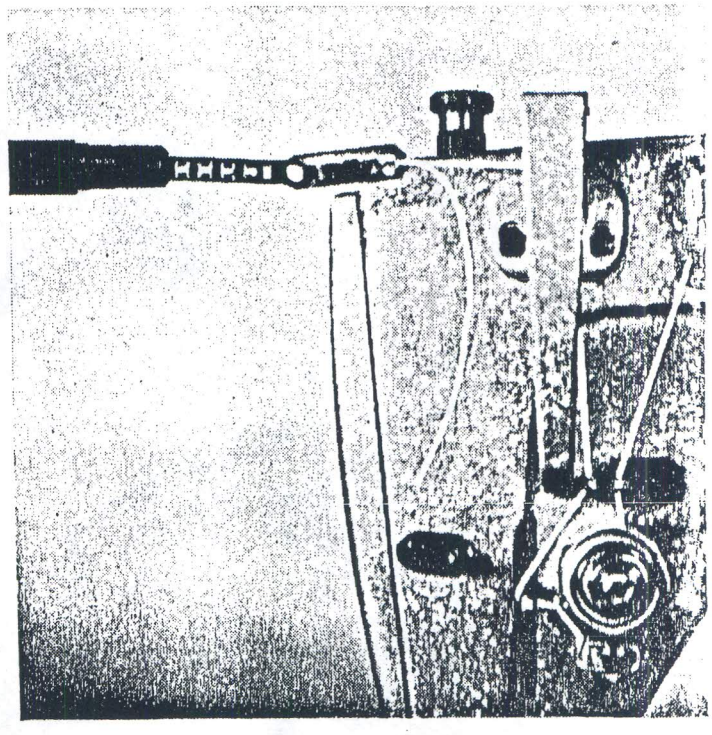
Classes 52800 and *52900,* there are spreader gauges for properly setting the spreader travel. Synchronizing gauges are made for *Class 36200* Flatseamers and also for *50000* series machines to check for the correct travel relationship between looper and needle.

Special wrenches are made for a variety of adjustments and settings. As as example, wrench 21388 AZ is made for removing the hand-wheel bushing housing on *Class 63400* and *63900* machines when removing the upper mainshaft. A similar device is made for *50000* series machines. Another example of a special tool is the extension torque wrench, #21388 AR, used for removing or replacing the two needle lever and crank shaft connecting rods on high speed *50000* series machines. High machine speeds require exacting standards on screws, nuts and other fasteners. For this reason Union Special has set its own standards for screw thread counts and also screw diameters. A drill and tap chart for Union Special screws can be very helpful.

Screwdrivers of the length required for sewing machines, sockets and end wrenches that fit confined spaces, tweezers, allen wrenches, tachometers, emery cord, and many other items are available under Union Special part symbols.

While some of these items are available in hardware stores in larger cities, in many rural communities they are very difficult to obtain. Charts covering these items are too lengthy to include in this article but are available on request. Some of the items are made by Union Special and some are local supply items.

Measuring needle thread tension.



INSIDE Union Specials

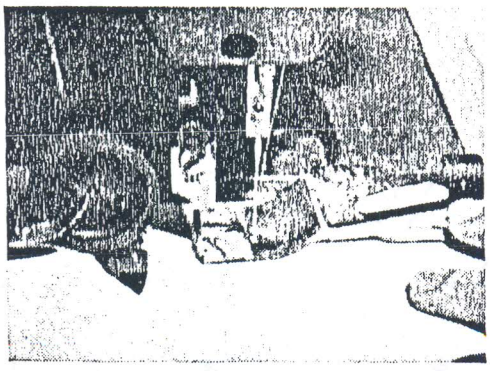
By John R. Haderly, Chicago

Interchangeable Presser Feet and Special Parts

IT IS OFTEN SAID *"Variety is the spice of life."* In many garment plants a variety of presser feet is a way of life. For example, in dress factories, a variety of presser feet is required for operations such as shirring, edge stitching, hemming various width hems, and top stitching.

Over a period of years, a garment manufacturer can accumulate quite an investment in many types of presser feet fitted with edge guides, hemmers, etc. Also, it frequently becomes necessary to have expensive presser feet made specially by an outside attachment maker to handle a precise sewing problem. Recognizing this, and to make it more convenient for customers, mechanics, and operators, Union Special, for many years, has made presser bars for lockstitch machines and certain looper machines that permit the use of presser feet made for other make machines.

Style 61400 P Square Shank Presser Foot.



On Union Special's drop feed *61400 Styles,* or needle-feed *61900 Styles,* presser bar #61457 is furnished for Union Special presser feet with the "Vee" shank. For square shank presser feet, presser bar #61457 A is used. By installing this presser bar in a *61400* or *61900* machine, a customer is able to use any of the square shank presser feet that he may have in his stock. On the top-roller-feed lockstitch machines such as *Style 61400 P,* presser bar #61457 F is supplied for Union Special "Vee" shank presser feet, and presser bar #61457 N is available for top-roller-feed styles to permit using all square shank presser feet. This particular presser bar originally was a special part listed under Part #L-208-A.

On the new Union Special *63400* plain-feed and the *63900* needle-feed styles, a further advance has been made by making a single presser bar that will take Union Special "Vee" shank presser feet as well as other make square shank feet. To change from the "Vee" shank to the square shank presser feet, it is only necessary to rotate presser bar 180° and install the desired presser foot.

For certain operations, where it may be found advantagous to change

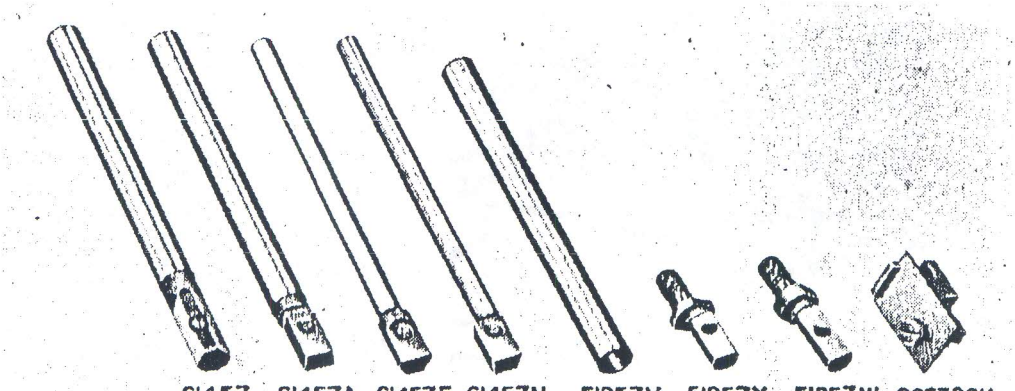
from a lockstitch machine to a looper machine, again adaptors are available that permit the use of the lockstitch machine presser foot. To make this change on a *50000 Series* 401 looper stitch machine, the standard presser bar should be replaced with presser bar #51257 V. Then, depending on the type of presser foot to be used the proper adaptor is added to the presser bar #51257 V. Adaptor #51527 X is made for Union Special "Vee" presser feet; Adaptor #51257 W is made for square shank presser feet.

The Durkopp *Class 265* zig-zag machines that have had world-wide acceptance due to their versatility and many unique features, also permit the use of a wide variety of presser feet through adaptor #265326-K. This adaptor will handle most competitive zig-zag presser feet that are fitted with special guide hemmers and so forth.

Earlier in this article reference was made to presser bar #61457 N as having been known formerly as Part #L-280-A. For many years, Union Special has made a wide variety of standard sewing parts and attachments for all of its machines to accommodate the widest possible range of different operations. However, it is frequently necessary to furnish special or non-standard parts in order to meet the customer's specific sewing requirements. When special parts are produced for Union Special looper-type machines they bear the prefix "K" in the part number. When such custom made parts are produced for Union Special lockstitch machines they bear the prefix "L" in the part number.

The initial manufacture of "K" or "L" parts follows when a customer places a firm order for the particular part or attachment required to fill a need that cannot be met by a standard part. This means the order must receive special handling by the departments involved, similar to a garment manufacturer making sample garments for his new line. A special department of skilled tool makers is devoted to the custom manufacture of such special parts. Because of the wide variety of parts that are made and the many machine tools involved in manufacturing special parts, only highly skilled tool makers have the necessary experience and training to custom make these special items. Since small quartities are involved, ranging anywhere from a one to a five-piece lot, the machine set-up time increases costs greatly over

Various Union Special needle bars and adapters.



standard parts that are made in larger quantities. This means necessarily a higher price than for standard parts. Also, since these are custom made parts, a time delay is inevitable in delivery.

Frequently, when a new style garment or a new operation is being introduced, a part made originally under the "K" or "L" method finds an ever-increasing market. In such circumstances, after several small lots of a particular "K" or "L" part have been made and a continuing demand is indicated, the part is standardized which means that it is produced in larger lot sizes and is then priced accordingly. The L-280 A presser bar is a case in point.

At the introduction of *Style 61400 P* top-roller-feed lockstitch machines, this special presser bar was made for a single cusomer who had a desire to use his specially made presser feet for attaching sleeve plackets to men's shirts. The machine became very popular for this operation, and since the same situation existed with other garment plants with respect to stocks of presser feet, the simplest solution was to make the square shank presser bar standard under the symbol #61457 N. Introduction of the top-roller-feed machines resulted in a substantial savings to customers as a result of increased production and quality of work and by making it possible for manufacturers to use the inventory of special presser feet they had accumulated. This meant it was unnecessary to invest in new presser feet.

When a special part is required that would be ordered under the "K" or "L" designation, an actual sample of the operation desired should be submitted together with any details or information that will be of assistance in producing it. A quotation of price and delivery is then given for confirmation before proceeding with the order. Since practically all "K" and "L" parts are custom made, of necessity, they can be made only on firm orders. However, "K" and "L" parts, even though they impose a higher cost and, correspondingly, a higher price, are important in solving specific sewing problems. The interchangeability of competitive presser feet and a method for providing specially made parts that are needed are just two of the many services that place Union Special foremost in the field of industrial sewing.

INSIDE Union Specials

By John R. Haderly, Chicago

Shirring or Intermittent Gathering Feed Machines

IN THE EARLY YEARS of the industrial sewing industry, if a garment style required a puff sleeve in a child's dress or shirred back in a ladies' blouse, it was customary to use a single needle plain sewer with a shirring foot and run a single row of lockstitching along the very edge of the piece of fabric that was to be shirred. The amount of shirring was adjusted by either tightening or loosening the needle thread tension and by the operator holding her finger on the material behind a shirring foot which had a stepped bottom directly behind the needle hole. This was slow, inaccurate, and expensive for the manufacturer.

To fill specific needs in the garment industry, Union Special has a wide variety of intermittent differential feed styles. *(See Figure 1)* This variety of machine styles and stitch types allow the normal production house to produce most any type of shirred or intermittently gathered seam construction that is necessary on high production Union Special equipment.

While the basic stitch types vary and the number of needles vary, the principles of intermittent differential feed mechanisms are all similar and share similar adjusting principles. The amount of differential or shirring action can vary from zero to 5 to 1 depending on the machine style and fabric involved.

Starting with the feed mechanism itself, there are two separate feed dogs that are driven independently from a common feed drive mechanism. The rear feed dog is commonly referred to as the main feed dog, and it moves at a constant rate of travel according to the stitch length setting. The front feed dog is commonly referred to as the differential feed dog, and the mechanism for driving it can be set so that:

(a) the differential feed travels at exactly the same stitch length as the main feed;

Figure 1

SHIRRING OR GATHERING STYLES	DESCRIPTION
39500 S-T-U	Overseamers
39500 AD-AL	Simulated safety stitch
51200 BV	401 stitch—1 needle, top roller feed, shirs and binds
51300 Z (AZ80161) Leather	401 stitch—1 needle
51400 BC	401 stitch—2 needle, lap seaming
51400 BK	401 stitch—2 needle, shirs, binds,
51600 BA	401 stitch—2 needle, lap seaming
52800 BR	602 stitch—2 needle, knitwear
52900 BL	Safety Stitch
53100 E	404—zig-zag

(b) the differential feed travels a longer distance for each stitch length than the main feed, thereby giving a continuous shirred or gathered effect; and

(c) the differential feed can be activated to intermittently gather more material at various points in the garment seam.

To achieve a proper feeding condition, both feeds should be sharp so that they will grip the material firmly but without cutting the fabric. The stitch length desired on the finished seam should be set by the travel of the rear feed dog. This feed dog should project a full tooth above the throat plate at the top of its feeding stroke and should be level right to left and front to back. The differential feed should be set equally high or slightly higher than the main feed dog. Raising it slightly higher than the main feed will usually give an increased gathering effect and be helpful where crossing seams is necessary, provided there is no back-feeding action.

The amount of shirring on the bottom ply of material varies with the machine, operation, or style of the garment. However, it is not unusual to have shirring ratios of 5:1. In other words, 60″ of the lower ply of fabric would be shirred into a 12″ upper ply. At this rate of shirring, the bottom ply of material is moving very rapidly and it is essential that the intermittent differential feed dog feeds the material straight to the needle and does not tend to push it out to the right or left side. To accomplish this, it is necessary to square the differential feed dog right to left; that is, not tipped down on one side or the other. Also, it must feed straight, back to front, in the throat plate feed slots without any side shake.

On Union Special *50000 Series* machines, the intermittent differential feed dog carrier can be adjusted in and out and tilted to the right or left by loosening the screws in the driving segment and positioning the feeds properly. *(See Figure 2)* Side shake can be eliminated by securely tightening the thrust collars on the feed rocker shaft. *(See Figure 3)* On *39500*

Figure 2

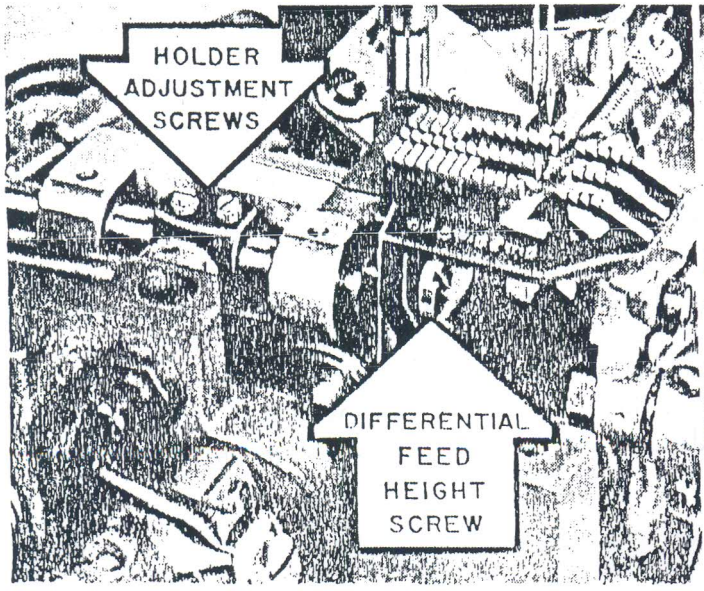
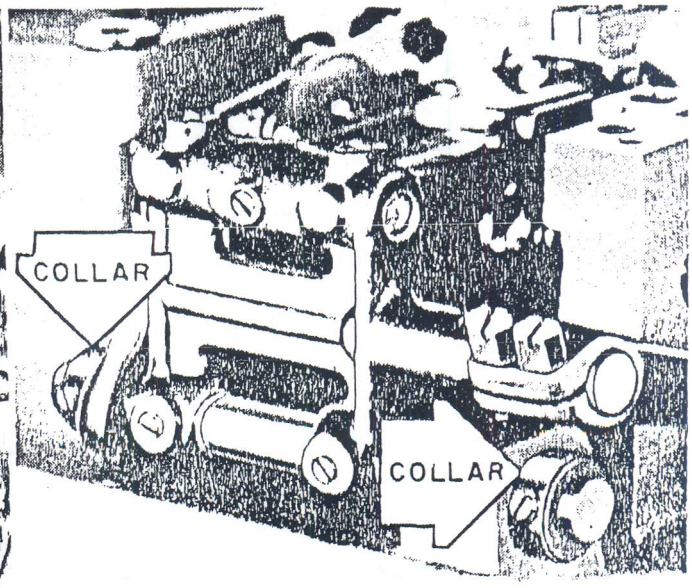


Figure 3



INSIDE Union Specials

By John R. Haderly, Chicago

Shirring or Intermittent Gathering Feed Machines

THE JUNE, 1966 ISSUE of THE NEEDLE'S EYE partially covered shirring or intermittent gathering machines. This is a continuation of that subject.

The stripper blade must be treated with the same respect and care in relation to its setting as the intermittent differential feed dog. It is important that the stripper blade be mounted as close to the presser foot as possible, without pinching the top ply of fabric between the blade and the foot. *See Figure 1.* Be sure that the intermittent differential feed dog carries the material beyond the front edge of the stripper blade, and as close to the needles as possible without gathering the upper plies. It is also important that the leading or front edge of the stripper blade is at right angles to the line of feed to avoid skewing or pushing the work either to the right or the left, as it is being fed.

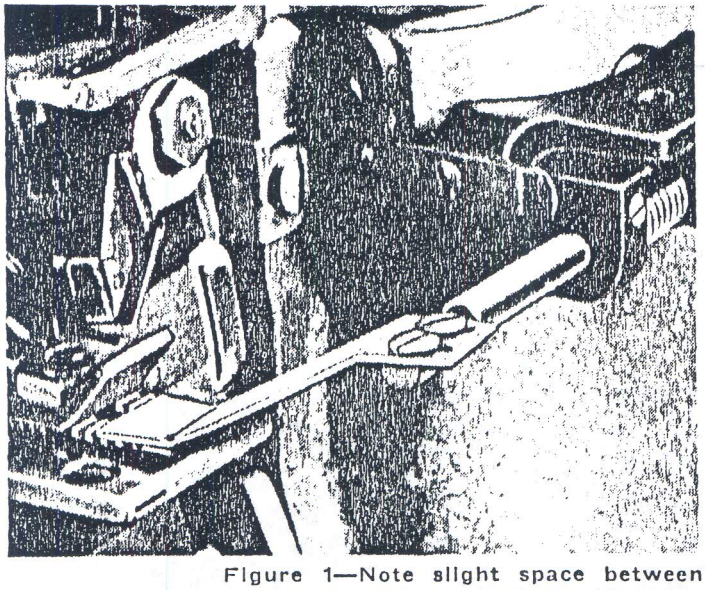


Figure 1—Note slight space between presser foot and stripper blade.

Another condition that will cause the fabric to guide unevenly will result from the stripper blade not descending on the throat plate or feed dog with even pressure across its entire width. *See Figure 2.* If the arm or shaft on which the stripper blade is mounted is bent slightly, either one corner or the other of the stripper blade will contact the material first. This will then cause the material to pull either to the right or to the left, depending on which corner is low. Be sure that the stripper blade drops uniformly on the throat plate. *See Figure 3.* Care should be taken that the stripper blade is not nicked or badly worn so that it will not snag or hold back on the fabric. The separate stripper blade mechanism will allow more or less tension to be applied, which will achieve more or less gathering depending on the fabric.

On the presser foot mounted stripper blade, the same conditions of squareness across the line of feed and squareness in relation to resting on the throat plate are important. Here, it is sometimes necessary to shim the stripper blade to achieve the desired effect. On a presser foot

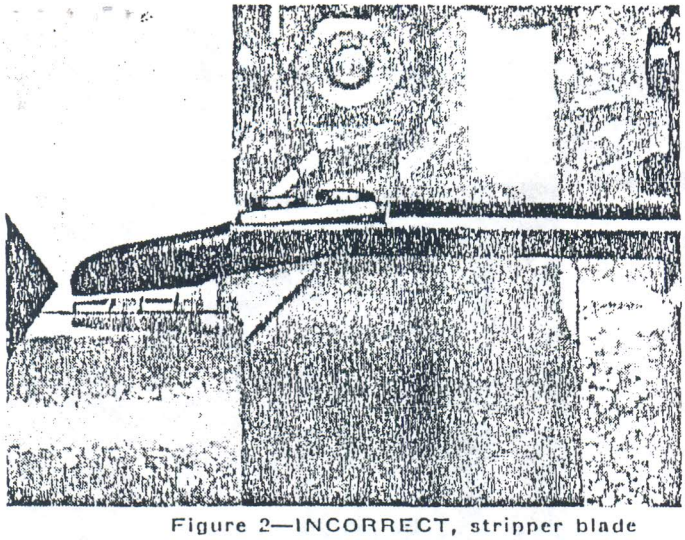


Figure 2—INCORRECT, stripper blade is not square with feed dog and throat plate.

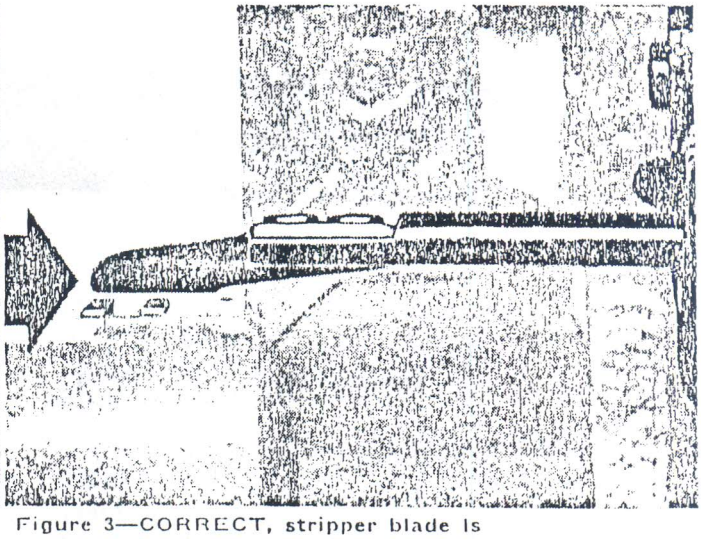


Figure 3—CORRECT, stripper blade is square or level with feed dog and throat plate.

mounted stripper blade it is very difficult to have an adjustable spring tension; however, it is common practice to use two stripper blades on a presser foot to give it more of a springing action. This will result in additional gathering, within limits.

Because of the constant flexing, presser foot mounted stripper blades are considered perishable parts and spares should be kept on hand, since they will eventually fatigue and crack.

When the machine is mechanically set for proper shirring, either intermittently or continuously, adjustments available on intermittent differential feed styles must be made that allow the operator to go from one fabric to another and maintain the proper degree of quality.

On Union Special *50000 Series* flat bed machines, intermittent shirring mechanisms have a range from zero to about 3 to 1, depending on the fabric and stitch length. On the left end of the machine there is an intermittent differential feed segment that is graduated to indicate the degree of shirring. *See Figure 4.* It is common practice for the operator to indicate on the sewing table, or inside the work tray that usually goes around a machine of this type, the various settings for certain fabrics. By using a small screwdriver to adjust the segments, she can easily return to a particular setting for a certain fabric.

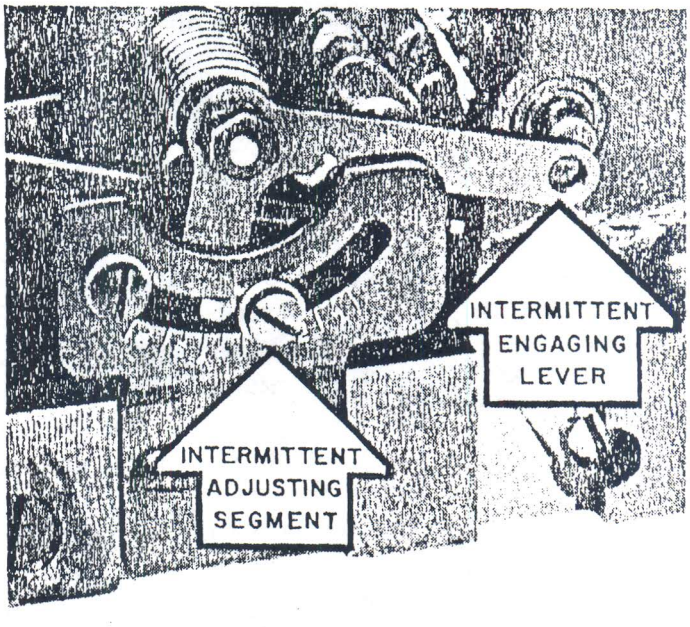


Figure 4

Class 39500 intermittent differential feed machines have thumb screw adjustments for varying the amount of differential feed action. Machines with this type of feed

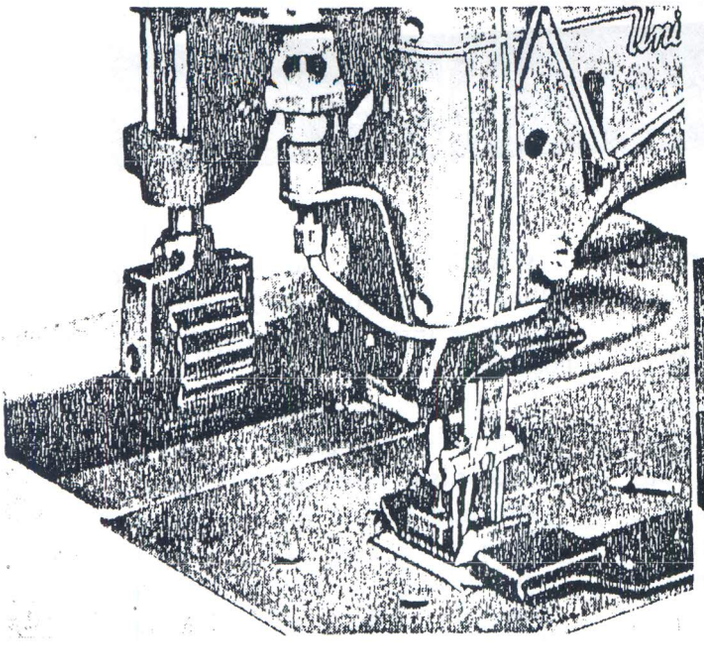


Figure 3

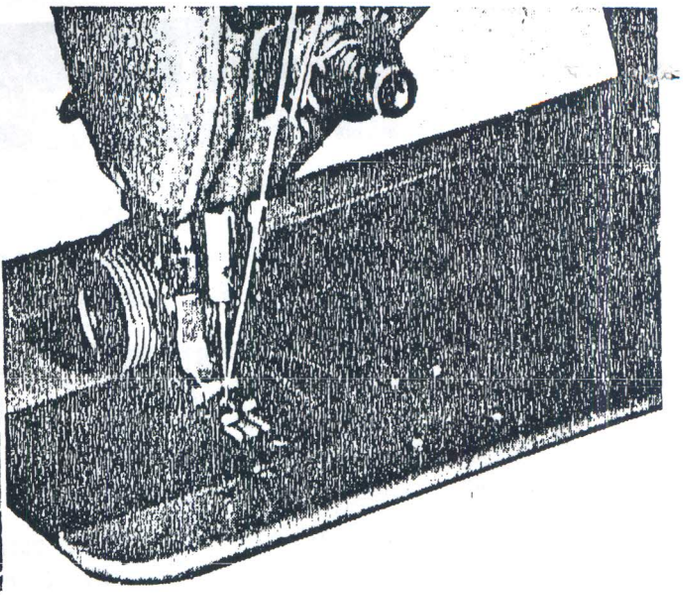


Figure 4

3) A roller only that is located either beside or behind the needles and is driven through means of shafting from a clutch housing that is located somewhere to the right of the needle. In this case, underarm space is limited. This mechanism often is made with the top roller being powered and feeding against a hardened shoe in or on the cloth plate surface of the machine. *(Figure 4).*

In addition, there are some pullers with driven upper and under rollers powered either by a gear train, clutch or flexible shafting. There are other puller mechanisms that are not a part of the synchronized sewing and feeding mechanism. These often run off the machine handwheel and drive continuously, however, these are considered auxiliary attachments.

In the first three types indicated, there are certain basic principles that are common. Each of these types of pullers uses a clutch mechanism that is divided into halves. The feed half of the clutch is made and timed in a manner that causes this portion of the clutch to rotate the puller or roller a given distance. The check or brake side of the clutch takes over when the puller feeding cycle is completed and prevents any back feeding or reversing of the puller roller while the oscillating lever that drives the puller is being repositioned for the next feed cycle. The constant feeding and braking action that results from the load being shifted from the brake side to the feed side of the clutch assembly results in an intermittent operation of the puller roller that is timed approximately to the feed dog action. *(Figure 5).*

The generally accepted method of setting the stitch length for a puller or top roller feed is to disengage the puller mechanism by raising the top roller. Set the drop feed mechanism of the machine to one stitch more per inch than the final desired result. In other words, if the finished seam should have 10

stitches per inch in it, it is recommended that the drop feed setting be made for approximately 11 stitches. Then, engaging the puller roller, adjust its feed travel until the finished seam is approximately 10 stitches per inch. In this manner, the puller is pulling at a slightly greater rate than the sewing machine feed dog, giving the operator the benefit of the "third hand" approach.

A minimum amount of oil is needed. However, the shaft bearing surfaces of the clutch barrel, requires some minor lubrication. in varying stitch lengths or failure of the puller to positively move the material from the presser foot, particularly when crossing seams.

A simple but very effective means of correcting trouble caused by excess gummy oil in the clutch mechanism is to run benzine or carbon tetrachloride into the clutch mechanism while it is rotating. A small oil can makes a good applicator. Be sure to run on scrap material, since a brown colored stain will usually be washed out of the clutch barrel when benzine is used for this cleaning purpose. Continue to

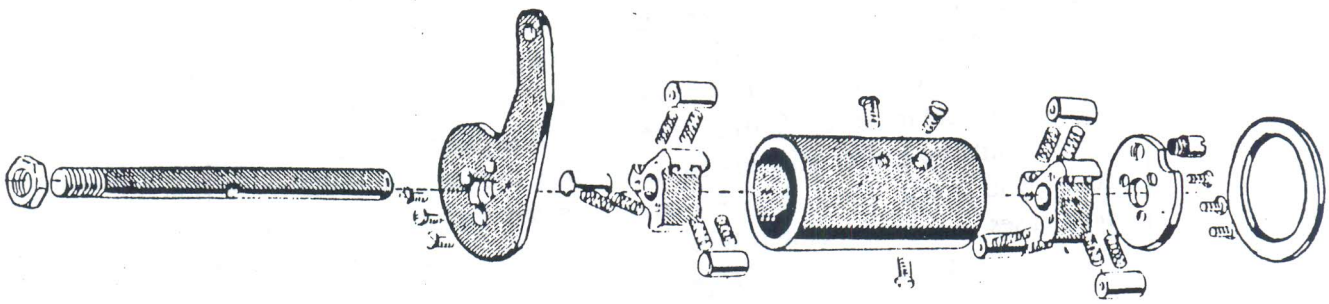


Figure 5—Clutch Assembly

Most new fabrics have a finish of sizing, starch or some other similar agent applied at the mill. In the course of sewing, minute particles of this finish comes off and works its way in and around the sewing parts. If these particles combine with any excess oil or lubricant and get into the clutch chambers for feeding and braking, the gummy substance that results could be detrimental to the intended action of the driving and braking clutch. This malfunction will usually show up run benzine into both sides of the clutch mechanism until the fluid runs out clear. Then add a single drop of oil to each side.

If the puller settings are correct, and the above action does not correct malfunctioning on the part of the puller, chances are that either the clutch tension spring is not functioning or the clutch discs, rollers or pressure springs inside the clutch assembly are worn or weak. The next article will be on roller timing, repairs and maintenance.

INSIDE Union Specials

By John R. Haderly, Chicago

Pullers—Their Function and Maintenance Part II

THE "INSIDE UNION SPECIALS" article in the October issue of THE NEEDLE'S EYE described the various types of pullers Union Special has available, stitch length settings, and methods for cleaning out the puller clutches when a variation in stitch length is a problem.

If the clutch has been cleaned with a solvent as previously described and the settings for obtaining a particular stitch length are correct, but the puller still malfunctions, you must look further. In most cases, either the clutch tension spring is not functioning properly or the clutch discs, rollers or presser springs inside the clutch assembly have become worn or weak. All reciprocating or intermittent rotary mechanisms have the phenomena of overthrow as speed increases. This is particularly true of feed dog drive mechanisms and intermittent puller clutch mechanisms. To reach the best possible feeding compromise between the feed dog and the puller the clutch tension spring is used as an adjustable brake. The clutch tension spring on the outside of the puller assembly can be either too loose or too tight in its setting. To make the correct adjustment, loosen the lock nuts (#1) until they barely exert pressure on the clutch tension spring; then gradually tighten these nuts against the tension spring until the minimum variation of stitch length from low to high speed has been achieved.

If the problem is a variation of stitch length at a given speed or failure to feed across normal seams, disassemble the clutch and check for signs of wear (#2, #3, #4).

The clutch discs (#4) or shoes should be replaced if there is any indication of a groove having been worn in the face by the action of the clutch rollers. Any grooving will prevent the rollers from achieving the desired holding action between the shoe and inside diameter of the clutch barrel, which will make it impossible to maintain stitch length. Usually, by the time the clutch discs or shoes show wear the springs have also lost some of their tension and should be replaced. Bear in mind that the heavy duty *Class 21700* puller clutches have removable shoes that can be reversed when wear occurs on the first side. Normally, by checking the clutch rollers with a micrometer it can be determined if there is any taper or wear across the width of the roller. If the diameter is the same at both ends of the roller and at several places around the circumference with no signs of corrosion or pitting, the clutch rollers are probably in acceptable condition.